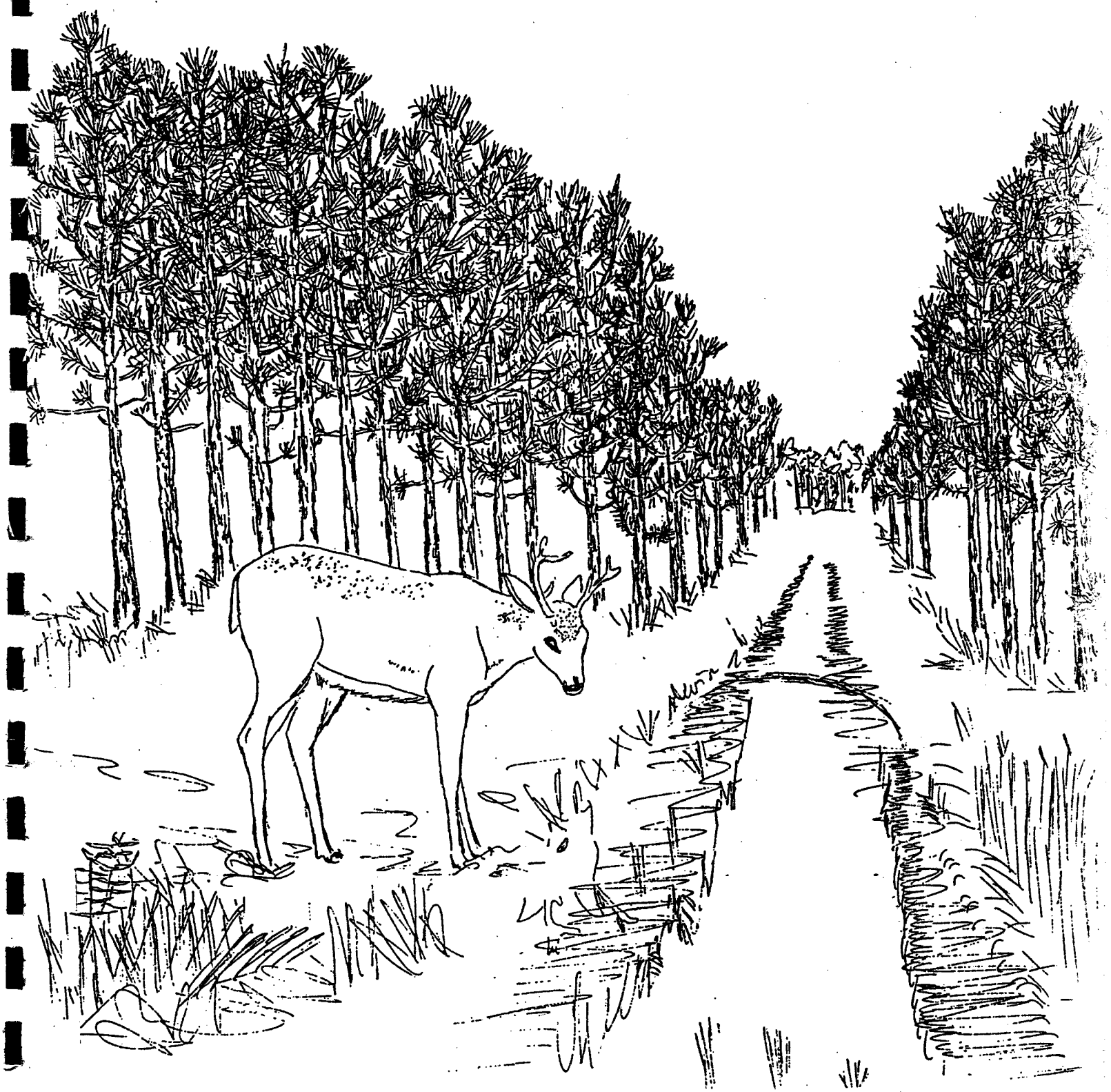
BROOKER CREEK PRESERVE

Management Plan
December, 1993



BROOKER CREEK PRESERVE
MANAGEMENT PLAN

prepared for

PINELLAS COUNTY DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

prepared by

Institute for Environmental Studies at the UNIVERSITY OF SOUTH FLORIDA

in association with

HDR Engineering, Inc.
Breuggemann & Associates
Laurie Macdonald, M. S., Zoologist
Florida Audubon Society
James Layne, Ph.D.
EHI, Inc.

December 1, 1993

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PINELLAS COUNTY: Tom Cuba, Will Davis, Craig Huegel, Jim Rolston, Jim Shinholzer, Jake Stowers, and Pick Talley.

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Cypress Woods Elementary: Bob Bouffard and Ted Leveroos.
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University of South Florida: Jo Aaron, Susan Hall, Rita St. Clair, Dr. Henry Mushinsky and Dean Rollin Richmond.

Cover design was done by Ms. Alma Coston of Dade City, Florida.

LIST OF CONTRIBUTORS

Dr. Judith Breuggemann, Breuggemann & Associates
Mr. Kevin Cook, Breuggemann & Associates
Dr. Patricia Dooris, USF Institute for Environmental Studies
Dr. Scott Emery, Environmental Health Integrated, Inc.
Dr. Bruce Hansen, USF Department of Biology
Dr. Herbert Kale, Florida Audubon Society
Dr. James Layne, Archbold Biological Research Station
Ms. Laurie Ann Macdonald, Zoologist
Dr. D. F. Martin, USF Institute for Environmental Studies
Mr. David Sumpter, HDR Engineering, Inc.
Mr. Barry Wharton, HDR Engineering, Inc.
Dr. Richard Wunderlin, USF Department of Biology

SUMMARY DESCRIPTION, PROPOSED FACILITIES, AND RECOMMENDATIONS

I. DESCRIPTION

Location of the Preserve--The Preserve occupies approximately 7100 acres in northeast Pinellas County (Please see Figure 1 for the location of all Sections and Townships referred to in this report). The Preserve's northern boundary is the Pasco County line; the eastern boundary is the Hillsborough County line; the southern boundary is the Florida Power Corporation's (FPC) electrical transmission line Right-Of-Way (ROW); the western boundary is very irregular and is composed of numerous property lines adjoining privately-owned land. There are several parcels of land within the boundaries of the Preserve which are not held by either the County or SWFWMD, including the two FPC ROW's which intersect in Section 36 (T27S/R16E) and some parcels of privately-owned land.

Goals and Mission of the Preserve--The Preserve has been established on behalf of the citizens of Pinellas County by the Board of County Commissioners to accomplish a variety of goals related to the preservation of the quality of life in the County. The primary Goals of the Preserve include: preserving the natural water resource benefits, particularly flood storage, now provided by the Brooker Creek floodplain; maintaining the natural groundwater recharge characteristics of northeast Pinellas County; protecting the watershed of Lake Tarpon; the conservation and restoration of habitat and wildlife native to the County and to west central Florida; providing an area to County residents which would be suitable for passive recreational activities; and developing a setting for learning about natural resources. The intent of these goals--the Mission of the Preserve--is to create the opportunity for County residents to experience, understand, and enjoy native Florida.

II. PROPOSED FACILITIES--Because the Preserve aims at providing access to and preservation of the representatives of native Florida habitats on site, it is recommended that buildings and other facilities be minimized. Facilities which are constructed should directly support the stated mission and goals of the Preserve. Even these, when constructed, should be as unobtrusive as possible. Care should be taken in the selection of the specific site for construction, in the materials chosen for construction, and in the landscaping surrounding the facilities. Before construction, the contractor should be made aware of the requirement to do as little damage as is practical to the construction area and to clean up the site thoroughly after the job is done. Appropriate language to that effect should be present in the plans and specifications for the facilities, and the contractor should be suitably instructed during the pre-construction conference. In addition, the County's construction inspection staff should include these two items on their inspection reports for later evaluation prior to the County's acceptance of the job. Co-ordination with FPC, the County Water Department, and SWFWMD will be necessary to bring the facilities into reality. Further, as discussed in the section on Funding Sources (below), monies should be sought from a variety of organizations in order to expedite the design and construction of the necessary facilities. The facilities proposed for the Preserve are:

1. ENTRANCE TO THE PRESERVE: The entrance to the Preserve is proposed off of the south side of Keystone Road in NW1/4 of Section 13 (T27S/R16E). The specific point proposed is at the location of an existing trail which leads south from Keystone Road.

2. ROADWAY TO THE ENVIRONMENTAL EDUCATION CENTER: The entrance roadway should be used to involve the visitor in the mission of the Preserve immediately upon entering the property rather than waiting until they arrive at the environmental education center. The roadway should follow the alignment of the existing trail.

3. ENVIRONMENTAL EDUCATION CENTER: The proposed location of the environmental education center is in the NW1/4 of Section 13 (T27S/R16E) on the approximately eight acres of old field on the hill bounded to the south by the east-west trending cypress strand. The center and its environs should continue the introduction of the visitor to native Florida which was begun on the entrance roadway.

The interior of the center would be constructed so as to introduce the visitor to the habitats located in the Preserve. A mural enhanced with planting is recommended for the center.

The center should also include: a classroom/meeting room; the biological field station with library and herbarium; storage rooms with shelves and cabinets; a preparation room; restrooms; outdoor classroom; a small theater; and a gift shop/book shop.

Outside of the center, landscaping should employ native plant materials and should promote water-saving plantings of native species. In planning the landscaping, no effort should be made to suggest a park or suburban setting.

Short walking trails should be constructed which lead the visitor away from the center, through nearby restoration sites, and back again. No overlook structures should be built as such a facility removes the visitor from a close experience with the Preserve.

A limited outdoor eating area should be provided in the form of natural backless benches rather than picnic tables.

3. BIOLOGICAL FIELD STATION: A building to accommodate researchers is recommended as part of the Environmental Education Center, and a dormitory is recommended in Section 2 (T27S/R16E). Research of an applied nature having direct benefits to the Preserve should be encouraged.

4. HIKING TRAIL: This trail could be built without cost to the County by the Florida Trail Association (FTA) following an agreement with the County and SWFWMD. The trail can begin on the existing vehicular trial in Section 13 (T27S/R16E) immediately to the SW of the environmental education center. At this point, the trail would proceed through the thin cypress strand at the existing crossing, proceed south across the old field, progress across Brooker Creek at the existing crossing, and continue south. At its exit from the Brooker Creek riverine forest, the trail can make use of existing vehicular trails as it makes its way to the south end of the Preserve, terminating at the picnic facility in Section 11 (T28S/R16E). There are sufficient existing trails on the property that no new trails need be cut for hiking purposes.

5. CONTROLLED GROUP CAMPING: Controlled group camping is a compatible land use for the Preserve, and it can be allowed in Section 2 (T27S/R16E) in the existing pine plantation. Facilities to accommodate groups will include potable running water, covered picnic shelter, trash barrels, and basic toilet facilities. Camping will be allowed by prior appointment only and for groups not exceeding 20 individuals.

6. SECURITY OFFICER'S RESIDENCE: A security officer's residence in Section

11 (T28S/R16E) to control access at the extreme southern end of the Preserve will be essential in reducing the environmental damage which is occurring presently.

7. ADDITIONAL FACILITIES IN SECTION 11 (T27S/R16E): A picnic area and one loop trail in the disturbed area of Section 11 would be beneficial to the city of Oldsmar and other residents to the south.

8. EQUESTRIAN FACILITIES: Riding trails should be constructed in Section 2 (T27S/R16E) to accommodate the equestrian community. The road into Section 2 will need improvement to allow the passage of horse trailers.

III. RECOMMENDATIONS--The development of the Preserve's facilities and programs will occur over a period of years, and there will always be changes and improvements which have to be made to the Preserve itself and to the Management Plan. Although we recognize that the Preserve represents a long-term commitment by the County and will provide long-term benefits to County residents, we believe that it is critical to accomplish certain essential tasks in a short time frame in order to maintain the momentum gained thus far in the project. Therefore, we recommend that four groups of activities be considered. Group 1 includes items needing to be done immediately (within the next three months) to address the needs of the Preserve. Group 2 includes items which will lay the foundation for the near-term development of the Preserve's facilities and programs; delay of these items will result in a slower project maturation, and these items should be accomplished within the next 12 months. Group 3 activities, those items which can be done within the next 24 months in order to maintain a reasonable rate of progress. Group 4 includes items which can be accomplished within three-five years.

A fifth group of items should be mentioned. These are items which will be on-going at the preserve, and they include: seeking funding for programs at the Preserve; fire management; liaison with the public and with other departments of the County; maintenance of Preserve facilities; research; exotic plant detection and control; and the development of education programs and materials.

The following recommendations include the most significant, listed according to the four groups above described, are abbreviated from various portions of the report.

<u>Group 1 Recommendations--Items to be done within three months</u>

1. **SECURITY:** Complete the immediate security measures for the Preserve.
2. **FRIENDS OF BROOKER CREEK:** Maintain public interest in the Preserve by formally establishing the Friends of Brooker Creek Preserve as a non-profit organization and by conducting evening programs about the Preserve in local churches and schools. This group will also be instrumental in developing a local funding base for the Preserve.
3. **PUBLIC ACCESS:** Begin to conduct occasional educational programs on the Preserve in the form of day field trips for specific groups. Develop and execute an agreement with FTA for the hiking trail in the south part of the Preserve. Also allow controlled equestrian use of the site.
4. **FUNDING:** Develop the final list of funding sources and prepare materials for the initial approach for funds. Acquire funding source data base.
5. **DESCRIPTION OF THE RESOURCES OF THE PRESERVE:** Continue the wildlife and plant survey through May, 1994 at a minimum; provide a report on the year's worth of data collected. The survey should include some sampling of aquatic systems in the Preserve and should be comprehensive enough to include a map of the areas infested with exotic

plant species. In particular, it will be essential to do the survey during this fall in order not to miss the fall-blooming species. Completing the survey is necessary to decisions regarding the immediate management of the Preserve.

Group 2 Recommendations--Items to be completed within 12 months

1. Prepare an annual update of the Management Plan.
2. Discontinue the practice of relocating animals on the Preserve.
3. Continue removal of trash eligible under the County's grant from the Florida Department of Environmental Protection.
4. Encourage research on the Preserve by making presentations at the University of South Florida and local colleges.
5. Prepare RFP's for engineering/architecture services to perform the design of all built facilities on the Preserve: the Environmental Education Center, the Biological Research Station, the picnic facilities and security officer's residence, the equestrian facility, and the controlled camping area in Section 2 (T27S/R16E).
6. Install signage at the future entrances to the Preserve; have ground breaking ceremony.
7. Begin the rehydration study of wetlands in Sections 13 and 14 (T27S/R16E) as part of the restoration program. This should be done in co-ordination with the Water Department which may provide funding for the work and associated monitoring. These wetlands should be done first, as they are part of the environmental education program.
8. Finish the less critical security measures.
9. Meet with FPC formally to advise them of the Plan, when approved, and explore ways in which the County and FPC can work together in the areas of restoration, fire management, and funding.
10. Provide copies of the Plan to: FPC; the Real Estate and Land Management Departments of SWFWMD; Pinellas County Real Estate, Water, and Engineering Departments; and Hillsborough County ELAPP.
11. Present the Plan to the Land and Resource Management Committee of the Governing Board of SWFWMD.
12. Provide copies of the Plant Survey and Animal Survey Reports to Florida Natural Areas Inventory, Florida Audubon Society, SWFWMD's Environmental Section.
13. Provide copies of the Executive Summary of the approved Plan to individuals and groups which have assisted in the surveys on the Preserve (Clearwater Audubon, Tampa Audubon, Florida Sierra, Florida Native Plant Society, members of the environmental education focus groups).
14. Initiate the prescribed burn program, beginning with the flatwoods having excessive fuel accumulation.
15. Prepare contract specifications for aerial mapping of the Preserve to obtain controlled aerial maps and photographs for use in presentations and in Preserve management.
16. Install needed culverts, fill ditches, and grade trails to restore hydrology.
17. Continue seeking funds for Preserve Programs.

Group 3 Recommendations-Items to be done within 24 months

1. Complete the design of the built facilities on the Preserve.

2. Prepare Invitations to Bid for the construction of the Environmental Education Center and Equestrian trails, award contracts, and initiate construction.
3. Grade spoil mounds in Section 11 (T28S/R16E) to ground level after first testing the material in the mounds for hazardous materials.
4. Initiate construction of the equestrian facilities in Section 2 (T27S/R16E).
5. Continue seeking funds for Preserve programs.
6. Initiate mural design competition.

Group 4 Recommendations-Items to be completed in three-five years

1. Complete the construction of the Environmental Education Center.
2. Issue Invitations to Bid for the construction of the other built facilities on the Preserve. Award contracts and complete construction within five years.
3. Begin mural execution following completion of Environmental Education Center.
4. Conduct an archeological and historical survey on the Preserve to identify and recover any significant cultural resources for cataloging and future display.
5. Join the Organization of Biological Field Stations.

I. INTRODUCTION

Location of the Preserve--The Preserve occupies approximately 7100 acres in northeast Pinellas County (*Please see Figure 1 for the location of all Sections and Townships referred to in this report*). The entire Preserve lies within Range 16E). Specifically, the Preserve occupies all or part of the following sections of land: Sections 1, 2, 11, 12, 13, 14, 23, 24, 25, 26, 35, and 36 of Township 27 South and Range 16 East (abbreviated T27S/R16E) and Sections 1, 2, 11, and 12 of Township 28 South and Range 16 East (T28S/R16E). The property includes 5346 acres owned by Pinellas County and 1,092 acres owned by the Southwest Florida Water Management District (SWFWMD). Also nominally included in the Preserve are the 654 leased acres in Pinellas County for the operation of the Eldridge-Wilde Wellfield.

The Preserve's northern boundary is the Pasco County line; the eastern boundary is the Hillsborough County line; the southern boundary is the Florida Power Corporation's (FPC) electrical transmission line Right-Of-Way (ROW); the western boundary is very irregular and is composed of numerous property lines adjoining privately-owned land. There are several parcels of land within the boundaries of the Preserve which are not held by either the County or SWFWMD, including the two FPC ROW's which intersect in Section 36 (T27S/R16E) and some parcels of privately-owned land.

Goals and Mission of the Preserve--The Preserve has been established on behalf of the citizens of Pinellas County by the Board of County Commissioners to accomplish a variety of goals related to the preservation of the quality of life in the County. The primary Goals of the Preserve include: preserving the natural water resource benefits, particularly flood storage, now provided by the Brooker Creek floodplain; maintaining the natural groundwater recharge characteristics of northeast Pinellas County; protecting the watershed of Lake Tarpon; the conservation and restoration of habitat and wildlife native to the County and to west central Florida; providing an area to County residents suitable for passive recreational activities; and developing a setting for learning about natural resources. The intent of these goals--the Mission of the Preserve--is to create the opportunity for County residents to experience, understand, and enjoy native Florida.

II. PHYSICAL DESCRIPTION OF THE PRESERVE

Drainage--The Brooker Creek Preserve encompasses portions of six hydrologic basins. About half of the Preserve (51%) falls within the upper Brooker Creek basin (Figure 2). To the north lies the Hollin Creek basin, which encompasses about 31% of the Preserve. A small parcel situated north of the abandoned SCL (now CSX) railroad tracks falls within the Duck Slough basin, which covers less than one percent of the Preserve. The southern one-third of the Preserve falls within the Double Branch basin, the Moccasin Creek basin, and the basin of an unnamed ditch whose waters eventually flow into Double Branch southeast of the Preserve. Brooker Creek and an unnamed tributary branch represent the only naturally channelized drainage features on the Preserve.

Brooker Creek runs approximately 15 miles and drains approximately 42 square miles of northeast Pinellas County and northwest Hillsborough County to the final outfall, Lake Tarpon. The stream heads seven miles east of the Preserve in the upland marshes, swamps, cypress domes, and lakes of northwest Hillsborough County. Brooker Creek meanders southwestward through sandhills, lakes, and marshy lowlands and empties into Lake Tarpon, representing 70% of that lake's watershed and approximately 47% of the lake's total inflow. For most of its length, the creek lacks naturally well-defined channels or tributaries. Topographic relief along its course is subdued, averaging around 3' per mile, but reaches as much as 7.5' per mile in the creek's sandhill-dominated upper reaches (Briley, Wild & Associates, 1978; Menke *et al.*, 1961; Wolfe and Drew, 1990).

Upstream from the Preserve, the hydrology of Brooker Creek has been modified by a series of man-made ditches in the upper watershed and water control structures at Lake Keystone and Island Ford Lake. Flow in Brooker Creek about 1.9 miles upstream from Lake Tarpon (about a half mile west of the Preserve) averages 21.2 ft^3/sec to no flow on a monthly basis (Wolfe and Drew, 1990). Flow is gaged from three stations upstream from the Preserve, and USGS has measured flows ranging between 0 and 1,600 ft^3/sec. (Briley, Wild & Associates, 1978). Average annual flow in the Creek has declined since 1961, primarily as a result of droughts and regional ground water withdrawals (Bartos, 1976; Bartos *et al.*, 1978; Briley, Wild & Associates, 1978).

Just prior to entering the Preserve (in Section 18 of T27S/R17E), Brooker Creek is channelized and has been disturbed by cattle grazing. After entering the Preserve, the creek is crossed by the FPC powerline corridor, where the creek's sheetflow characteristics and floodplain vegetation have been disrupted. After leaving the FPC ROW, Brooker Creek forms a very broad, natural channel for about 3,200 feet then flows out into a vast riverine swamp centered in Sections 13, 14, 23, and 24 (T27S/R16E). The creek's floodplain is relatively undisturbed here with the exception of (1) an unauthorized vehicular crossing located about 750' west of the western edge of FPC's ROW in Section 13 (T27S/R16E), (2) the levee-like configuration of Lora Lane in Sections 14 and 23 (T27S/R16E), and (3) the large ditch located along the northern section line of Section 23 (T27S/R16E). During periods of low flow, flow in this ditch appears to be greater than in the creek's natural channel. The ditch exits the Preserve and continues west for a quarter mile. At this point the water discharges to the southwest and eventually flows into a long, narrow stretch of the Brooker Creek riverine swamp parallelling East Lake road about a half mile west of the Preserve (Briley, Wild & Associates, 1978). Further ditching alongside the water transmission pipeline corridor following and extending south of Lora Lane, as well as along the FPC powerline corridors, undoubtedly has influenced local hydrology in the Preserve. There is also a small, unnamed branch which receives its headwaters from Lake Dan and neighboring swamps in Hillsborough County and flows south and southwest, entering the Preserve in Section 13 (T27S/R16E).

Flow in the Hollin Creek basin moves west and southwest through a series of swamps interconnected by drainage ditches and exits the Preserve at the northwest corner of Section 11 (T27S/16E), eventually discharging to Salt Lake immediately below the Anclote River confluence. In the Duck Slough basin, the water flows northward, exiting the Preserve at the northwest part of Section 2 (T27S/R16E), eventually flowing into the Anclote River.

Water in the Moccasin Creek and Double Branch basins at the Preserve's southern periphery moves southward as sheetflow through a series of swamps and marshes and discharges to upper Tampa Bay. The unnamed ditch basin directs waters from a short section east of the FPC powerline in Sections 25 and 36 (T27S/R17E) toward a north-south ditch about 1.3 miles east of the Preserve. This ditch crosses Racetrack Road and discharges to Double Branch Creek a mile east of the Florida Downs Racetrack.

Water Quality--There is little recent water quality data on Brooker Creek. In the lower reach of the Creek in the urbanized Tarpon Woods area west of the Preserve, the water quality is considered poor (FDER water quality index = 65) and does not meet its designated Class III use (Hand and Paulic, 1992).. The chief problem appears to be low levels of dissolved oxygen, attributed to impacts arising from agricultural practices, construction activity, urbanization, hydrologic modification, and septic tank leachate (Hand and Paulic, 1992). The upper Brooker Creek watershed is suspected of use impairment due to nonpoint pollution sources as evidenced by declining fisheries (Livingston et al. 1988). The best available study of water quality is the report by Bartos (1980) in which data were collected at nine stations on the Creek from Gunn Highway to East Lake Road. Unfortunately, no stations were located directly within the boundaries of the Preserve. At any rate, this study describes the Creek as having generally low dissolved oxygen concentrations, high color characteristics and nutrient concentrations which varies with stream discharge and site location. Bacteriological quality of water in the Creek was impaired somewhat at certain stations. The data are typical of the small streams in Florida and the southeastern United States which are characterized by intermittent flow and an urbanizing watershed. Data are insufficient to make definitive statements regarding the water quality of the Creek within the Preserve itself.

Topography--The Preserve falls within the Ocala Uplift physiographic district's Tampa Plain, a lowland characterized by karst features related to the occurrence of the Tampa Limestone (Brooks, 1981). Two subdivisions of the Tampa Plain occur on the Preserve. The Odessa Flats, which occurs north of a line tracking northwest from Keystone Road at the Preserve's east boundary to the northwest corner of Section 11 (T27S/R16E), is a poorly dissected low sand plain associated with the Anclote River watershed. In the Preserve, this subdivision is characterized by flatwoods and swamps, with low sandhills intermingling in the eastern half. Elevations here range between 15' and 40'+ above sea level and local relief is more pronounced. To the south lies the Lake Tarpon Basin, an erosional basin partially backfilled with late Pleistocene sediments. On the Preserve, this subdivision is dominated by flatwoods and extensive swamps, with a few, relatively small patches of sandhills in the northeast corner. Elevations range between 10' and 35' above sea level. The sandhills crosscut the eastern portions of both the Odessa Flats and the Lake Tarpon Basin and comprise a major portion of a small sandhill district which straddles the Pinellas-Hillsborough-Pasco county line and extends approximately three miles north-south by one to two miles east-west.

Geology and Soils-- The Preserve is underlain by a thick sequence of sedimentary rocks ranging in age from Eocene to Holocene (Table 1). The surficial deposits are composed of fine to medium-grained quartz sand containing minor amounts of clay and silt, Pleistocene to Holocene in age. These deposits, which are from 30' to 90' thick in the

Preserve area, form the surficial (water table) aquifer. This aquifer is separated from the underlying limestone-dominated Floridan aquifer by a thin (5'-20' thick) confining layer composed chiefly of clay, sandy clay, and silt. The lithologic units making up the Floridan aquifer exceed a thousand feet in thickness and range in age from the Eocene to Miocene (Geraghty and Miller, 1976; Briley, Wild & Associates, 1978). The most productive sections of the Floridan aquifer are the beds of the Suwannee Limestone and Tampa Limestone. The Eldridge-Wilde Wellfield north of Keystone Road taps the Floridan Aquifer for municipal supply purposes.

Table 1. Geologic and Hydrologic Units Underlying the Brooker Creek Preserve

Geologic Units				Hydrologic Units	
Age	Name	Thickness a/ (ft.)	Character of Material	Name	Water-Bearing Characteristics
Pleistocene and Holocene	Surficial deposits	0-100	Brown and gray fine sand; some gravel; clay and sandy clay	Water-Table Aquifer	Unconfined. Depth to water generally less than 10 feet. Yields 5 to 250 gpm. Quality generally fresh; salty near shoreline and estuaries.
Miocene	Tampa LS	0-100	White to cream, sandy limestone; fossiliferous	FLORIDAN AQUIFER	Contains water under artesian pressure; some wells flow. Recharged mainly by leakage from Water-Table Aquifer. Transmissivity ranges from low to high; yields range from several hundred gpm to 5,000 gpm; and specific capacities of wells range from 30 to 600 gpm/ft draw-down. Water quality ranges from fresh and moderately hard in inland areas to highly saline near the shoreline.
Oligocene	Suwannee LS	200-300	White, yellow, and brown fine grained limestone with chert lenses		
Eocene	Ocala GR	80-500	Yellow, gray brown, soft limestone, foraminifera		Upper part generally poor producer; lower part good producer.
	Avon Park LS	300-500	Cream to brown, soft limestone; some zones of hard, brown dolomite, some gypsum		Good water-bearing zone; water quality poor in places due to high chloride and sulfate content.
	Lake City LS	200-600			Good water-bearing zone; water quality generally poor due to high chloride and sulfate content.
	Oldsmar LS	—	Dolomite and limestone; chert; and gypsum		

The soils mantling the Preserve represent a diverse suite of mineral and organic soils derived from Pleistocene and Holocene periods (Figure 3). SCS has identified 18 soil types and miscellaneous land types across the Preserve (Table 2). About 56% of the soils are poorly drained flatwood soils, of which nearly three-quarters is Myakka fine sand. An estimated 38% of the soils are very poorly drained hydric soils which contain varying amounts of organic matter. Nearly 95% of the hydric soils is mapped as Astor soils, which provide substrate for the extensive Brooker Creek swamp system dominating the central portion of the Preserve. The xeric sandhill and scrubby flatwoods soils cover roughly six percent of the Preserve and consist of somewhat poorly to excessively drained soils, principally of the Astatula series. Also mapped are seven excavated farm ponds and one small area of "made land" (fill material).

Table 2. Soils of the Brooker Creek Preserve

Type	Code	Acreage	%
Adamsville fine sand	2	43.9	0.6
Astatula fine sand, 0 to 5 percent	3	17.1	0.2
Astatula fine sand, moderately deep water table	5	359.8	5.0
Astor fine sand	6	4.8	<0.1
Astor soils	7	2552.1	35.4
Charlotte fine sand	8	27.0	0.4
Elred fine sand	10	67.0	0.9
Felda fine sand, ponded	12	17.5	0.2
Immokalee fine sand	14	51.8	0.7
Made land	15	2.6	<0.1
Manatee loamy fine sand	17	20.1	0.3
Myakka fine sand	18	2924.7	40.6
Oldsmar fine sand	20	190.2	2.6
Pamlico muck	23	19.5	0.3
Placid fine sand	26	92.2	1.3
Pomello fine sand	27	13.8	0.2
Pompano fine sand	28	329.2	4.6
Pompano fine sand, ponded	29	406.9	5.6
Wabasso fine sand	43	33.1	0.5
Water	99	25.7	0.4

Man-made Features-- The area in which the Preserve is located has been used since approximately the late 1800's for a variety of purposes, and the Preserve itself remains the site of several man-made facilities. Early activity in the vicinity involved chiefly agricultural operations, including cattle production, citrus groves, and timbering. Later, the area became the location of public service activities requiring the construction of electrical transmission lines and municipal water supply facilities. Parts of the preserve have undergone some alteration for future residential development which did not materialize.

Three public roadways are located within the Preserve's general boundaries: Keystone Road (also called Tarpon Springs Road), an east-west roadway connecting northwest Hillsborough County with US 19 in Pinellas County; Old Keystone Road, a loop road off of Keystone Road; and Lora Lane, a roadway running south from Keystone Road which proceeds as a dirt road into the Preserve in Section 14 (T27S/R16E). Considerable low to moderate density residential development associated with these and other, secondary, access roads surrounds the Preserve

In the part of the Preserve north of Keystone Road are located several man-made features and facilities associated with various agricultural, developmental, and public service activities:

1. the Eldridge-Wilde Wellfield, in operation since 1955, and covering 654 acres leased by the County in Sections 1, 11, and 12 (T27S/R16E); this facility includes a pump station and other buildings, paved and dirt roads, production and monitor wells, and transmission main and secondary pipelines; the area is actively used for cattle grazing and citrus production;
2. a County alcohol treatment facility;
3. the remnants of a former development and range operation, located in Section 2 (T27S/R16E) and including excavated ponds, the remains of two buildings, and gravel and dirt trails;
4. FPC's electrical transmission line ROW which is approximately 300' wide in Sections 1 and 12 (T27S/R16E);
5. one recently abandoned railroad grade in the northwest quarter (NW1/4) of Section 2 (T27S/R16E) and one remnant abandoned railroad grade (possibly of historical interest) in NE1/4 of Section 12 (T27S/R16E) just west of the FPC ROW;
6. numerous barbed wire, smooth wire, hog wire, and chain link fences;
7. numerous dirt trails, ditches, and fire lanes;
8. a series of parallel swales in the NE1/4 of Section 2 (T27S/R16E).

In the part of the Preserve south of Keystone Road several man-made features and facilities are located:

1. the southern portion of the FPC ROW which extends through the northern part of the Preserve; the width of the ROW is approximately 300' except in the vicinity of the intersection with another FPC ROW coming in from the northwest where the ROW is about 500' wide;
2. a second FPC ROW which enters the preserve in Section 23 (T27S/R16E) and whose ROW is approximately 100' wide;
3. the ROW for the County's water transmission main which proceeds south along the Lora Lane corridor until turning in a southwesterly direction in the SW1/4 of Section 2 (T28S/R16E) and exiting the preserve;

4. an east-west trending FPC ROW in Sections 11 and 12 (T28S/R16E) whose ROW width is approximately 400';
5. spoil mounds in Section 11 (T28S/R16E), the largest of which may be partially composed of construction debris;
6. two residences located to the east of Lora Lane in Section 14 (T27S/R16E);
7. numerous monitor wells and formerly used production wells;
8. one small excavated pond in Section 1 (T27S/R16E);
9. numerous trails, ditches, and fire lanes; and
10. two trails associated with water pipelines in the SE1/4 of Section 12 (T28S/R16E).

III. BIOLOGICAL DESCRIPTION OF THE PRESERVE

A. HABITAT TYPES PROVIDED ON THE PRESERVE

Historical Communities--According to the original U.S. General Land Office survey records for Townships 27 and 28 South of Range 17 East, the Brooker Creek Preserve during the 1840s exhibited a complex vegetative mosaic of flatwoods, sandhills, and swamps (Florida Department of Environmental Protection, Division of State Lands, n.d.). Sandhill vegetation, consisting of longleaf pine and turkey oak prevailed in the northeast portion of the Preserve. The mapped occurrence of Adamsville, Astatula, and Pomello series soils approximates the spatial distribution of sandhill vegetation on the Preserve during pre-settlement days. What appear to be late successional remnants of the original sandhill community appear as xeric woods in the eastern portions of Sections 13 and 24 (see Figure [Land use/cover map], cover type 421 - xeric oak) and in Section 1 (T27S/R16E). Low, wet, pine flatwoods exhibiting a relatively open growth of longleaf and slash pines with a shrub layer of saw palmetto prevailed throughout the flatlands south and west of the sandhill areas. The swamps were of two general types - cypress swamps (presumably pond cypress dominated) and deeper cypress-swamp black gum swamps. The former were found scattered throughout much of the Preserve, while the latter appeared to be confined to the extensive swamp body centered in Sections 13, 14, 23, and 24. Along the periphery of these deeper swamps, mixed hydric to mesic trees (including elms and bays) were present. Brooker Creek itself, where it enters the Preserve at the lower east line of Section 13, was found to be an estimated 33 feet across and deep. A smaller branch tributary to Brooker Creek, simply described as a "small creek," was noted where it entered the Preserve about a half mile to the north. Another small, west-flowing branch, a part of the Anclote River drainage network, was observed exiting the Preserve at the northeast corner of Section 2. At the opposite end of the Preserve, another small creek, whose bed was dry at the time, was observed in Section 12 (T28S/R16E). What appears to be the same creek about one-third mile downstream was observed flowing southeast toward Double Branch. The Preserve north of Keystone Road has been altered substantially from pre-settlement times as a result of ground water withdrawals, cattle and citrus production, and facility construction. South of Keystone Road, the "core" of the Preserve is not dissimilar to its pre-settlement conditions. However, there are large areas which have been altered chiefly as a result of utility ROW's and cattle production. Past fire management practices also may have played a role in habitat alteration.

Existing Communities--The existing land use/land cover of the Preserve was recently mapped from 1990 1:24,000-scale color infrared aerial photography under a contract with the Southwest Florida Water Management District (Figure 5). Approximately two percent of the Preserve was

classified as urban, consisting mainly of open land, recreational, and low density residential (Table 3). About 16% is classified as agricultural, which is dominated by cropland/pastureland and other rural open lands. Rangeland, both shrub/brushland and mixed types, accounts for 6.4%. Nearly 30% of the Preserve is covered with forested uplands, of which pine flatwoods is the prevailing type, supplemented by smaller areas of mixed pine-hardwood forests, xeric oak forests (which represent late successional sandhill communities), and a remnant stand of sandhill longleaf pine-xeric oak. Open waterbodies are represented solely by a series of excavated ponds, which cover less than one percent of the Preserve. Forested wetlands, chiefly cypress swamps (which also includes wetland coniferous swamps), river/lake bottomland swamps, wetland hardwood swamps, and mixed coniferous-hardwood swamps, encompass an estimated 35.5% of the Preserve. The Preserve also features four non-forested wetland types (freshwater marshes, wet prairies, intermittent ponds, and aquatic vegetation), which together cover about 8.8%. of the property. The two FPC powerline corridors are classified under utilities and account for 2.1% of the Preserve. A small amount of disturbed (excavated and/or landfilled) lands is also present, located primarily in Section 11 (T28S/R16E).

Table 3. Land Use/Land Cover at the Brooker Creek Preserve

Type	Code	Acreage	%
Residential, Low Density	110	31.9	0.4
Residential, Medium Density	120	0.6	<0.1
Commercial and Services	140	4.8	<0.1
Institutional	170	18.4	0.3
Recreational	180	27.9	0.4
Open Land	190	65.9	0.9
Cropland and Pastureland	210	470.2	6.5
Tree Crops	220	2.5	<0.1
Other Open Lands (Rural)	260	699.2	9.6
Herbaceous	310	2.7	<0.1
Shrub and Brushland	320	389.8	5.4
Mixed Rangeland	330	71.9	1.0
Upland Coniferous Forests- (chiefly overgrown planted pine)	410	86.5	1.2
Pine Flatwoods	411	1742.8	24.0
Longleaf Pine - Xeric Oak	412	23.6	0.3
Xeric Oak	421	56.6	0.8
Mixed Coniferous/Hardwood	434	247.5	3.4
Reservoirs > 10 acres	533	0.4	<0.1
Reservoirs < 10 acres	534	4.5	<0.1
River/Lake Swamp	615	577.2	7.9
Cypress	621	1321.2	18.2
Wetland Forested Mixed	630	683.5	9.4
Freshwater Marsh	641	310.3	4.3
Wet Prairies	643	256.2	3.5
Aquatic Vegetation	644	1.1	<0.1
Intermittent Ponds	653	3.5	<0.1
Disturbed Land	740	3.4	<0.1
Utilities	830	150.6	2.1

Natural plant communities

Upland Coniferous Forests (Pine Plantation) (410) -- A pine forest artificially generated by planting seedling stock or seeds of slash pine (Pinus elliottii). These stands are characterized by high numbers of trees per acre and of uniform age. Pine flatwoods is the commonly utilized original community for pine plantations and the understory usually retains a moderate percentage of the original herbaceous and shrubby vegetation (see pine flatwoods). Where they exist on the Preserve, these trees should be harvested as appropriate and replaced with seedlings from the local area.

Pine Flatwoods (411) -- Typical pine flatwoods are characterized by an open canopy forest of widely spaced longleaf (Pinus palustris) and/or slash pine (Pinus elliottii) with an understory of herbs and shrubs dominated by saw palmetto (Serenoa repens). The community occurs on relatively flat, moderately to poorly drained terrain composed of acid sands generally overlying an organic hardpan or clayey subsoil. During the rainy seasons, water frequently stands at or on land's surface, briefly inundating the community. During the dry seasons, evapotranspiration rapidly removes moisture from the soil, and the soil becomes very dry. This places many plants under stress of water saturation during the wet season and under stress of dehydration during the dry season. Pine flatwoods are fire-maintained communities that require periodic burning every 4-8 years to maintain their integrity. Without frequent fires, pine flatwoods succeed into hardwood dominated forests whose closed canopy can essentially eliminate many of the ground cover herbs and shrubs. Additionally, the dense layer of litter that accumulates on unburned sites can eliminate the reproduction of pines. Mesic flatwoods are open or have a dense, nearly impenetrable understory of saw palmetto. Typical understory shrubs include: gallberry (Ilex glabra), staggerbush (Lyonia fruticosa), dahoon holly (Ilex cassine), dwarf huckleberry (Gaylussacia nana), blueberry (Vaccinium spp.), netted pawpaw (Asimina reticulata), and tarflower (Befaria racemosa). Typical herbs include wire grass (Aristida beyrichiana), bluestem (Andropogon spp.), goldenrod (Solidago spp.), Mohr's throughwort (Eupatorium mohrii), false hoarhound (Eupatorium rotundifolium), and orange milkwort (Polygala lutea). Mesic flatwoods grade into wet pine flatwoods which are characterized by a relatively open canopy of slash Pine with a sparse groundcover of hydrophytic herbs and shrubs. Typical shrubs include seedling sweetbay (Magnolia virginiana), wax myrtle (Myrica cerifera), and gallberry (Ilex glabra). Typical herbs include spikerush (Eleocharis spp.), beakrush (Rhynchospora spp.), St. John's-wort (Hypericum spp.), bloodroot (Lachnanthes caroliana), bog buttons (Lachnocaulon anceps), pipewort (Eriocaulon decangulare), and yellow-eyed grass (Xyris spp.).

Longleaf Pine - Xeric Oak (412) -- This forest type, also known as sandhill, is on deep, infertile sandy soils with the vegetation dominated by longleaf pine (Pinus palustris) and is distinguished from longleaf pine dominated flatwoods by the presence of a mid-story canopy of blue-jack oak (Quercus incana), turkey oak (Quercus laevis), sand live oak (Quercus geminata), and other dry-site tolerant oaks and hardwoods. The open shrub understory includes: shiny blueberry (Vaccinium myrsinites), Darrow's blueberry (Vaccinium darrowii), gopher-apple (Licania michauxii), Adam's needle (Yucca filamentosa), and beautyberry (Callicarpa americana). Typical herbs include: wiregrass (Aristida beyrichiana), sky-blue lupine (Lupinus diffusus), Michaux's snout-bean (Rhynchosia michauxii), yellow buttons

(Balduina angustifolia), Florida elephant's foot (Elephantopus elatus), eastern milk pea (Galactia regularis), and dwarf pawpaw (Asimina pygmaea).

Xeric Oak (421) -- This forest type is similar to and occupies the same sites as the longleaf pine - xeric oak except that the pines, if present, are not the dominant species. Longleaf pines may have been present in significant numbers prior to harvesting, but were never regenerated. Herbaceous and woody species common to this community were mentioned under longleaf pine - xeric oak.

Mixed coniferous/hardwood (434) -- This community type contains the same species as longleaf Pine - xeric oak, but is dominated by neither upland conifers nor hardwoods.

Reservoirs (533-534) -- Reservoirs are generally surrounded by emergent, herbaceous, aquatic vegetation such as cattails (Typha spp.), arrowhead (Sagittaria lancifolia), smartweed (Polygonum spp.), maidencane (Panicum hemitomon), water-willows (Ludwigia spp.), and rushes (Juncus spp.). Woody species include buttonbush (Cephalanthus occidentalis) and Carolina willow (Salix caroliniana). White waterlily (Nymphaea odorata) sometimes occurs rooted in deeper water. Floating vegetation includes mosquito fern (Azolla caroliniana), water spangles (Salvinia minima), and duckweed (Lemna spp.).

River/Lake Swamp (615) -- Also referred to as bottomland hardwood forests, this community is composed of a wide variety of predominantly hardwood species of which the more common are southern red maple (Acer rubrum), Carolina willow (Salix caroliniana), buttonbush (Cephalanthus occidentalis), laurel oak (Quercus laurifolia), pond cypress (Taxodium ascendens), swamp dogwood (Cornus foemina) American elm (Ulmus americana), and swamp black gum (Nyssa sylvatica var. biflora). Herbaceous vegetation includes a wide variety of hydrophytes: grass-leaf arrowhead (Sagittaria graminea), lizard's-tail (Saururus cernuus), climbing aster (Aster carolinianus), false nettle (Boehmeria cylindrica), royal fern (Osmunda regalis), cinnamon fern (Osmunda cinnamomea), and toothed mid-sorus fern (Blechnum serrulatum).

Cypress (621) -- The dominant in this community is pond cypress (Taxodium ascendens) which is often associated with swamp black gum (Nyssa sylvatica var. biflora), southern red maple (Acer rubrum), laurel oak (Quercus laurifolia), and dahoon holly (Ilex cassine). Understory shrubs include fetterbush (Lyonia lucida), Virginia willow (Itea virginica), and buttonbush (Cephalanthus occidentalis). The herbaceous understory usually includes a variety of ferns such as royal fern (Osmunda regalis), cinnamon fern (Osmunda cinnamomea), netted chain fern (Woodwardia areolata), Virginia chain fern (Woodwardia virginica), and toothed mid-sorus fern (Blechnum serrulatum). Other common herbaceous species are water hoarhound (Lycopus rubellus), alligator-flag (Thalia geniculata), golden-flag (Canna flaccida), and false nettle (Boehmeria cylindrica). Endangered and threatened epiphytes are common in cypress swamps. These include butterfly orchid (Encyclia tampensis), air plant (Tillandsia fasciculata), wild pine (Tillandsia simulata), and spreading air plant (Tillandsia utriculata)

Wetland Forested mixed (630) -- This community includes mixed wetlands forested communities in which neither hardwoods nor conifers are dominant. The species occurring

here are a mixture of those occurring in river/lake and cypress swamps.

Freshwater Marsh (641) -- This community is characterized by the dominance of herbaceous species often in monospecific populations, although a few woody species may occur near the edge or as isolated individuals or colonies. The characteristic herbaceous species include sawgrass (Cladium jamaicensis), cattails (Typha spp.), common arrowhead (Sagittaria lancifolia), alligator-flag (Thalia geniculata), and golden flag (Canna flacida).

Wet Prairies (643) -- This community is composed of predominantly grassy vegetation and is distinguished from marshes by having less water and shorter herbage. These communities are dominated by one or more of the following species: maidencane (Panicum hemitomon), beakrush (Rhynchospora spp.), St. John's-wort (Hypericum spp.), yellow-eyed grass (Xyris spp.), bloodroot (Lachnanthes caroliana), branched water-hyssop (Gratiola ramosa), blue water-hyssop (Bacopa caroliniana), umbrella sedge (Fuirena spp.), torpedograss (Panicum repens), flatsedge (Cyperus spp.), and buttonweed (Diodia virginiana).

Aquatic Vegetation (644) -- This community includes floating, emergent, or submergent vegetation. Common species include: duckweeds (Lemna spp.), mosquito fern (Azolla caroliniana), water spangles (Salvinia minima), parrot's-feather (Myriophyllum aquaticum), and white waterlily (Nymphaea odorata).

Intermittent Ponds (653) -- This community, also referred to as a seasonal pond, is defined as a waterbody which exists for only a portion of the year. It relies upon water received directly from precipitation. It is often a monoculture of an herbaceous species. Common species are parrot's-feather (Myriophyllum aquaticum), and branched water-hyssop (Gratiola ramosa).

Disturbed Lands (740) -- Disturbed lands are those areas which have been changed due to human activity. These contain a variety of native or non-native weedy species: dog fennel (Eupatorium capillifolium), common ragweed (Ambrosia artemisiifolia), groundsel tree (Baccharis halimifolia), beggar-ticks (Bidens alba), hairy indigo (Indigofera hirsuta), and white sweet-clover (Melilotus albus).

Utilities (830) -- Construction along utility ROW's such as those for electrical power or water supply lines initially creates a disturbed situation which may return to a more or less natural plant community depending on the amount of usage and maintenance performed. The space beneath power lines usually resembles wet prairies, intermittent ponds, or freshwater marshes and contains many of the same species found in these habitats. Woody vegetation is usually kept to a minimum due to frequent use of herbicides. Because of the need to maintain the utilities, there is usually a system of roadways with a variety of weedy species bordering it.

Plant Species Survey and Lists -- Ten two-man field days were spent in surveying and 108 species lists were generated resulting in 510 species being recorded as occurring on the property (see Appendix B for details concerning the plant survey and Table 1, Appendix B, for plant species lists). Of these, 362 (about 71%) of the species have been vouchered with

the specimens deposited in the University of South Florida Herbarium.

Endangered and Potentially Endangered Plant Species -- Eighty-three endangered or potentially endangered species are expected at Brooker Creek Preserve (see Table 2, Appendix B). Of these the occurrence of 20 species have been verified. Fifteen species are considered as threatened (T) and five species as commercially exploited (CE) by the Florida Department of Agriculture. None are listed by the United States Fish and Wildlife Service (USFWS).

Exotic Plants -- A very low percentage (about 11%) of the species recorded are non-native species (see Table 1, Appendix B). These occur primarily along roadways, powerline right-of-ways, and highly disturbed sites at the northernmost (primarily in or near the well field) and southernmost ends. Most species are widespread, weedy, and relatively non-invasive species, but potentially serious exotics include: Sprenger's asparagus fern (Asparagus densiflorus), paper mulberry (Broussonetia papyrifera), Australian pine (Casuarina equisetifolia), Chinese tallow tree (Sapium sebiferum), wild taro (Colocasia esculenta), air potato (Dioscorea bulbifera), earpod tree (Enterolobium contortisiliquum), cogongrass (Imperata cylindrica), leadtree (Leucaena leucocephala), punk tree (Melaleuca quniquenervia), latex plant (Morrenia odorata), parrot's-feather (Myriophyllum aquaticum), and Brazilian pepper (Schinus terebinthifolius). An area of special concern is Section 11, NW quarter, which is a highly disturbed fill area with Australian pine, leadtree, ear tree, and air potato. The extremely invasive stink vine (Paederia foetida) was not observed during this survey.

Habitat Quality -- Habitat quality was determined by means of qualitative comparisons with undisturbed off-site representatives of the same habitats as those present on site. Several specific criteria were used to make these comparisons, with the overriding considerations being the (1) ability of the Preserve habitat to support expected wildlife species and (2) degree of similarity of the Preserve habitat with the undisturbed off-site habitat. The specific criteria which were used when assessing habitat quality are listed in Table 4.

Table 4. Habitat quality criteria.

CRITERION	WETLANDS	UPLANDS
1. evidence of normal hydroperiods	X	
2. presence of atypical plant species	X	X
3. evidence of physical disturbances	X	X
4. evidence of atypical fire patterns	X	X
5. presence of basin subsidence	X	
6. presence of excessive fallen trees	X	X
7. evidence of normal animal activity	X	X

Wetlands: The wetlands on the Preserve generally fall into three categories relative to their habitat quality. The first category includes those wetlands which have undergone long-term desiccation as a probable result of local water table decline. These wetlands are most prevalent in the area north of Keystone Road and, to a lesser degree, immediately south of Keystone Road in Sections 13 and 14 (T27S/R16E). The second category involves wetlands which have been physically disturbed and/or burned. This category includes: parts of the Brooker Creek riverine forest, particularly that stretch east of the (SE1/4) of Section 13 (T27S/R16E) and the stretch affected by the construction of Lora Lane and the large drainage ditch in Sections 14 and 23 (T27S/R16E); certain wetlands located south of the Brooker Creek floodplain itself, particularly in the SW1/4 of Section 2, (T27S/R16E) and the S1/2 of Section 11 (T28S/R16E); wetlands which have been cut by the electrical transmission line and water transmission pipeline ROW's; and several wetlands located in Section 2 (T27S/R16E). The third category includes wetlands which are relatively undisturbed and are excellent examples of healthy systems. This category includes the remainder of the Brooker Creek riverine forest and the other wetlands south of the Brooker Creek floodplain.

Wetlands in the first category, as a result of an absence of water, have become unsuitable for the wetland-dependent animal species which would be expected to be present in these systems. Other species of wetland-independent wildlife can be found in these communities, but populations are likely very sparse. Therefore, the habitat quality and the contribution of the wetlands in the first category to the wildlife value of the Preserve as a whole is very low.

The wetlands in the second category still function in providing habitat for wetland-dependent wildlife species, but their habitat quality is impaired as a result of alteration and fragmentation by trails and ROW's. Vehicular traffic through many wetlands, including the marshes along the north-south electrical ROW, is a significant problem in the wetlands in the Preserve. The problem becomes worse when wetlands do not have standing water, and access by vehicles is easier. Some of these communities could be restored by removing the cause of the disturbance [eg., the trail across the channel of Brooker Creek in Section 13 (T27S/R16E)]; other communities must remain at least somewhat impaired because of the permanent nature of the disturbance (eg., utility ROW's).

Wetlands in the third category are outstanding in their ability to provide habitat for native wildlife species. These wetlands remain virtually undisturbed, and they supply large contiguous areas for wildlife activity. Also, they are associated with upland communities which further enhances the wetlands' habitat value.

Uplands: The Preserve has long been used as an area for unauthorized trash dumping and off-road activities. The result has been the accumulation of garbage, primarily in the uplands, and vehicular damage to upland communities on the site (Figure 4). Virtually all of the xeric communities and the pine flatwoods have collections of trash which include items such as: tires, shingles, aluminum cans, appliances, miscellaneous wood, concrete rubble, car parts, bathroom fixtures, mattresses, corrugated metal roofing and culverts, shoes, and assorted plastic and metal containers. Most of the trash occurs in small collections scattered over the Preserve, but there are three areas of larger accumulations. The first area

is located in the extreme northeast portion of the Preserve south of Keystone Road in Section 13 (T27S/R16E) where large numbers of tires and old appliances have been discarded. The second area is located in the extreme northwest portion of the Preserve north of Keystone Road in Section 2 (T27S/R16E) where the remnants of two buildings have resulted in piles of concrete, metal, and other construction-related materials. The third area is located just north of the trail across the Brooker Creek channel in Section 13 (T27S/R16E). The accumulation of trash is not an irreversible impairment of habitat quality; however, the trash that is present throughout the Preserve does detract from the land's aesthetic character and could pose a safety hazard to future users of the Preserve.

Unauthorized off-road vehicular traffic is a problem primarily in the wetlands; nevertheless, there are several areas of uplands which have been affected by this activity. These areas include the large xeric community along the eastern boundary of Section 24 (T27S/R16E) and virtually all of the flatwoods in Section 11 (T28S/R16E).

B. ANIMAL SPECIES PRESENT ON THE PRESERVE

Background–The following is abbreviated from the Wildlife Surveys located in Appendix C. Detailed description of the areas surveyed, the survey methodologies, and the data collected are provided in Appendix C.

The goal of the wildlife surveys was to compile baseline faunal composition/habitat utilization data essential to the development of the Brooker Creek Preserve Management Plan. The survey depended upon a combination of literature review, range and habitat requirement data, and extensive field sampling and observations to provide the best description of wildlife resources on the Preserve.

Procedure

1. Identify species that potentially occur on the Preserve based on specific species' range information and site characteristics.

2. Conduct habitat specific surveys in all major habitat types represented on site while emphasizing survey work in habitat types that have not been previously studied. Compare results to predicted species.

3. Refine survey methodologies to identify listed species presence/absence.

4. Conduct initial surveys that may be used as a baseline for all future surveys. (ie.; surveys designed to measure and track the success of any restoration efforts) Therefore, use methods that are replicable and offer an opportunity for comparative studies throughout the management process.

5. Based upon consideration of survey findings and site wildlife habitat evaluations, develop management recommendations to restore, enhance, and maintain wildlife habitats on the Preserve.

6. Establish a Geographic Information System (GIS) database with all relevant findings so that information can be queried by species, habitat, location, season of occurrence, and protected status.

7. Archive all field notes, survey data, (etc.) by appropriate means so that it will be available for future analyses.

Literature review revealed that no survey work has been conducted in the xeric habitats on site. Additionally, most of the listed species of mammals and herpetofauna that may potentially occur on site are most likely to occur in native xeric plant communities. Therefore, surveys for mammals, reptiles, and amphibians were emphasized in xeric habitat types and were specifically designed to capture listed species in this habitat. Small mammal and herpetofaunal trapping was conducted for atleast four days in all major habitat types on site.

Results

Species Expected and/or Observed--Based upon review of known geographic ranges, specific distributional records, and habitat requirements, 159 species of birds, 22 species of amphibians, 52 species of reptiles, and 41 species of mammals potentially occur on the Brooker Creek Preserve (Table C-1, C-2, C-3; located at the end of the narrative in Appendix C). This does not include bird species that migrate through the area. A total of 143 species of wildlife were documented on the Brooker Creek Preserve during the study period. Fourteen additional species were recorded during previous survey efforts (1 species: Breeding Bird Atlas; 13 species GFC Survey). Of the total animals that potentially utilize the Preserve, this survey and others have documented 86% of the amphibian species, 56% of reptiles, 79% of the birds, and 43% of the mammals (Table C-6).

Voucher specimens were only collected when an individual was found dead. The specimens collected have been preserved and are currently being stored in the University of South Florida Biology Department.

Listed Species--Nineteen species protected by either the U.S. Fish and Wildlife Service or the Florida Game and Fresh Water Fish Commission potentially utilize the Preserve. Seven of the 10 species of listed birds that utilize habitat types represented on the Preserve were observed documented. These are the Little Blue Heron, Snowy Egret, White Ibis, Tricolored Heron, Wood Stork, Southeastern American Kestrel, and Sandhill Crane. Additionally, there is a Southern Bald Eagle nest approximately 1 mile west of the Preserve on Lake Tarpon. Two of the 6 predicted species of listed herpetofauna were documented: the American Alligator and Gopher Tortoise. Two of the 3 predicted species of mammals were observed: the Sherman's Fox Squirrel and Florida Mouse. The Gopher Frog, the only listed amphibian likely to occur on site, was not documented.

Two species which are candidates for federal listing have been observed on the Preserve: the Bachman's Sparrow and the Osprey.

Introduced Species--Several non-indigenous species have been observed on the Preserve. These include: giant toad (Bufo marinus) (Huegel, 1993. pers. comm.) domestic dogs and

cats, and European starlings. At this point, none of these species appears to pose problems to native species, and no control or removal program is recommended. In time, however, as the surrounding area becomes more urbanized, domestic cats and dogs may cause depredation on several native species of bird and small mammals, and other introduced species may become established on the Preserve as pets are released or escape from their owners. Therefore, it will be necessary to undertake an on-going program of observation for the presence of non-indigenous species and to enlist the assistance of the Preserve's residential neighbors in excluding exotic species from the preserve's boundaries.

The feral hog, as already mentioned, is present on the Preserve and is not causing serious habitat disturbance at this time. That situation may change in the future, and measures to reduce the hog population may be necessary. Hog removal via trapping can be arranged with the Hog Hunters Association and should be co-ordinated with the Florida Game and Fresh Water Fish Commission when the need arises.

The impact of exotic species on native Florida habitats is a subject which should be included in the environmental education program for the Preserve. Assisting the public in understanding the damaging effect of exotic species will ultimately benefit the Preserve Manager in keeping this problem to a minimum, and it will provide still another mechanism to involve the public in the Preserve.

Recommendations and Management Implications--Recommendations on wildlife habitat management are based on the results of these surveys and habitat evaluations (Table C-4). The Management Plan delineates methods to enhance specific habitat requirements of target species. Known and potential wildlife populations were considered in the recommended prescribed burn guidelines, site selection for the Nature Center, identifying areas (and opportunities) for continued research and limited public access, and identifying areas where public access is compatible.

1. A majority of the listed bird species rely on the marsh systems and open water areas that are predominantly located within the Florida Power easements. Florida Power has expressed a willingness to work with the County and should be consulted/instructed on how to best to restore and manage these areas. Site security is also essential to reduce "mud-bogging" activities in potential nesting and/or foraging habitat for species including King Rails, American Bitterns, Common Moorhens, Herons, and Egrets. Other measures that would reduce disturbance to the marsh are the selection and maintenance of one access road per easement. This is currently difficult because under various wet and dry conditions, portions of the roadway are impassable. Perhaps if Brooker Creek and other watercourse crossings were culverted, powerline and security traffic would restrict travel to this roadway. Cattail monocultures should be discouraged and a diverse emergent habitat should be promoted.

2. Soil surveys indicate that portions of the north/south Florida Powerline easement were historically xeric habitat. Through coordination with Florida Power, methodologies need to be developed to restore these areas without the use of fire. This may initially involve discing and mechanical removal of exotics.

3. Southeastern Kestrel were observed during the study. Kestrels naturally use woodpecker holes for nests. Efforts to retain isolated pines and snags in open areas

would benefit kestrel populations. Nest boxes may also increase the kestrel population. Optimal areas to place nest boxes are along the powerline, particularly to the north and adjacent to the sandhills, and in the old field. Nest boxes should be spaced at least 0.5-km apart, the average distance recorded between kestrel nest sites in Florida. Nest boxes should be placed 4 to 5 meters off the ground. A 1-m wide strip of sheet metal around the pole below the box to deter climbing predators. Boxes should be oriented to the south or east to allow warming in the morning but not overheating in the afternoon (Wood et al. 1991). Dimensions and a construction plan for kestrel nest boxes is presented in Foran (et al. 1984).

4. Wood Duck boxes may be positioned adjacent to the large marsh area north of the power station and the perennial water north of Tarpon Springs Road. Dimensions for these nests are presented in Cerulean (et al. 1989; Figure C-4).

5. Bluebird Boxes may be positioned along the edges of old fields and power lines (Cerulean et al. 1989; Figure C-4).

6. The remaining sandhill areas should be managed as optimal habitat for gopher tortoise (Cox, 1987). Therefore the canopy densities should be maintained at less than 25% coverage, and burned in the early summer to enhance the growth of wire grass. These areas should be burned frequently (2 - 5 yrs.) with variation in frequency determined by the responses of the habitat to fire.

7. The old field habitats predominantly located north of Brooker Creek and the wetland habitats that have been de-watered are in need of restoration. One habitat type is critical to the other. The soil types in the old field indicate that a large portion could be restored as sandhill (Astatula soils) and another portion as pine flatwoods (Myakka soils). This could be accomplished through frequent burning or removal of the topsoil and planting of native grasses. By removing the exotic bahia grass and replacing it with a native panicum, the community should gradually succeed into a native xeric community (Dennis Thompson, SCS, pers. comm.). Alternately, by burning back the bahia grass, which is not well adapted to fire, the native herbs may re-establish dominance (J. Layne, Archbold Biological Station, pers. comm.). Early growing season burns enhance the growth of native fire-dependent grasses. By increasing the xeric habitat on site, optimal tortoise habitat and potential burrow associate habitat is increased. This effort offers a good opportunity for research. Floral and faunal surveys throughout the restoration process may contribute to an understanding of these communities and succession.

8. Since hydrologic variation exists within the Preserve's pine flatwood sites, it is likely that under natural conditions, these communities burned at variable frequencies. To sustain this natural diversity, the higher, drier, flatwoods which are more susceptible to fire should be burned more frequently (3-7 years). These conditions are optimal for Sherman's Fox Squirrel, Bachman's Sparrow, and Brown-headed Nuthatch. The hydric flatwoods located within a zone adjacent to the Creek should be burned on a less frequent regime as conditions allow (see burn plan). This habitat is optimal for the Wood Rat, Red-eyed Vireo, and Yellow-throated Warbler. This will maintain the

natural diversity of the flatwood communities represented on site. Species richness is directly proportional to habitat diversity.

9. If there is historical evidence that a given species occurred on site, or it is reasonable to assume upon thorough evaluation of range and species needs that a species occurred on site, and the species is judged to no longer exist on site, than restocking may be considered. The judgement that a species existed on site and no longer exists can only be made after species-specific evaluation for more than one year. Restocking should only be considered for reptiles and amphibians. Further discussion on the subject of re-introduction may be found in the Re-introduction section of this report.

10. Public access should be discouraged in the sandhill areas and in any active restoration/management efforts.

11. An optimal site for the Nature Center would be just north of Brooker Creek along the southern edge of the old field. By positioning the Center in this area, no natural plant communities would need to be displaced.

12. Only limited public access and active restoration/management efforts should be allowed in the sandhill areas.

13. Keystone Road divides the Preserve into two main areas, with the better habitat conditions located to the south of the road. The road may act as a barrier to wildlife movement and/or it may become a source of wildlife mortality as traffic increases in the area. It can be expected that, at some point in the future, Keystone Road may be improved or replaced to increase its capacity to handle additional traffic volume. Should the existing roadway be replace with a four-lane facility or a two-lane facility with wider travel lanes and shoulders, Keystone Road would constitute a greater barrier to wildlife movement. Presently, there are no site-specific data on road-killed wildlife on Keystone Road or on any road in the vicinity of the Preserve. Therefore, it is recommended that a wildlife survey be conducted on Keystone Road for the purpose of assessing the road's role as a barrier to wildlife movement and as a cause of wildlife mortality. The data from this study would then be available for future decisions regarding possible wildlife crossings in the existing roadway or in the design of future roadways in the present alignment of Keystone Road.

Opportunities for further research--Wildlife-related research opportunities are discussed in Appendix C.

C. MAPPING OF THE PRESERVE

ArcInfo map/database files on existing land use/land cover, soils, drainage basins, and topography were acquired from the GIS section of the Southwest Florida Water Management District. These files were processed on pcarcinfo and ArcCAD, the two geographic information systems programs which were used collaterally throughout this phase of the project. pcarcinfo and ArcCAD feature a relational database program which facilitates collection, organization, and quantification of the various natural and cultural

resources present on the Preserve. The tables and maps on drainage and topography, soils, land use/land cover, among others, were generated using these programs. In addition, to aid in the identification of wildlife species/habitat relationships, wildlife survey data collected during the project is being assembled into a database file (in dBASE III+ format) and interrelated with the vegetative cover information contained in the land use/land cover and other natural resource related ArcInfo map/database files. A future task which would be helpful is to generate the per cent cover of the various habitat types within each burn unit on the fire management map (Figure 6).

The digital GIS files generated during this project will be supplied to the County. However, because of recent occurrences within the company which manufactures and supports the County's GIS, Geovision, it is recommended that the files not be converted from pcArcInfo to Geovision at this time.

The aerial mapping available for the Preserve is of limited usefulness due to age in one case and the absence of topographic information in another case. Therefore, it is recommended that the County have the Preserve flown in order to produce (1) good quality 1"=200' aerial maps and (2) 1"=1000' true color aerial photographs and controlled mapping. These maps and photographs will be essential to the Preserve Manager in implementing controlled burns, in planning facilities, and in making presentations to the Board of County Commissioners and the public. It is also recommended that ordinary color slides and video tape of the Preserve be taken from the air to provide additional material for presentations and for future use in the Environmental Education Center.

IV. PUBLIC CO-ORDINATION

Public co-ordination has consisted of public meetings held on May 25 and October 26, 1993, presentation to the Board of County Commissioners, and numerous conversations and field trips with interested individuals. The first public meeting was held to inform interested parties that the management plan was being developed and to solicit comments as to the content of the plan. At the meeting, the degree of interest in the Preserve was gauged in three ways: verbal comments during the question and answer portion of the meeting; written comments on a comment form provided for the purpose; and written responses on a questionnaire. The range of comments received by these means are tabulated in Appendix D in the rear of this document.

In general, of those responding, there was considerable support for the following activities, which are listed in order of decreasing support: research, nature trails, volunteer groups, horseback riding, environmental education, hiking, and primitive camping. Of those responding, many individuals indicated that they would participate in the following activities, listed in order of decreasing participation: nature trails, hiking and primitive camping, horseback riding, volunteer groups, environmental education, and research. When asked whether specific educational or information resources should be provided on the Preserve, many indicated "Yes" to the following activities, listed in decreasing order of interest: unguided nature trials, display areas of wildlife, guided nature tours, a Preserve learning center, and classes on plants and animals of the Preserve.

Of the written comments provided on the comment sheets, most comments requested that the area be left as it is for wildlife and that horseback riding be allowed on the Preserve.

At the second public meeting, attendees were informed as to the programs and facilities

proposed for the Preserve. Many comments were supportive, and suggestions were received which were incorporated into the final management plan.

From a subjective gauging of public response, it is clear that there is substantial interest in the Preserve and in a variety of activities compatible with the mission of the Preserve.

As already mentioned, there is considerable interest in the Preserve on the part of the public which has been generated during this project. It will be important to maintain this level of interest in order to garner continued public support of the Preserve and its mission.

V. MANAGEMENT PLAN

A. GOAL OF THE PLAN--The Plan was designed to provide a framework to guide the early development of the Preserve. It is anticipated that the Plan will be revised periodically as the issues identified in these beginning stages of the project are addressed, as facilities come into being, and as the recreational, educational, research, and public involvement programs mature.

B. MANAGEMENT PRACTICES

Security-Unauthorized vehicular use of the Preserve continues to be a major problem. Eventually, the entire tract will have to be secured from vehicular access in some way; however, there are some areas which need immediate attention. Those areas are:

1. The southern boundary of the Preserve, particularly in Section 11 (T28S/R16E) where access from a paved road is available. The placement of vertical pipes buried in the ground and protruding 3-4 feet may prevent vehicular access without impeding wildlife movements. In addition to preventing access from the paved road, access to the ROW from the flatwoods must be blocked as well. Co-ordination with Florida Power Corporation in this area will be essential. A security or wildlife officer's residence at the south end of the Preserve in Section 11 is recommended to reduce unauthorized entry.

2. The unfenced boundary of the Preserve adjacent to the south side of Keystone Road. Here, access from Keystone Road is easy. Once inside the Preserve at that point, trespassers can proceed to the FPC ROW. Upright pipes buried in the ground or a chain link fence is needed here.

3. The gates along the water transmission main in Section 35 (T27S/R16E) and Section 2 (T28S/R16E). These gates need repair and locks. Vehicle access is very easy.

4. The old railroad grade in Section 2 (T27S/R16E). This a temporary, but long-term, problem due to the use of the grade as a haul road for the construction activity north of the Preserve. In the future, the Bi-county expressway will be constructed, eliminating this access. In the meantime, vehicle access into the Preserve is easy. During the construction, a permanently locked fence can be used during off-hours. During work hours, a checkpoint at the intersection of the haul road an the East Lake Road

extension would provide the needed security. Co-ordination with the developer, Gireh, Inc., would be required to accomplish either of those security measures.

5. Access from the northwest from East Lake Road along the FPC ROW. Fences at East Lake Road require improvement, and a fence at the Preserve boundary should be constructed.

6. Access from Race Track Road to the FPC ROW. Here, access is easy from a paved road. The gate should be kept locked. Co-ordination with FPC will be necessary.

7. Access from Nine Eagles Golf Course. This area sometimes provide vehicular access, depending upon the condition of the barrier. A secure barrier without a gate should be installed.

As mentioned above, the chief security problem involves unauthorized access by vehicles. However, the Preserve is open to foot and horse traffic at many other points which would have to be curtailed if total security is desired. In general, this problem is not of sufficient magnitude to warrant an effort toward total security at this time. Eventually, it will be desirable to limit foot traffic to a few access points, primarily for safety reasons, and a perimeter fence will be needed. Currently, areas particularly susceptible to foot traffic include: the SW1/4 of Section 2 (T28S/R16E); the eastern boundary of the Preserve in Sections 13 and 24 (T27S/R16E); from Lora Lane; through the gate in the Ridgemoor subdivision; over the cable gate at the FPC ROW at Keystone Road; and all of the points noted above in the discussion on vehicular access.

Trash Removal--The Preserve has a number of small to large trash dumps within its boundaries (Figure 4 in Appendix A). Trash removal task has been initiated by enlisting the assistance of the County Mosquito Control Department in removing tires from Section 13 (T27S/R16E), and other debris capable of harboring mosquitos. The work is being done through a grant from the Florida Department of Environmental Protection. Other trash should be removed on a time-available basis, beginning with Sections 13 and 24 (T27S/R16E). Those areas are recommended as first priority because of the potential for the construction of facilities and trails in those sections. From our survey, the trash present on the site does not constitute a crisis situation, ie. no blatant evidence of the presence of hazardous trash has been observed in most of the Preserve. However, there are two areas that would require further investigation to ensure that no problematical material is present. These two areas are the spoil mounds in Section 11 (T28S/R16E) and the old building remnants in Section 2 (T27S/R16E). It is recommended that an investigation be done by a qualified assessment firm prior to any effort to remove of the material.

Prescribed Burning

Introduction--The prescribed fire management plan outlined below applies to that portion of the Preserve south of Tarpon Springs Road. The plan places primary emphasis on restoring the natural processes that shape the evolution of Florida's ecosystems. A vital component of this plan is the reestablishment of the Preserve's natural fire regime. The overriding goal for the Brooker Creek Preserve is to formulate and implement a

management program based on natural ecosystems and their natural interactions with fire.

The composition and structure of plant communities in Florida is determined by climate, weather, soil conditions, and fire. Weather and climate, within a given range, are seasonally constant and predictable. Soil conditions may be altered due to land use, but on the Brooker Creek Preserve they for the most part are relatively unchanged. Fire, however, is the one ingredient that has been changed. The natural (pre-development) regime of summer wildfire every few years has been largely replaced by a man-made regime of annual winter burns and wildfire suppression. Ensuring the long-term viability of the Preserve as a reservoir of biological diversity requires the application of prescribed fire in a way that mimics this natural fire regime.

Fire is a prime determinant of the plant and animal communities on the Preserve. Characteristics of the vegetation which govern the kinds of ignitable fuels available, weather conditions, and ignition tactics collectively define fire behavior. Fire behavior, fire intensity, and the rate of spread determine the ecological outcomes. These factors also determine the cost and techniques needed to contain fire in desired areas.

Prescribed burns are the controlled application of fire to wildland fuels in either a natural or modified state, under specific environmental conditions which allow the fire to be confined to a predetermined area and at the same time produce the intensity required to attain planned resource management objectives (Wade 1988). Benefits of prescribed fire are public safety (due to the reduction of the potential for damaging wildfire), fuel reduction, site preparation, plant disease control, wildlife management, and biological community restoration and maintenance.

The following sections provide the basis for the development of a fire management plan for Brooker Creek Preserve. The preparation of this section relied heavily upon materials assembled in Florida's Inter-agency Prescribed Fire Training Manual, as well as findings and insights garnered from the Nature Conservancy's Fire Management and Research Program, the Tall Timbers Research Station, and the Florida Natural Areas Inventory. The management plan prepared for the Walker Ranch (The Nature Conservancy, 1992) provided a useful general model in the organization and presentation of the following material.

The ultimate goal of fire management is to restore and maintain the fire adapted communities represented on site. This goal involves three phases of planning, of which this document is the first. This document identifies: fire management objectives, prescribed burn units, general and habitat-specific burn strategies and priorities necessary to develop site specific plans. The site specific plans or prescribed burn unit plans should consider certain site-specific characteristics shortly before a prescribed burn is planned. These characteristics include presence/absence of exotics, nesting seasons, site specific fuel accumulation, and the accuracy of the FLUCFCS maps. The day of the burn, additional information is necessary to complete the burn prescription. (See and Figure 7a. and 7b, and Legal Requirements section, below)

Prescribed fire management objectives

General Objectives

- Base recommendations on natural systems management and processes.
- Develop a comprehensive prescribed burn strategy that couples site-specific restrictions and opportunities with the desired burn frequency for any given community.
- Optimize habitat for gopher tortoise (and its associated species), Bachman's sparrow, Sherman's fox squirrel, and brown-headed nuthatch, each of which requires a different set of habitat types and conditions.
- Maintain and, where appropriate, reestablish an old-growth longleaf pine component in the pine flatwoods and sandhill communities.
- Restore sandhills and flatwoods that have been converted to improved pasture.

Specific Objectives

- Establish prescribed fire frequency ranges for the Preserve's fire-dependent communities based on their natural fire regime which prevailed before Euro-American settlement of the region (after Robbins and Myers, 1989, and Florida Natural Areas Inventory, 1990).
- Use growing season burns to reduce palmetto dominance and density.
- Use existing roads, trails, and natural features to determine burn unit boundaries.
- Stratify the rotation of burn units to create a temporal-spatial mosaic pattern in order to enhance diversity in the pine flatwoods.
- Utilize natural fire frequency patterns in longleaf pine recruitment areas (where such pine stands historically existed).
- Create burn units specific for the sandhill communities to facilitate gopher tortoise and related species management.
- Exclude fire from well-developed xeric hammocks.

Community-specific prescribed burn considerations--There are five vegetative communities which are dependent upon fire for their maintenance and long-term biological viability: xeric oak hammocks, sandhills, pine flatwoods, freshwater swamps, and freshwater marshes. Old fields (mainly abandoned bahia pasture) are also addressed because of fire's anticipated role in the comprehensive habitat restoration effort. Their vegetative composition, areal extent, soils, and topographic setting have been previously described (see Section III. A. Natural

plant communities). The following briefly characterizes the Preserve's fire-adapted vegetative communities, their natural fire frequencies (after FNAI, 1990), fuel types, and appropriate fire behavior fuel models (Anderson, 1982). Subsequently, the fuel types are defined.

Xeric Oak Hammock. The xeric oak hammock community occupies an estimated 21.3 acres of the Preserve. This live oak- dominated community is sparsely vegetated in the lower strata due to the dense evergreen canopy. Historically a sandhill community, fire suppression has allowed it to succeed into a xeric oak hammock community. When fire does occur, it is nearly always catastrophic and may revert xeric hammock back to either a sandhill or scrub community. The fuel is classified as blowy leaf type. It would be difficult to burn xeric hammock due to the lack of fuels and the possibility of crown damage. Therefore, it is recommended that xeric hammocks be managed without the use of prescribed fire and that wildfire ignited within or adjacent to these areas be immediately suppressed. these recommendations are made in order to perpetuate this community on site. This community type represents a very small percentage of the total area of the Preserve (< 1%), and it contributes to the habitat diversity on the Preserve. In addition, there is field evidence that the xeric oak community in Section 24 (T27S/R16E) was historically a homestead and a native American use site; therefore, the area probably has been a xeric oak community for a considerable amount of time.

Sandhills. Sandhill vegetation, also referred to as the longleaf pine-xeric oak forest, covers roughly 50.2 acres of the Preserve. Turkey oak, sand live oak, bluejack oak and live oak are the dominant trees. The natural fire frequency range of sandhills is 2 to 5 years. The fuel type is largely a mix of the blowy leaf type and grasses where the ground cover is sparse, with some palmetto/gallberry type fuels in the shrubby patches. Under present conditions, sandhills best fit fuel model 9. An important management goal for the sandhills is to promote optimal gopher tortoise habitat (Cox 1987). Cox states that optimal canopy coverage for gopher tortoises is 25% or less. Early summer burns promote the growth of wire grass, the predominant food source of gopher tortoise. Management for tortoise will enhance the habitat for burrow associates. Based on the site-specific response to burns, these characteristics should be considered in determining the interval between burns.

The remaining sandhill areas should be managed as optimal habitat for gopher tortoise (Cox, 1987). Therefore the canopy densities should be maintained at less than 25% coverage.

Pine Flatwoods. Pine flatwoods occupy approximately 1,742.8 acres of the Preserve. These flatwoods are hydrologically variable and can be divided into two general types: (a) low wet flatwoods associated with the floodplain of Brooker Creek and it's tributaries, and (b) high dry flatwoods located beyond the floodplain.

(a) Low Flatwoods. Low Flatwoods have a relatively dense canopy of slash pine and are poorly drained. There is a higher incidence of wet prairie and wax myrtle than palmetto-gallberry in these areas. The natural fire frequency of this community is 1 to 7 years. This is a result of a lack of burning, perhaps due to intentional fire exclusion, or because of high water tables. Before burning these areas, the County may want to partially cutover and thin

the pine stand for two reasons: (1) burning in shrubby areas where pines are dense may result in canopy fires and tree mortality, and (2) selective harvesting of pines along existing roads and trails may help offset costs of management.

Excessive moisture will restrict favorable burn conditions, whereas excessive dryness will increase the potential for duff fires which pose smoke management problems. Fuel types consist of pine needle litter and palmetto-gallberry. Fire behavior will be more intense in areas where there is a greater dominance of shrubs. Trees should be thinned in areas where this fuel type is prevalent. Currently, fuel model 7 best fits this community type.

The hydric flatwoods located within a zone adjacent to the creek should be burned on a less frequent regime as conditions allow (see burn plan). This habitat is optimal for the Wood Rat, Red-eyed Vireo, and Yellow-throated Warbler.

(b) High Flatwoods. High flatwoods are characterized by a sparse slash pine canopy with a shrub stratum predominantly comprises by palmetto and gallberry with intermittent patches of wet meadow (bog buttons, yellow-eyed grass, sphagnum moss, red root, sedges, sundew). The natural fire frequency of this community is 2 to 5 years. These areas should be burned during the winter to reduce heavy fuel loads and then maintained with growing season (May to mid-August) burns. The primary fuel type is palmetto-gallberry. Based on vegetation response vary burn regime within this habitat type. Currently, fuel model 7 best fits this community type. To the extent that prescribed growing season burns increase the grassy component, fuel model 2 may become more appropriate.

To sustain this natural diversity, the higher, drier, flatwoods which are more susceptible to fire, should be burned more frequently (3-7 years) to produce/maintain conditions optimal for Sherman's Fox Squirrel, Bachman's Sparrow, and Brown-headed Nuthatch.

Swamps. Cypress, hardwood, and mixed cypress-hardwood swamps cover roughly 2,581.9 acres of the Preserve. Swamps on the preserve consist of hardwood swamps dominated by maple, pop ash, tupelo, bays and cypress swamps. The fuel complexes are represented by available litter in the upper soil horizon. During dry conditions, these areas may burn. There is no appropriate fuel type category. One exception to this, is bayheads which have a thick organic layer of muck that may smolder for weeks. Swamps burn naturally on an infrequent regime (8-100+ years), and often only in their higher, drier exterior zones. The use of fire as a management tool in this habitat is not recommended until the proposed hydrologic restoration objectives for the Preserve are satisfactorily achieved.

Freshwater Marsh/Wet Prairie. Freshwater marshes and wet prairies occupy an estimated 566.5 acres of the Preserve. These areas are dominated by cattails, sedges, rushes, and grasses. Most of the Preserve's marshes and wet prairies are man-made, resulting from the excavation of borrow pits and the clearcutting of once-forested wetlands along the FPC powerline. Natural fire frequencies within marshes range between 2 to 25 years; wet prairies range between 1 and 7 years. The key ecological factor to consider in prescribed burns of marshes and wet prairies is the desired species composition. Grassy type fuels are dominant in these areas. The most appropriate fuel model for this system is fuel model 3. Because most of the marsh/prairie habitats occur under the powerline, coordination with

FPC land managers will be essential.

Old fields. Abandoned bahia pasture covers approximately 71.5 acres of the Preserve. These old fields are dominated by bahia grass and various perennial herbs. Fuel model 2 appears to be best fitting for this community type. Prescribed burning in these old fields need to be coordinated with the proposed sandhill and pine flatwoods restoration efforts (Section V.B. - *Restoration of original habitats*).

Definition Of Fuel Types

Palmetto-Gallberry. Most prevalent in flatwoods. Can be divided into three fuel loading categories: light (0-2 years since last burn), medium (3-5 years since last burn), and heavy (6+ years since a fire). This is the most dangerous fuel to prescribe burn in Florida. It burns hot and fast.

Blowy Leaf Fuels. These occur within the sandhill areas. When conditions are right, fires can burn through Blowy leaf fuels quickly.

Grasses. This fuel type can be divided into 3 categories: Light grasses, heavy grasses, and grasses with a volatile overstory. The marshes in the powerline easement are comprised of this fuel type. Fires in this type can creep or they can run faster than a man, depending on conditions.

Pine Needle Litter. This co-dominates as a fuel type in the hydric flatwoods. Pine needles generally burn less vigorously than grasses, especially under dense tree canopies. This is a relatively safe fuel type that lends itself to a number of firing techniques.

General prescribed fire management strategies

Burn Block Boundaries-The Preserve can be divided into logical burn blocks (Figure 6). These are defined as distinct units bounded by fire breaks. Fire breaks, or control lines, may consist of natural or artificial breaks. Natural breaks include topographic barriers, such as wetlands (under wet conditions) and open water. Artificial breaks include fire lanes, trails, roadways, ditches, and utility corridors. With the exception of fire breaks that need to be established along the perimeter of the Preserve, the existing network of unimproved roads and trails should adequately serve as fire breaks. Artificial barriers should be re-plowed in advance of burning.

Primary Control Line Network and Prescribed Burn Units-Major roads, trails, and cleared easement corridors on the Preserve were used to create a primary control line network (Figure 6). The prescribed burn units (BU's) identified were determined through the use of aerial photography, land use maps, and groundtruthing.

The following criteria were used to define and delineate the burn units on the Preserve: (1) limit the burn unit size to blocks that can be burned in a one day period under typical rates of spread; (2) where smoke sensitive areas are near, smaller size unit should be

established; (3) use the existing road and trail network to define unit boundaries; (4) to the maximum extent possible, incorporate wetlands in the design of unit control line boundaries to serve as natural fire breaks; and (5) assign sandhill and xeric hammocks areas to their own burn units.

Applying these criteria to the Preserve resulted in the creation of 53 burn units (Figure 6). These burn units, in turn, can be broken into subunits to satisfy the one-day burn requirement and any smoke management concerns.

Recommended Prescribed Fire Management Strategies-The following general fire management strategies for implementing the preceding fire management objectives are recommended for the County's consideration. The specific strategies to implement will vary based on community type, fuel loads, safety concerns, adjacent lands constraints, smoke management concerns, and other considerations. These strategies should be based on fire management standards and guidelines recommended by the Florida Division of Forestry, the Florida Game and Fresh Water Fish Commission, and The Nature Conservancy.

- The pine flatwoods and sandhill communities should be placed on a schedule of growing season burns (May-July). Where heavy fuel loads have accumulated, a two to three year schedule of winter season burns (December-February) should precede the growing season regime until fuel loads are sufficiently reduced. Application of The Nature Conservancy's Burn Schedule for Upland Longleaf Pine/Wiregrass Community (reproduced in Robbins and Myers, 1989, Appendix II) is one recommended approach.

- Aside from fuel reduction burns, no burns should occur during fall and early winter in the pine lands, when fires can cause high mortality among mature pines.

- The use of prescribed fire in the abandoned pasture lands should be governed by the requirements of the Preserve's habitat restoration program. Until this program gets underway, the wildlife values of these old fields should be maintained or enhanced where possible.

- Prescribed burning should be an important tool in, and proceed concurrently with, the restoration of wetlands that have been vegetatively and hydrologically altered.

- Where suitable, firing techniques which mimic natural wildfire intensities (e.g., flanking and striphead fires) should be employed. These firing techniques require well trained crews and adequate suppression equipment. If necessary, small test fires may be set to better gauge fire behavior.

- Wildfire, under proper conditions, can also play an important role in natural community management. If ignited during extreme droughts or intensely windy periods, wildfire *should be immediately extinguished*. During favorable weather periods, however, the Preserve Manager, in cooperation with the DOF, may determine that a wildfire should be allowed to burn (most will self-extinguish without outside assistance). This decision should be based on whether the site is already prepared for a prescribed burn in the immediate future and is small enough to ensure the fire is extinguished within a 24 hour

period. Weather conditions prevailing at the time should also fall within prescribed limits, and there should be no threats to public safety or neighboring properties.

- Monitor soil moisture conditions in wetlands that border on burn units scheduled for an upcoming burn to ensure high moisture levels to impede spot ignitions or retard the spread of fire from adjoining burn units. Prescribed burns may be used to prune unnaturally heavy shrub vegetation along wetland perimeters. For improved fire control, the adjoining uplands should be burned first.

- The trails making up the primary control lines need to be maintained as fire lanes and access roads.

- Fire lanes need to be established in uplands that abut the property line.

- All perimeter control lines should be immediately secured and should be adequate to stop or severely retard the spread of an escaped prescribed fire or a wildfire, both from within the property and from adjacent land onto the property. A minimal width of at least 15 feet is recommended.

- Isolated cypress domes within any given burn unit may require perimeter fire lanes depending upon the water table height at the time of the burn.

- Fire in bayheads should be avoided when the water table is below the surface. If the duff in these areas catches on fire, it may smolder for weeks.

Prescribed Fire Management Priorities

1. Burn areas where fuel accumulation is potentially hazardous. These areas are scattered throughout the Preserve, particularly to the south.

2. The high pine flatwoods that have burned recently (located in Primary Units 5 through 14) should be burned before additional build up of fuel. If these areas are not burned in the near future, the accumulation of fuel may hinder future burn management efforts.

3. The two sandhill communities located on the Preserve boundary (BU 3 and 10) should be burned as soon as the perimeter fire lanes are secured.

4. Areas north of Brooker Creek (Primary Units 1, 2, parts of 3, and 4) should not be burned until the hydrologic integrity of these areas is restored. Currently, because a majority of the wetlands north of the Creek have been dewatered, a burn would remove the organic topsoil.

5. The xeric hammock and a buttonbush swamp which occur in BU 9 should be avoided. The adjacent high pine flatwoods should be burned after a fire lane is re-secured between the flatwoods and the swamp/xeric hammock edge.

6. Burning in the hydric flatwoods should not commence until analysis of the effectiveness of limited silvicultural activities is completed. Burning in these areas must carefully consider the depth to water table and fuel accumulation.

7. Upland burns within the FPC easement should be conducted in combination with prescribed burns on adjacent lands. Since most prescribed burns will occur in the wet season, it is unlikely that marsh burns would be concurrently feasible. Wetland burns within the easement must be conducted when the water table is down. Of course, any burns on FPC easements are subject to coordination with Florida Power.

8. Certain burn units are relatively small (<50 acres) and surrounded by wetlands, BU 7 and 46 for example. It is unlikely these areas were burned as frequently as areas contiguous with other non-wetland fire adapted communities. Consequently, these areas should be burned less frequently.

9. Large burn units (e.g., BU 21 and 36) are predominantly high pine flatwoods and may be burned as one unit under suitable conditions subject to the one-day burn window and smoke management concerns.

Coordination. All burns should be conducted under the supervision of the Division of Forestry (DOF). The Preserve manager should coordinate burning efforts by communicating to appropriate DOF staff the desired goals for the burn. At the time of the burn, a prescription should be written that considers conditions at the time of the burn. A prescription should identify and secure control lines, and address recent precipitation, current weather conditions, fuel type, fine fuel moisture content, smoke screening test, and suppression equipment (See Figure 7).

Florida Power Corporation and/or the Southwest Florida Water Management District should be consulted when burning is on or adjacent to their respective properties.

Florida Game and Fresh Water Fish Commission should be consulted to assess the need for a burn to maintain/restore optimal conditions for a target species.

Smoke Management. Critical to favorable public opinion; identify smoke sensitive areas adjacent to property and distance from the site (hospitals, airports, nursing homes, retirement communities, residents, roadways). These areas need to be considered during each burn. Obtain a list of phone numbers from these organizations and educate them on the need.

Public Relations. Inform affected property owners of planned burns. Using the media and county staff, educate the public on use of prescribed fire as a management tool.

Legal requirements. Reduce liabilities by using Division of Forestry and burn plans developed and implemented by a burner certified in accordance with Florida Statutes 590.12 and 590.026. These plans will define the methods used to meet the burn goals under the site/weather conditions at the time of the burn. More specifically, plans will identify the ecological goals of a given burn and define: (1) weather conditions, (2) site conditions, (3)

appropriate firing techniques, (4) safety measures, (5) smoke management techniques, (6) define an emergency plan if the fire escapes (holdings and contingencies), and (7) fire behavior. The Preserve manager should archive all burn plans and post burn evaluations to make appropriate adjustments based on site burn experience.

Important Implementation Issues-The next phase of the Preserve's prescribed fire management program should be the development of a burn unit specific fire management plan, that is approved by the County in consultation with the DOF and FGFWFC. This phase should consider presence/absence of exotics, nesting seasons, site specific fuel accumulation, condition of the fire lanes, and the accuracy of the FLUCFCS maps.

Specific burn prescriptions for each burn unit should be drafted. These prescriptions should identify the unit's fire management goals, inventory fuel loads, and establish the fuel and weather condition "windows" necessary to meet the unit's management goals. The fire planning efforts should exceed the minimum standards for prescribed burning provided by DOF to comply with Chapter 590 (Fla. Stat.) and the Florida Prescribed Burning Act. Each unit's prescription plan also should include a smoke screening to identify smoke sensitive areas and the measures to be taken to minimize harmful smoke effects (the DOF smoke screening procedure is recommended). Two example forms for filing burn unit prescriptions, one for simple and another for more complex prescribed burns, are attached (Figure 7a and 7b). The overall prescribed fire management plan should also include detailed contingency planning, identify standards for control line preparation, project equipment and staffing needs, post-fire evaluation procedures, and a public education initiative.

Trail Maintenance--The Preserve is the site of numerous small and large dirt trails. Some of the trails were developed for land management purposes by previous owners, and other trails have been created as a result of long-term unauthorized vehicular access to the Preserve. For the County's purpose in managing the Preserve, it will be necessary to maintain most of the major trails and some of the fire lanes. However, several of the trails on site will not be necessary for management purposes and can be abandoned.

It is assumed that access to the Preserve will continue to be available for required activities via the largest of the existing roads and trails [FPC's ROW's, the corridor of the water transmission main along Lora Lane, the two large trails in the S1/2 of Sections 11 and 12 (T28S/R16E) and the trail leading east from the Ridgemoor subdivision]. In that event, some improvement of these major trails will be desirable. The improvements include surface grading, filling of large holes, stabilization, and culverting (discussed in Section V. B-Restoration of Hydrology). Areas of the major trails needing surface improvements include (a) the two large trails in Section 12 at the same locations requiring culverts, and the most northerly of the two trails needs substantial hole filling and stabilization and (b) the Lora Lane corridor needs culverts and the filling of several large holes.

It will be necessary to maintain some smaller trails for management access and for duty as fire lanes, while other trails and some fire lanes should be returned to original grades and allowed to become overgrown naturally. The trails which should be maintained are:

a. Sections 1, 11, and 12 (T27S/R16E): all existing trails.
b. Section 2 (T27S/R16E): main trail; other trails should be incorporated into the habitat restoration program, below described.
c. Sections 13 and 14 (T27S/R16E): major trails; others should be incorporated into habitat restoration program, below described.
d. Section 23 (T27S/R16E): trail leading east from Lora Lane extension.
e. Section 24 (T27S/R16E): east-west trail traversing the section from Section 23 to FPC's ROW and the trail connecting the east-west trail with the FPC ROW in the NE1/4 of the section. The east-west trail needs gravel surface improvement in the SW1/4 of the section in order to make the road passable in the wet season. This work should be done manually to avoid damage to the local wetland system.
f. Section 25 (T27S/R16E): east-west trail traversing the section and connecting the north-south FPC ROW with Section 26 (T27S/R16E) and the short trail between the FPC ROW and the eastern boundary in the NE1/4 of the section.
g. Section 26 (T27S/R16): short east-west trail connecting Lora Lane extension with the smaller east-west FPC ROW.
h. Section 35 (T27S/R16E): east-west trail connecting Lora Lane extension with Section 36 (T27S/R16E) to the east. This trail will need grade stabilization and surface improvement in the stretch located between 1100' to 2100' east of Lora Lane extension where the trail passes through dense cypress.
i. Section 36 (T27S/R16E): east-west continuation of the trail leading east out of Section 35 and the trail connecting the smaller FPC ROW with the north-south FPC ROW in Section 25 (T27S/R16E). The east-west trail will need grade stabilization and surface improvement in the stretch located between 550' and 1000' from western section line where it passes through dense cypress.
j. Sections 1 and 2 (T28S/R16E): main east-west trail connecting the eastern property boundary with Lora Lane Extension in Section 2.
k. Section 11 (T28S/R16E): the main north-south trail (which is an extension of Forest Lakes Blvd.). This trail will need major regrading and surface improvements due to its being used extensively by off-road vehicles and because of the clay material hauled in and spread on the trail in the past.
l. Section 12 (T28S/R16): existing major trails.

Trails and fire lanes which should be regraded to reduce ponding and abandoned are:

a. Sections 25 and 26 (T27S/R16E): trail/fire lane along northern section lines; the more northerly of the two east-west trails in Section 25.
b. Section 35 (27S/R16E): the southerly fork of the trail leading west off the main trail.
c. Section 36 (T27S/R16E): fire lane located to the north of the trail to be maintained; trail located in the extreme southern portion of the Section 36; and short trail located between the north-south FPC ROW and the eastern property boundary in the N1/2 of the section.
d. Section 11 (T28S/R16E): the large trail leading west off of the main north-south trail.

The use of any of the trails on the site should be strictly limited to those persons and activities required/allowed on the Preserve. Vehicular traffic should be restricted to those vehicles necessary to accomplish County-sanctioned activities. Horse and foot traffic should

be limited to those trails designated for the purpose.

Restoration of Original Habitats--As already described, parts of the Preserve are of excellent habitat quality, while other parts will require restorative work to meet the goals of the Preserve. Recommendations contained in the sections of the report dealing with the restoration of hydrology, security, trash removal, trail maintenance, and prescribed burning will bring about considerable restoration and/or maintenance of natural communities on site, particularly pine flatwoods and xeric communities. These measures depend upon the manipulation of communities rather than wholesale alteration of natural components of the landscape in order to bring about the desired effect. However, some areas will require more active restorative measures, including deliberate planting of desirable plant species, excavation, specific fire management, and exotic plant removal. In all cases, access to any areas undergoing restoration should be by permission of the Preserve Manager only. Further, at least qualitative monitoring of the restoration areas should be done of both pre-restoration and post-restoration conditions in the sites in order to assess progress and to track the costs of the work.

The County's effort to restore native habitats on the Preserve could be accomplished in conjunction with the County's need for mitigation of wetland impacts on construction projects throughout the County. The Preserve could function, in part, as a mitigation bank on which the County could restore and enhance wetland and upland habitat to compensate for impacts elsewhere. The restoration projects thus undertaken could expedite those other projects by assisting the County in meeting the requirements of various regulatory authorities. The restoration projects would also provide excellent opportunities for research into restoration ecology, and they could be incorporated into the environmental education program on the Preserve. Restoration projects would, of course, accomplish what their name implies, thereby re-establishing large areas of high quality habitat for wildlife in Pinellas County.

The following are recommendations for restoration projects, both large and small, which would encourage the return of native habitats and/or revitalize existing habitats on the Preserve.

1. The slightly disturbed areas along the trails harbor many exotic species and considerable pioneer vegetation. Improvement can be effected through the controlled burning and mechanical removal techniques used for adjacent flatwoods.

2. The FPC ROW's support several exotic species which provide a continual source of seeds for dispersal in other areas of the Preserve. The exotic species in the ROW'S should be removed by a combination of chemical, mechanical, prescribed burning techniques in order to reduce the opportunity for exotic species re-invasion. Co-ordination with FPC will be required to accomplish this work.

3. In Sections 1, 11, and 12 (T27S/R16E), the Eldridge-Wilde wellfield, upland restoration would involve the removal of the improved pasture and citrus trees and planting with native species to bring back the sandhill and pine flatwoods communities which formerly occupied the area. However, in consideration of the County's lease on the property, no recommendations concerning the lands which are now actively used for agriculture are made at this time. Should the County obtain title to the land in the

future, a specific plan for habitat restoration should be developed.
Other upland areas exist in these three sections which are not actively used for agriculture. The habitats present include primarily Mixed Coniferous/Hardwood (434) and Pine Flatwoods (411). These areas should be maintained as described in the Fire Management section of this report if such practices are consistent with the County's lease on the property.

Wetland restoration in these three sections would provide much-needed aquatic habitat in the area. Restoration would require augmentation (the addition of water to a wetland) to re-establish the depth and duration of water in the wetlands. Augmentation could be accomplished in the same manner as the cattle-watering ponds are maintained in the southern part of the wellfield. In this way, some wetland habitat could be provided on the wellfield. It should be noted that many of the wetlands in the wellfield have subsided and burned to the point of making them poor candidates for augmentation. Other wetlands, particularly those south of Keystone Road would be better candidates for restoration via augmentation because of the higher potential for the success of restoration work.

4. In **Section 2 (T27S/R16E)**, restoration efforts would involve: exotic species removal, re-grading swales (see section on Restoration of Hydrology), pine flatwoods re-establishment, and wetland augmentation. There is a need for exotic species removal in the S1/2 of the section along the main north-south trail. The majority of the exotic vegetation can be removed via prescribed burning and mechanical removal techniques. The open areas of the section would serve well to re-establish the former slash pine flatwoods. The areas should be planted in Pinus elliottii in an informal configuration to mimic natural flatwoods. Thereafter, controlled burning to allow the slash pine to become established should be done.

   The existing excavated ponds should be mechanically cleared of weedy species along the banks and planted with native shrubs and herbaceous species. Other wetlands in the E1/2 of the section will benefit from augmentation to restore some measure of normal hydroperiod (time during the year when there is measurable standing water in a wetland).

   This section is well suited to activities such as the proposed equestrian riding trails, the biological field station dormitory, and controlled group camping. These facilities/activities would be appropriate because there is sufficient already cleared area on which to construct facilities, making it unnecessary to clear good quality native habitats. Also, the progress of the restoration effort would be readily observed by the public, increasing awareness of the value of preserving and restoring natural areas.

5. **Sections 13 and 14 (T27S/R16E)** contain a highly disturbed open area. In the northern half of Section 13, the vegetation consists mainly of the very weedy common ragweed (Ambrosia artemisiifolia), groundsel (Baccharis halimifolia), elderberry (Sambucus canadensis), and yankeeweed (Eupatorium compositifolium). The vegetation in the southern half of Section 13 consists of scattered oaks (Quercus geminata, Q. chapmanii, and Q. myrtifolia) with an herbaceous ground cover dominated by the weedy slender

grass-leaved goldenrod (Euthamia minor) and southern crabgrass (Digitaria ciliaris). The potential for restoration in the southern half of the section is great since a number of typical sandhill species occur scattered throughout the site. These include: greeneyes (Berlandiera subacaulis), Florida elephant's-foot (Elephantopus elatus), pine-barren frostweed (Helianthemum corymbosum), four-petal St. John's-wort (Hypericum tetrapetalum), gopher-apple (Licania michauxii), sky-blue lupine (Lupinus diffusus), prickly-pear cactus (Opuntia humifusa), wild pennyroyal (Piloblephis rigida), saw palmetto (Serenoa repens), Chapman's' goldenrod (Solidago chapmanii), shiny blueberry (Vaccinium myrsinites), and Adam's needle (Yucca filamentosa). Similarly, there should be no difficulty in restoration of the adjacent lands in Section 14 when acquired. Through controlled burning and reintroduction of a key plant species (Pinus palustris), the area could successfully be restored to an open sandhill community, a benefit to the Preserve because there is little of that habitat present on site.

The determination of the most effective burning regime for this large open area may requiring some preliminary work in order to conduct a burn which favors the xeric species which are coming into the site while discouraging the bahia grass which is so common on the site. The selection of the burn regime could be accomplished via a test burns of small (5 acres) plots and a comparison of the species which become established in the plots with the species recruiting in unburned plots. This work could be incorporated into the environmental education program of the Preserve and would generate data of use in the management of many of the tracts of County-owned land.

Burning parts of the area to aid the restoration of the sandhill community could be done in conjunction with spreading topsoil from other sandhills which are being cleared for construction over some of the burn plots. This technique in sandhill restoration has met with some success in Polk County where IMC, Inc. has done work to reclaim lands used for phosphate mining.

6. Wetlands in the area north of Brooker Creek in Sections 13 & 14 (T27S/R16E) are extremely dry and do not provide habitat for wetland-dependent wildlife at this time. The absence of water in the wetlands north of Brooker Creek results in a significant loss to the Preserve and the surrounding area because the wetlands now are not able to support several species which should utilize the area. These species include: the endangered wood stork, which has been observed in years past; the threatened Florida sandhill crane, for whom the former marshes on site would be optimal nesting habitat; the round-tailed muskrat (under review for listing); alligator; numerous amphibians, and wading birds. The wildlife which would use these communities under normal conditions would benefit enormously from the addition of water to the wetlands' basin. Augmentation would restore at least a portion of the wetlands' hydroperiods which, in turn, would provide nesting and foraging habitat for wetland-dependent wildlife species. In addition to greatly enhancing wildlife habitat, augmentation would increase the diversity of natural habitats on site by replacing the disturbed, dried out systems with revitalized wetlands. Further, wetland restoration using augmentation would provide an unique opportunity for long-term applied research which could assist the County in future decisions regarding the development of groundwater supplies within the County boundaries. Any research program on augmentation should be incorporated into the

program of the environmental education center, and project reports should be supplied to the County Water Department and SWFWMD.

A program of wetland augmentation cannot be undertaken unless a source of water to put into the wetlands is identified and approved. At this point, the potential water sources may include: reclaimed water from either Pinellas County, Hillsborough County, or nearby subdivisions: stormwater runoff which could be pre-treated in a small, artificial wetland prior to discharge into natural wetlands on site; Lake Tarpon; and groundwater produced on site. It would be necessary to investigate the feasibility of these potential sources of water and to select the wetlands to be augmented from among the candidate wetlands. In addition, the County would be best served if the wetlands included in the program of augmentation were monitored both hydrologically and ecologically before and during the augmentation process.

The weedy interiors of these sites, particularly the former marshes, will also benefit from controlled burning which will effectively deepen the wetlands by burning any non-oxidized organic matter which is present in the basin of the wetland. Burning the wetland basin will also reduce the potential for the sprouting of seeds of undesirable weedy species. The large sawgrass-dominated wetland immediately north of Brooker Creek, in particular, should be a candidate for burning prior to re-hydration.

7. The **floodplain of Brooker Creek** has suffered reduced flows in the past 30+ years, and restoration of normal flow patterns would be very advantageous to the Preserve, to Lake Tarpon, and to the northeast part of Pinellas County as a whole. Some restoration of flow will be accomplished if the creek crossing at FPC's ROW is renovated to re-establish the former cross section and discharge capacity at that location.

   Another alternative to restoring flow in Brooker Creek may be available upstream in the lakes which occupy the creek's upper watershed. It may be possible to study the operation of the control structures on the lakes to determine whether flow is being detained in the upper watershed to the detriment of the lower watershed, including the creek itself.

   Augmentation of flow in the creek is an option, but it is one which should be used only if (1) the hydrologic restoration recommendation addressing the Creek crossing at the FPC ROW described below does not suffice and (2) it becomes clear that there is no possibility of altering upstream management practices to provide more water to the lower watershed. Delaying the use of augmentation until it is known whether these other two alternatives can or will be done is suggested in an effort to re-establish some of the former characteristics of the watershed (true restoration) rather than only to apply a "quick fix" to one of the watershed's problems. True restoration of flow in Brooker Creek will, as already mentioned, provides ecological and social benefits to the entire lower watershed.

8. The **NE1/4 of Section 13** contains an excellent example of Florida pine flatwoods which can be restored by the removal of the large amounts of tires and trash and by

controlled burning. This area is well suited to incorporation into the environmental education program of the Preserve because of its high quality and its proximity to the anticipated location of the Environmental Education center.

9. In Sections 23, 26, 35 (T27S/R16E) & Section 2 (T28S/R16E), restoration of the disturbed edges of wetlands in the existing and the new 60" pipeline ROW could be done following construction of the new pipeline. some restoration will presumably be done as part of the project permit. It may be necessary to do some replanting of upland species, particularly slash pine, following construction. The planted pine in Section 26 should be managed with selective harvesting and controlled burning to attempt to bring about a more natural-appearing community. In Section 2, the disturbed are in the SW1/4 of the section where the existing 60" pipeline exits the section, a combination of controlled burning and replanting will assist in restoring the flatwoods. The very disturbed cypress community in the area will also benefit from controlled burning in the edges of the community. No restoration should be planned, however, until the construction for the new pipeline is completed. Co-ordination with the County Water Department should be done to determine the degree to which the ROW can be planted without interfering with future access to the pipeline.

10. In Section 25 (T27S/R16E) are two very small areas of xeric communities which have become grossly overgrown due to fire exclusion. The two areas total 1.8 acres and are located in the NE1/4 of the SW1/4 of the section. While the total area is small, there is virtually none of this habitat type in the southern part of the Preserve, and its restoration would benefit the area by providing some xeric habitat and ecotone to an otherwise vast expanse of pine flatwoods. The areas can be restored by very careful burning of the adjacent flatwoods to reduce encroachment on these small areas, followed by mechanical removal of the smaller shrubs to reduce competition. to a viable state.

11. In Section 36 (T27S/R16E) one small area, located in the SW1/4 of the NE1/4 of the section, infested with melaleuca will require attention to remove this exotic species (see section on Exotic Plant Removal).

12. Restoration of Section 11 (T28S/R16E) will require considerable effort. The area, a former pine flatwoods, is now overlain with a clayey soil fill and has several extensive spoil mounds. The dominant vegetation is saltbush (Baccharis halimifolia) with two exotics, ear tree (Enterolobium contortisiliquum) and leadtree (Leucaena leucocephala), abundant and widespread in the area. A significant amount of work will have to be done to restore the drainage patterns and remove the overburden. Because of its poor condition and the easy access from a paved road, it is recommended that the area be used as a location for a security officer's residence and as a picnicking site. Restoration of the native pine flatwoods could be attempted on an experimental, small-scale basis in the future.

The security officer will provide the need control over access to the site which currently is the site of considerable unauthorized activity, including off-road vehicle use of the area.

The picnicking facilities should consist of two shelters with no more than 6 tables each; restrooms should be nearby. Such a facility will be of benefit to the residents of Oldsmar and will reduce the need for picnic tables in the environmental education complex.

The spoil mounds should be used to fill in the ditches paralleling the trail (to the degree allowed by permitting authorities). Any remaining material should be spread over the uplands in the area in order to improve the soil should restoration of the uplands be undertaken.

The planning, design, and construction of any facilities on the site should be co-ordinated with SWFWMD, the owners of the part of the Preserve.

13. Restoration of the heavily overgrown **slash pine flatwoods** on the Preserve would be advantageous to several wildlife species, and it would assist in reducing the potential for an extremely hot, damaging wildfire. The removal of the shrubby fuel accumulation in these flatwoods and the re-establishment of the typical two-layered configuration of slash pine and saw palmetto can be accomplished as described in the section of the report dealing with fire management.

Re-introduction of Species--At this time, the project team does not recommend any candidate species for re-introduction to the Preserve. Because of the size of the Preserve and its proximity to developed areas, it would not be feasible to re-introduce species requiring large ranges such as the Florida panther and black bear. Smaller species could be considered for re-introduction at a later date but only after sufficient sampling work has been done to demonstrate that the species truly is not present on the Preserve. The survey work done during this 6-month project together with the observations done by others are insufficient to document the presence or absence of every plant and animal species which could be expected on the Preserve. Therefore, it would not be appropriate to "re-introduce" a species which may be present but whose population is so small as to be undetectable using the standard survey-level techniques employed to date on the Preserve. Also, without knowing all of the species which are present on the Preserve, we could not predict the effect that the re-introduction of any species might have on existing species. On this last point, it is conceivable that a species is present, but undetected thus far, and the addition of more individuals of that species would displace the resident individuals from their range.

Any species re-introduction program must be evaluated in order to justify the money and time spent on it. The success of a re-introduction program can only be evaluated with population data collected both before and after the re-introduction has occurred. If we have not observed the species on the site due to the non-specific and short-term nature of the sampling programs, it does not mean that the species is not present. Therefore, at this time, we would not have the prior data with which to compare the post re-introduction data. Further, if the species is present in such small numbers and/or it is so secretive as to be virtually undetectable, it may not be detected after the re-introduction has been done. Consequently, it will be extremely difficult to collect post re-introduction data to measure the performance of the re-introduction programs. A step toward a solution to this problem is to conduct specific sampling programs for species which should utilize the site in view of the location of the Preserve and the habitats on the site but which are expected to be

present in very low numbers.

In general, a better approach to single species re-introduction is to manage the Preserve for high quality habitat and habitat diversity. In the absence of extensive, detailed data on the specific communities in the Preserve, the project team believes that a management plan which focuses on restoration and preservation at the habitat level will benefit more species overall than a plan which emphasizes efforts to benefit a small number of species. Also, the habitat-level strategy is particularly appropriate for the management of the Preserve in view of the goals and mission of the Preserve.

Relocation of Species--In the past, it has been the practice to relocate animals on the property which was later to become the Brooker Creek Preserve. Now that the County has designated this area as a preserve and desires to promote native Florida habitat and wildlife conditions on the land, it is inappropriate to continue the practice of allowing animals to be released on the property. The arguments against relocation are virtually the same as described above for re-introduction with the added argument of wildlife population density. Knowing that animals have been relocated on the Preserve in the past yet not having any quantitative information on the current population densities on the Preserve, it would be potentially damaging to existing resident wildlife populations and to the habitats that support them to increase the numbers of individuals of a species by even one animal. In the future, after data on population densities have been collected, re-locations could be resumed upon the determination that neither the resident populations nor their habitats would be negatively affected.

Exotic Plant Removal--The preceding discussion concerning the restoration of habitat mentioned several areas of the Preserve in which exotic plant species are a problem. The areas identified so far are very likely not the only areas having exotic plants, however, because the plant survey done for this project was not an exhaustive one. Therefore, it will be important for County staff to note the presence of exotic species when out in the field on the Preserve.

It should be further noted that it will be necessary to have an on-going program in exotic plant detection on the Preserve. Because of its location in southwest Florida and due to its proximity to subdivisions in which many exotic ornamental species have been used in landscaping, the Preserve will have persistent problems with the establishment of exotic plants. The County should plan, therefore, to continue an exotic plant detection and control program indefinitely.

The plant survey indicated that approximately 11% of the species observed were species of exotic plants. Many of the woody species can be removed by cutting the stem, burning and burying the debris, and treating the stumps with glyphosate, the active ingredient in several commonly-used herbicides. Most herbaceous species will be controlled by burning. Four species will require special attention, including punk tree, Brazilian pepper, air potato, and cogon grass. The few individuals of Brazilian pepper should be completely removed, including the roots. For punk trees, because the number of individuals detected thus far is small and located in one area, it is recommended that the trees be cut, the debris burned and buried, and the stumps treated with Round-Up (Layne, 1993). The site should be evaluated annually for two years after this initial removal to insure that no additional individuals sprout.

In the case of cogon grass, the best control method at this time is to apply glyphosate

following a burn of the affected area (Tanner et al., 1992). For air potato, the plants should be cut, the debris burned, and the stem treated with glyphosate. Alternatively, the stems could be treated following a prescribed burn of the area in which the plant occurs (Wunderlin, 1993).

Restoration of Hydrology--Several factors have affected surface and ground water conditions in the Preserve. Some of the factors are of a more regional nature, for example, the water control structures and practices in the upper Brooker Creek watershed in Hillsborough County, the ground water withdrawals from municipal water supply facilities, and periodic rainfall deficits in southwest Florida since 1961. The precise determination of the direct impact of these regional factors on the Preserve would require a hydrologic and engineering study. However, based upon a review of existing data, it can be concluded that these factors have generally reduced the quantity of surface water present on the Preserve. To develop information describing the impact of these factors quantitatively, it is recommended that the County consider a hydrologic evaluation of the effects on the Preserve of the water control operations in the upper Brooker Creek watershed. The effects of ground water withdrawals are documented sufficiently.

Other factors affect surface water hydrology on a more local basis, and these factors include ditches and other excavations constructed on the Preserve, the utility ROW's, the presence or absence of culverts, and certain of the trails on the Preserve. These factors either impede the natural flow of water, drain wetlands areas, or artificially retain water in temporary or permanent ponds. To reverse the hydrologic effects of the most significant of these factors, the following recommendations are made.

1. Restore the sheetflow characteristics of Brooker Creek at its intersection with FPC's ROW by bridging the crossing. This task would require the approval and co-operation of FPC, an hydraulic analysis of the crossing, and engineering structure design for the bridge. A timber bridge is recommended at this location for aesthetic purposes. In addition to restoring hydrology, a bridge at this location will end the practice of driving through the channel of Brooker Creek at a point just west of the ROW.

2. Restore the surface water flow characteristics of the Preserve on site by regrading the trails to original land elevations and installing culverts or making ditch improvements at locations in which flow has been blocked. The determination of the numbers, elevations, and sizes of the culverts or the dimensions of ditches needed at a particular location is a task beyond the scope of this report. However, the locations of the culverts/ditches can be recommended based upon a review of reports on the water resources of the area, an evaluation of existing topographic features, and a study of available mapping. The recommended locations are for culverts and /or ditch improvements are listed below. In all cases, it will be necessary to regrade the areas undergoing improvement.

3. Snag the channel of Brooker Creek within the Preserve in order to remove obstructions to flow and garbage which has accumulated on the upstream side of the obstructions.

LOCATIONS OF RECOMMENDED HYDROLOGICAL RESTORATION MEASURES

a. Section 12 (T28S/R16E): culverts needed at (1) on the trail in the lower portion of the SE1/4 of the section, at a point located 450' northeast of the northern boundary of the FPC east-west ROW, and (2) on the trail immediately north of #1, above, at a location approximately 2200' from the western boundary of the FPC north-south ROW.
b. Section 11 (T28S/R16E): culverts needed at a point in the SE1/4 on the trail approximately 450' northeast of the trail's intersection with the FPC's east-west ROW.
c. Section 2 (T28S/R16E): culverts needed on the water transmission main corridor at two points: (1) 400' south of the northern section line, and (2) approximately 3400' south of the northern section line.
d. Section 1 (T28S/R16E): ditch improvements on the FPC ROW at two locations: (1) 600' south of the large trail crossing the ROW and (2) 1550' north of the large trail.
e. Section 36 (T27S/R16E): culverts needed on the main north-south trail at points located (1) 200' south of northern section line and (2) 1200' south of northern section line; also existing culverts south of the ROW intersection which need cleaning.
f. Section 35 (T27S/R16E): culverts are needed at two points along the main north-south trail located at 2500' and 4200; south of the northern section line. Depending upon the route for the new water transmission pipeline in this section, this recommendation may be altered to accommodate the major flow pattern (which is in a southwesterly direction across the main trail). A culvert is also needed in the more northerly fork of the trail which leads west from the main north-south trail; the culvert is needed at a point located 1400' west of the intersection of the trail with the main trail. The southerly fork of the west trail should be graded to original elevations and abandoned.
g. Section 26 (T27S/R16E): culverts needed in the main north-south trail at a point located at 375' south of the trail's intersection with FPC's ROW.
h. Section 25 (T27S/R16E): a series of culverts is needed in the north-south FPC ROW at a point located about 3500' south of the northern section line to accommodate a major southwesterly flow pattern.
i. Section 23 (T27S/R16E): a series of culverts or small bridge is needed in the Lora Lane extension at a point 1950' south of northern section line to accommodate Brooker Creek.
j. Section 13 (T27S/R16E): a series of culverts are needed in the FPC ROW at a point located 1200' and 1550' south of northern section line.

3. Backfill the ditch located on the northern boundary of Section 23 (T27S/R16E) within the Preserve property to restore flow in the Brooker Creek channel located 1950' to the south.

4. Fill and grade the shallow excavation which leads into the cypress swamp in the NE1/4 of Section 11 (T28S/R16E).

5. Backfill the ditches parallelling the main trail in the central portion of Section 11 (T28S/R16E);

6. Grade the series of parallel swales in the NE1/4 of Section 2 (T27S/R16E) back to original elevations.

The above recommendations address those items which will benefit the hydrology of the Preserve in a measurable way. There are other items, notably small trails and fire lanes, the restoration of which would cause more ecological damage than good. Therefore, no active recommendations for these items are made; the lack of use by vehicles will eventually allow the trils to become revegetated. Further, there are areas along the north-south FPC ROW in which flow across the ROW has been impeded. The above recommendations address only the largest problem areas rather than every area of flow impedance. The reasoning here is that the restoration of the former hydrological system in the smaller areas across the ROW would result in the destruction of all of the shallow-water habitat present on the ROW. Such habitats area very uncommon on the Preserve, and their preservation is critical to several species of birds and amphibians.

There are two other items which should be mentioned relative to the hydrology of the Preserve. First, the Bi-county Expressway design and construction in Section 2 (T27S/R16E) should be closely monitored to ensure that hydrology is maintained in the large cypress community in the NW1/4 of Section 2. Also, there will be mitigation work on some of the wetlands in Section 2 in connection with this project which may reverse some of the hydrologic alteration which has occurred on the property. Second, the water transmission main replacement project should consider the maintenance of hydrology in the design and construction phases of the job, particularly in Section 2 (T28S/R16E) and Sections 26 and 35 (T27S/R16E). The route of the new pipeline is generally east of the existing route in the Lora Lane extension except in Section 11 (T28S/R16); therefore, it will be necessary to clear large forested areas and to traverse several of the locations now needing culverts of other improvements. Both of these projects require permits addressing the issue of hydrology maintenance, and co-ordination with project personnel will be very helpful in ensuring that the needs of the Preserve's wetland communities are considered.

Public Involvement

OVERVIEW--Brooker Creek Preserve offers a unique opportunity for the public to participate in the development of a major environmental and aesthetic resource for Pinellas County. It is a new preserve with an interested community that ranges from scholars to horsemen. Diverse interests include: habitat restoration and conservation, research, education, recreation and equestrian utilization, just to name a few.

In any plan certain steps must be followed in order to get the desired results. One must set objectives, define the audience, select the media channels, develop the message, establish strategies, devise a timetable, then structure the measurements that will define our results. In devising the public involvement plan for the Preserve, several communication models were examined to understand the interested parties. Of these models, most noted are the asymmetrical model and the symmetrical models of public relations planning. The asymmetrical model is a one-way channel of communication that manipulates public behavior from a sponsoring organization, while the symmetrical model allows two-way communication between the sponsoring organization and the audience. The two-way symmetrical method benefits both the organization and its audience by creating an open system that freely exchanges information and gives way for new ideas through flexible

thinking. A form of symmetrical communication was used for the Brooker Creek public involvement plan.

Information gathered through interviews, questionnaires, environmental education meetings, community contacts, and word of mouth indicates that Brooker Creek will have an audience comprised of the following: environmentalists, local governments, recreational users, volunteers, a citizen support organization, educators, researchers, equestrians, and many others from the surrounding community. In targeting these various audiences, we have used a single message aimed at a single audience in order to get the best results for meeting each group's needs.

GOALS OF THE PUBLIC INVOLVEMENT PLAN--The goal of a public involvement plan for Brooker Creek must be to build sufficient awareness and interest in key audiences to insure a respectable level of participation in the Preserve's programs.

TARGET AUDIENCES--Effective communication relates the organization's goals to the interest and concerns of our audiences, groups of people with common interests who are affected by the acts of the organization. For Brooker Creek, our audiences are comprised of environmentalists, local governments, recreational users, volunteers, a citizen support organization, educators, researchers, equestrians, and many others from the surrounding community. Each group within the total audience must be targeted separately with a specialized message aimed at the very nucleus of the group. These audience groups should be broken down into smaller, more definable categories as the management team progresses with its long-term plans. The more specific the audience definition, the better its concerns and interests can be communicated, thus the better the communication. After audiences are narrowed, priorities must be set on which groups are the most important in meeting objectives.

Because Brooker Creek Preserve is located in one of the most densely populated areas of Florida, residents of Pinellas, Hillsborough and Pasco counties will most likely be the dominant users of the facility. When targeting audiences, decisions about which groups are the most responsive will insure the success of the program. A grid like a bulls-eye can be helpful. Aim at those closest in philosophy to the preserve and in stages gradually include those in the perimeter of the area, increasing the audience with each stage.

MEDIA CHANNELS--Most public involvement planning focuses heavily on external broadcast or print media, but a much broader approach should be utilized in the case of a public sector project such as Brooker Creek Preserve. Certainly media includes newspapers, magazines, television and radio, but it can also include a letter, a conversation, newsletters, paycheck stuffers, bulletin boards, direct mail, audio-visual presentations, public meetings, seminars or related conferences.

These media channels can be described as controlled or uncontrolled. Controlled media channels allow the sender to have complete control over the message (direct mail) while uncontrolled media channels present the sender with little or no control over the message (news conference).

It is important in selecting media channels that final judgment is delayed until the message and strategy are fully devised. In order to reach all the audiences that affect Brooker Creek, both controlled and uncontrolled media channels should be used. For example, story placement in special interest newsletters (uncontrolled) and letters sent to

prospective volunteers (controlled) are two contact strategies that may be used to reach targeted audiences.

DEVELOP THE MESSAGE--We must remember that the Brooker Creek message seeks to influence public opinion and create public involvement. Messages must be understood and relate to the interest and concerns of our targeted audiences. Frequent use of key words will surely build a desired image. However, they should be part of a thoughtfully conceived strategy that emphasizes the message's frequency (number of times a message is sent) and reach (number of times a message is received).

ESTABLISHING STRATEGIES--Effective strategy must have action and it must relate to the plan's goal by producing the desired results. The purpose of the public involvement plan is to accomplish a certain very specific, measurable goal. The public needs to know the benefits provided by the Preserve both to themselves and to the environment this can be done by using the following strategies:

1. Erect appropriate signage at the entrance to the Preserve.

2. Submit information about the Preserve to the parks of Pinellas County listing, parks of Florida listing and the Florida Atlas & Gazette for its parks listing.

3. Hold public meetings using formal presentations followed by open-ended audience participation.

4. Send news releases that describe facilities, habitat restoration efforts, and interesting biological findings in Brooker Creek to the neighborhood sections of the Tampa Tribune, St. Petersburg Times, Tropical Breeze, and environmental and scientific publications (such as Florida Naturalist, Florida Scientist).

5. Prepare advertisements in print and electronic media outlets aimed at the passive recreational user and research audiences.

6. Contact conservation groups such as Florida Audubon, Florida Ornithological Society, and local chapters of the Florida Native Plant Society and offer to speak at their conferences.

7. Contact civic groups and offer speaking engagements to those who are interested. Groups that can be contacted include Rotary and Kiwanis.

8. Contact influential members of the community to get their support. In doing so a network will be set in place for possible funding outlets. This kind of community influence can play a great role in shaping the opinions of others.

9. Contact influential horse people (names and phone numbers are available) to act as a border/security patrol.

TIMETABLE--Effective strategy requires a carefully devised timetable. It must be

thorough, making sure nothing is left to chance and it must be attainable. Timetables are crucial in the "follow through" of a plan so that actions can be easily tracked and monitored. This will set a time frame on the strategies, giving them a monthly, weekly and even daily perspective on what was completed.

During the next year the following should be completed and devised into a working timetable:

1. The "Friends of Brooker Creek" alliance should be formed following the supplied guidelines found within this text.
2. Establish your contact strategies and implement them.

First year involvement strategies should include the following:

1. Erect proper signage to the Preserve's entrance.

2. Contact the Florida Parks Department and Pinellas Parks Department so Brooker Creek Preserve can be listed in all state and county literature that pertains to environmental concerns.

3. Contact map makers so Brooker Creek Preserve can be shown on maps as a county park.

4. A ground breaking or opening day ceremony should take place, notifying the media through press releases and follow-up telephone calls. The opening day celebration will be an excellent time to send out letters to influential members of the community for their monetary and volunteer support.

5. Develop and implement a volunteer training program.

RESULTS ANALYSIS: Once the Brooker Creek public involvement plan is implemented, the results should be measured for the desired outcome. Public involvement planning is a continuous process that should be divided into phases. It is best to say that once phase one is completed, the results will be monitored, for the purpose of making changes in the message if necessary. On-going public feedback will give an indication on how to shape our message for the next phase. This type of action will create a functional two-way form of communication that benefits the sender and receiver of the message.

AUDIENCE BREAKDOWN AND CONTACT STRATEGIES: The following are a list of the perceived audiences, listing the recommended media channels that should be used in reaching them as well as concerns and possible solutions.

1. EQUESTRIANS & POSSIBLE MEDIA CHANNELS--Open forum meetings can have a negative effect if an entire organization is allowed to voice an opinion against the Brooker Creek Management Team. It is best to organize leaders in limited numbers (preferably no more than 3) when meeting with the Brooker Creek Management Team. The smaller the delegate group, the quicker the solution time. Direct mail is a one-way form of communication that can be controlled. Direct mail will be an excellent way of

introducing horse trails to the equestrian community. PSAs are an inexpensive way of introducing the facility to the equestrian community. PSAs can be announced on targeted radio stations and can be announced at various riding events.

Press releases can be sent to organization headquarters for newsletter insertion. Press releases may possibly lead to full-blown news stories. Send releases to newsletters, organization head quarters, weekly and daily newspapers.

Telephone contact should be used as follow-up as well as initiating concerns on a one-to-one basis.

CONCERNS: This audience is concerned about the availability of horseback trails at Brooker Creek Preserve. Some neighbors have been riding their horses on the property for years.

MANAGEMENT CONCERNS: Horse waste, spread of weed seeds, liability issues and impact on flora and fauna.

SOLUTION: Offer a designated riding area on land that is least likely to be damaged by horses (perimeter of border fence). Have riders responsible for their own horse waste and have them sign a claim waiver at check-in.

2. COUNTY GOVERNMENT & POSSIBLE MEDIA CHANNELS--County Commission meetings will allow senior staff to discuss the preserve's agenda with the county commission. This allows staff to pose problems and concerns in front of the commissioners. Direct Mail can take a variety of forms. The County Commission can be included when one-page fact sheets are sent to supporters with the preserve's message. Most direct mail gets lost in the shuffle. Contact the staff of the County Commissioners who will be most concerned about Brooker Creek issues and let them know what Preserve letterhead looks like and to keep an eye out for it.

COUNTY GOVERNMENT CONCERNS: Local government will be concerned about how the preserve should be utilized and how taxpayers' dollars are being spent. Local government will be concerned about area citizens that might criticize management decisions concerning Brooker Creek Preserve and about non-tax based funding options for the preserve.

MANAGEMENT CONCERNS: Preserve staff will be concerned with the Commissioners' commitment to the Preserve's mission and goals and the likelihood of providing the necessary funding levels for viable yet visionary programs. The Brooker Creek staff must have a unique relationship with County Commissioners that is based on understanding between both parties.

SOLUTIONS: The staff should closely with County Commissioners in securing funding and assuring reasonable management goals. Keep commissioners informed by direct mail and through frequent communication with senior staff. Use County Commission meetings only when necessary and definitely utilize the county's educational criteria.

3. RECREATIONAL USERS & POSSIBLE MEDIA CHANNELS--Those that use the Preserve will disperse messages about the property throughout the community. Brochures are an effective form of one-way communication that can be strategically placed at the entrance to the Preserve centers. A simple tri-fold brochure that describes the Preserve will suffice initially. Later, more elaborate informational materials (similar to the format used by Archbold Biological Research Station) can be developed with grant funds. Florida Trail members who use the hiking trail will also carry the Preserve message to other members of the organization.

CONCERNS: The recreational user will be concerned with the facilities that are offered, possible fees, parking and restrooms. The recreational user will also be concerned with the type of activities that the Preserve offers.

MANAGEMENT CONCERNS: The Preserve's staff main concern is that the site is properly being utilized by the public and the environment of the Preserve is not being damaged.

SOLUTIONS: Clearly state the facilities and the limitations of facility use in a brochure. A voluntary questionnaire querying the participant's satisfaction with his/her experience in the Preserve would be a helpful tool in a continuing program to relate Preserve programs to the recreational user audience.

4. VOLUNTEERS & POSSIBLE MEDIA CHANNELS--Face-to-face communication can be used as a channel to reach your volunteer public. Offer guest speakers to facilitate at meetings, clubs and events that may have potential to generate volunteers. Rotary and Key Club organizations are excellent speaking engagements that have a possibility of generating volunteers.

Direct mail targeting possible volunteer sources are vital in preparing a volunteer base. Send direct mail to organizations that have the possibility to produce volunteer sources such as civic organizations, scouting troops, colleges, schools, environmental organizations and the AARP. Ads concentrating on publications that may be read by volunteers. Place ads in newsletters and magazines such as Florida Audubon and other organizational literature. PSAs at organizational headquarters and events that may support a volunteer base. Target PSAs at local talk-radio stations as well as the large FM stations. Phone contact to finalize and to meet initial correspondence to known volunteer prospects that are interested in Brooker Creek Preserve.

VOLUNTEER CONCERNS: Volunteer concerns will be in the areas of training, uniforms, burnout and lack of voice. Training is essential for a project such as Brooker Creek Preserve that will rely heavily on unpaid volunteers to manage daily practices. Volunteer training should instill the idea that volunteers are part of the program, and they must be encouraged to speak out.

MANAGEMENT CONCERNS: The Preserve staff will be concerned with the manner in which the preserve is represented by the volunteers.

SOLUTIONS: Devise a training program which allows volunteers to further the mission of the Preserve in a meaningful way. The guidelines provided in the County's volunteer handbook supply a sound basis upon which to build an effective program for the Preserve. In addition, the volunteers should be given T-shirts with the Preserve's logo for use when they are on duty. The volunteers should also be formally appreciated for their work on at least an annual basis via a mechanism which recognizes hours served and contributions made by each volunteer. Records of these two items should be kept, not only for appreciation purposes, but also to demonstrate the magnitude of the cost savings the volunteers represent to the County budget.

5. EDUCATION & POSSIBLE MEDIA CHANNELS--Newsletters describing the Preserve should be sent to groups such as the League of Environmental Educators of Florida, West Coast Regional Environmental Education Center and the state Office of Environmental Education. Direct mail to environmental education teachers in the Brooker Creek area. Phone contact to follow-up on direct mail and other media channels. Phone contact can also be used to target specific teachers and programs. Brochures that will act as a point of display informing the public on the Preserve.

EDUCATIONAL CONCERNS: The educational community will be concerned about the type of environmental program and facilities offered by the Preserve.

MANAGEMENT CONCERNS:
The perceived concerns of the Preserve staff are in the aspect of utility. Will the preserve be utilized? Does the Preserve have proper facilities? Are programs viable? Does the Preserve have the proper tools for carrying out its educational objectives?

SOLUTIONS:
List possible educational programs and schedules on a brochure that can be displayed at Brooker Creek and send it to all teachers in Pinellas and Southwest Pasco that offer classes in biology, natural history, ecology and environmental education. Clearly list the facilities offered at the site including restrooms, parking, picnic areas and so forth. Brooker Creek will use trained volunteers to guide teachers and students through a predetermined area of the park. Volunteer guides will instruct participants outdoors and inside the environmental education center. The environmental education center will act as a central meeting place to start and finish each session.

6. RESEARCH & POSSIBLE MEDIA CHANNELS--Please see discussion on Research in the Preserve, below)

7. ENVIRONMENTALISTS & POSSIBLE MEDIA CHANNELS--Newsletters addressing environmental organizations such as Florida Audubon, Florida Sierra, Conservation Foundation, Florida Academy of Science, 1000 Friends of Florida, and the Florida chapter of the Nature Conservancy should be supplied with copy pertaining to the Preserve. Face-to-face contact in the form of guest speakers to inform environmental organizations about Brooker Creek Preserve will be very helpful in reaching this audience.

ENVIRONMENTAL CONCERNS: Environmental concerns will be concentrated on impacts that include habitat, flora, fauna, garbage, water and human use. Environmentalists will be concerned with human impacts on the area.

MANAGEMENT CONCERNS: The Preserve staff will be concerned with answering the questions initiated by environmental organizations and in insuring a favorable image in the minds of such organizations.

SOLUTIONS: The inclusion of environmental organizations in Preserve planning and activities will be the most effective means of obtaining their support and participation in Preserve programs.

8. SURROUNDING COMMUNITIES & POSSIBLE MEDIA CHANNELS--Open forum meetings can be a great source for initiating the communities concerns and giving updates on the Brooker Creek property. Meeting times can be posted at the Oldsmar library, YMCA, area churches and at local homeowner associations. Direct mail is a form of communication that can be used to contact the local community. Poster and bulletin board placement offering information are an inexpensive way of touching the surrounding community. Posters can be strategically placed on telephone poles at high traffic, high visibility points, as well as the Oldsmar library, area churches and at local homeowner associations. Telephone contact should be used in emergency situations (e.g., fires) and when concerns need to be addressed on a one-to-one basis.

SURROUNDING COMMUNITY CONCERNS: The surrounding community will have various concerns including how the park is managed and vandalism, just to name a few.

BROOKER CREEK CONCERNS: Dumping, control burning, trespassing, hunting and poaching.

SOLUTION: Keep surrounding community abreast on control burning times and what to look for during the burns. Allow the community to get involved by reporting any sign of illegal dumping, trespassing and hunting on the Preserve property.

9. BROOKER CREEK ALLIANCE (Friends of Brooker Creek)--The first step in establishing a volunteer program should be the creation of a Citizen Support Organization (CSO). It should be set up so that membership fees can act as revenue. Also, members should be used to organize volunteer efforts in and outside of the preserve. The "friends" group will create a point - counter point operation with volunteers overseeing daily services and activities. It will take a number of volunteers to make Brooker Creek successful and the appointed CSO governing board should coordinate them. Business leaders will also be included in the "friends" group and will be viewed as a primary source for fund raising. Egmont Key and the Museum of Science and Industry will be used as models for generating corporate interest.

The "Friends of Brooker Creek" should not only include money-paying members but should also include a second level of membership that incorporates volunteers that donate large quantities of time. These volunteers are vital in the daily operations of Brooker Creek

Preserve. Members from the very vocal horse community should be included, incorporating a horse patrol that will act as security around the perimeter of the preserve. There is vested interest from both Brooker Creek and the horse community. Security must be enforced and research shows that concerned horse people want to help and have offered to ride the fence looking for intruders. A REHAB unit focusing on the restoration of native plants should be included in the "Friends of Brooker Creek" made up of members from the Florida Native Plant Society and other interested individuals. Other operational volunteers that should carry the "friends" title will be members of the surrounding community that will lead visitors in day hikes and educational outings. These volunteers will be well versed in the area's wildlife and history and should be applauded for their support of Brooker Creek Preserve.

Egmont Key has a CSO in place that can be viewed as a model for structuring the Brooker Creek alliance. When setting up a CSO there are a few steps that must be followed.

1. Decide if Pinellas County is interested in an organization volunteer group.

2. Name organization.

3. Incorporate organization in the State of Florida as a non-profit organization.

4. Contact Department of Natural Resources to get all the documents needed for CSO. They will supply them upon request.

5. File with IRS for tax exempt, non-profit status with document #1023. There is a $375 filing fee with the state for filing this document. Also, an organization can not exceed $10,000.00 for the first four years in operation.

6. Get alliance and Pinellas County contract agreement saying that the county has agreed to oversee the land use.

When setting up the Brooker Creek alliance it will be helpful to have a CPA and lawyer on the board so that hourly fees can be reduced to volunteer hours. Also, a financial statement must be supplied annually to the Florida Parks Service so they can review the non-profit status of the organization.

Once the Brooker Creek alliance has been established, a membership application should to be created that divides membership fees into different categories such as individual, family and corporate status. Each membership status will provide different levels of monetary involvement and with each increase in status, a step up in privileges will be provided.

VOLUNTEERS: Volunteers are vital in the success of non-profit organizations. It is a good idea to get a cross section of volunteers that will gradually work into more specialized avenues. The key in working with volunteers is to have knowledgeable supervision that can direct the volunteer staff in areas of expertise. It is important to note that when working with volunteers a good training program is crucial in educating volunteers in proper techniques. A volunteer training guide should be implemented and followed. Volunteers

must be rewarded in some way in order that they feel as if they are doing something with a meaning and purpose.

Brooker Creek should have three distinct levels of volunteers. The first level should be the "Friends of Brooker Creek" made up of big business and dues-paying membership. This level will primarily focus on fund raising and management functions through public interaction. The second level of volunteer will be those that donate large amounts of time in the daily operations of Brooker Creek such as horse patrol and field guides. The third level of volunteer should be those that do the undesirable volunteer work, such as garbage clean-up. The court system is a great source for those that must complete a given number of community service hours. Heritage Park in Pinellas County has a tiered volunteer system that should be examined as a model for Brooker Creek Preserve. Contact Ken Ford for further information on Heritage Park at 582-2123.

A volunteer coordinator should be set in place who will be responsible for much of the volunteer recruitment. It is important that the volunteer coordinator have one person in a department or facility that would have a complete understanding of the volunteer program's policy and procedures and would act as a liaison between the volunteers and the staff.

Volunteers no longer fit a stereotyped image. They may be elementary school children who volunteer as a group to pick up litter, or active individuals in their eighties, with both knowledge and experience to share with others. Volunteers come with different backgrounds, abilities and desires to interact with other people. Socializing among volunteers and between volunteers and staff is an inherent part of any volunteer program.

A separate volunteer plan should be implemented listing rules and regulations, recruitment techniques, training procedures, etc. Pamela G. Kinnaman, Volunteer Coordinator for Pinellas County should be contacted. She recruits and places volunteers for Pinellas County. She and the county have an extensive volunteer effort giving an orientation for county volunteers that includes a volunteer handbook.

Some examples of groups that can be contacted for volunteer sources are:

* Local special interest organizations, such as Audubon programs, Nature Conservancy, Wildlife Society, garden clubs, habitat interest groups and hiking organizations (Pinellas Trails, Florida Trail).

* Members from the horse community that can act as security.

* Boy Scout troops.

* Civic groups-Individuals that may be interested in a certain topic may want to work in projects such as clean-up and other duties.

* Key teachers and students interested in environmental education. Also, local PTA groups can be addressed for their involvement in activities such as clean-up and support.

* Retired educators used to lead volunteer research groups or to act as trail guides. The American Association of Retired Persons (AARP) is a good contact for any type of retired person volunteer program.

* College students-Undergraduate and graduate level.

* Church groups

* Area homeowner associations

VOLUNTEER RECRUITING: Recruiting requires patience and persistence, particularly in the initial stages of building a program. As time goes on, satisfied volunteers will spread the word and may be one of your best sources of additional help. A good place to start looking for volunteers is at a volunteer clearinghouse such as the Volunteer Action Center and the Retired Senior Volunteer Program; both have locals in Pinellas County. Possible ways of contacting volunteers are:

* Telephone organization leaders and ask for their involvement.

* Mention in organization newsletters through advertisements and article placement.

* Offer to speak at organization meetings to spark interest.

* Use faxed messages targeting organization headquarters.

* Devise a way to get bulletin board placement at organization headquarters. Put up eye-catching displays on bulletin boards in schools or known organization meeting places.

* Use radio PSAs to make contact, offering volunteer jobs.

* Use traditional press releases and public service announcements targeting volunteer action.

* Advertise in known outdoor publications such as Sierra and Outside magazines.

* Target newspapers with press releases, especially specific sections such as the outdoor calendar in the sports section.

* Personal contacts

* Develop mailing list to University biology departments describing volunteer program and requesting volunteers.

* Develop a visiting program that incorporates a speakers bureau and involves field trips to the preserve.

* Use the local cable companies to broadcast segments about Brooker Creek Preserve on their public access channels.

* Develop an intern system with high schools and colleges of all levels.

* Put an ad in the Biological Field Station Directory for scientists willing to direct field studies.

Ken Ford at Heritage Park was contacted regarding his volunteer program. He said that word of mouth is his greatest recruiting technique. Brooker Creek Preserve is the best selling point for the volunteer program. In other words, it will sell itself. Use media channels to spread the word about volunteers and they will come to you. Ford said that a monthly broadcast on Vision Cable's public access channel is one of the best generators of volunteers as well as visitors to the park.

Individual volunteers can be reached through the news media, at club meetings, social functions, or church gatherings; through professional societies or senior citizen groups; at shopping malls, fairs or conferences; and through private business, industries, or state and other federal agencies. Student volunteers can be found on college campuses and reached through the college's clubs, student union information networks, college newspapers, job placement centers, and by approaching professors teaching a course related to the needs of Brooker Creek. High school and elementary school age volunteers can be found through teachers, principals, guidance counselors, and clubs. Special interest groups, such as a local hiking club or boy scout troop, can be reached through an active member or group leader.

Many courts now have alternative sentencing structures in which individuals found guilty of certain crimes do public service work rather that serve jail time. Many times the individuals eligible for alternative sentencing are juveniles or persons who have committed "white collar" crimes. These individuals can be used for the less desirable volunteer chores such as litter pick-up and trash removal.

Radio and television are effective in conveying interest in Brooker Creek through a volunteer program. Public service announcements can be heard by thousands of people and participation in local talk shows gives some intimacy of personal contact while reaching many people at once.

Non personal techniques of communication such as posters, articles or slide shows can also reach a great number of people but lacks the enthusiasm and question-answering abilities of personal contact. When using non personal techniques, enough information should be given to answer the potential questions of an interested individual. Articles in newspapers, newsletters or magazines and letters to the editor will give specifics to the volunteer needs of Brooker Creek. Posters, posted notices, and exhibits can be placed in a number of places, including conferences, supermarkets, and at the Brooker Creek environmental education center.

Slide shows can be loaned to groups or organizations. A well done slide show will answer many questions concerning the program without requiring the presence of a Brooker Creek employee. A volunteer with audio-visual experience may produce the show and may even present the program in a speakers bureau format, going from location to location discussing Brooker Creek. Direct mail techniques can also be an effective way to reach people, but requires an investment of time and money that may be handled with volunteers.

CONCLUSIONS

Creating a public involvement plan is a step-by-step process that involves setting objectives, defining key audiences, selecting media channels, developing a message,

establishing strategies and analyzing the results.

Preliminary research in developing a Brooker Creek public involvement plan was completed through questionnaires, public meetings and interviews, as well as informal contacts and conversations. In order to develop a public involvement plan, our management team must derive a set of objectives that can be implemented into a fully set plan. Ongoing brainstorming sessions must take place in order that objectives, audiences and media channels can be defined. As this information is clearly understood, our message can be refined and strategies can be established to reach the desired goal in getting the public involved at Brooker Creek.

The preliminary research uncovered the importance of volunteers and the need for the creation of a Brooker Creek alliance or "friends" group that can be used to develop a volunteer bank and as a funding source.

RECOMMENDATIONS

* Develop an outline for the Friends of Brooker Creek alliance that states mission, by laws, number of board members and board member roles.

* Develop the governing board of the "Friends" group and file the proper paper work.

* Implement the three levels of volunteer programs
  -Use "Friend" members to head volunteer efforts
  -Devise a volunteer training program
  -Decide on active or passive park use and then train volunteers accordingly
  -Coordinate volunteers into their roles

* Divide the public involvement plan into a series of phases.

* Prepare proper signage to the Preserve's entrance.

* Contact Pinellas County and FDOT to have road direction signs to the Preserve established.

* Contact the Pinellas County and Florida Parks Departments so that Brooker Creek Preserve can be listed on all available free literature (Florida Parks Department 904-488-3300 and Pinellas Parks Department 813-464-3347).

* Contact atlas and map makers so that Brooker Creek Preserve can be noted as a functioning park in their publications (Florida Atlas & Gazetteer from DeLorme Mapping 207-865-4171).

* Target area newspapers about a dedication ceremony, field study or ground breaking that may take place at the opening of Brooker Creek Preserve. This type of event will surely get media coverage and could provide much needed photo opportunities.

* Send press releases targeting environmental publications such as Florida Audubon.

* Contact civic groups (Kiwanis and Rotary) and offer speaking engagements to those who are interested.

* For the opening day celebration send out letters of invitation to influential members of the community and to organizations targeted by the Brooker Creek management team as being beneficial volunteer sources (Florida Audubon, Florida Trails).

* Target area McDonald restaurants who use tray liners with environmental messages on them. They have been known to advertise for Pinellas Parks in the past.

* Target Green Magazine, a public access cable show on Vision Cable in St. Petersburg. They have been known to do feature stories on parks and recreational activities that involve the environment.

* Enlist the cooperation of the Florida Trail Association in constructing and maintaining walking trails within the Preserve. Ask to be included in their literature 904-378-8823.

* Telephone organizations that are sources for volunteers.

* Use bulletin boards to inform audiences about Brooker Creek.

* Develop mailing list to university biology departments describing the Brooker Creek volunteer program.

Environmental Education--The Plan was prepared following open, informal meetings with educators, ecologists, and other interested individuals in which the need for an environmental education program was clearly supported by all involved.

OVERVIEW--A viable environmental education program and an on-site education and visitor center are indeed essential components for the Preserve. The population of the Tampa Bay region will benefit by the opportunity to see and relate to "natural" Florida. More critically, area residents need to understand how they can extend that natural Florida to their back yards. On-site education will provide an incentive for this extension as well as providing awareness of the need to implement effective resource management. A natural curiosity about "real" Florida is the best path to an environmentally sound future for Pinellas County.

INTRODUCTION--Environmental education is not just a collection of facts. It is a topic of life-long importance that is characterized by a constant interplay of environmental information, social and economic impacts, and personal values. It requires a holistic approach in the collection of environmental information. This lifestyle perspective includes an ever- developing awareness of the interplay between built and natural environments, and an understanding that there is a level at which both are "natural". Since we are dealing with a lifelong process, new facts must be added as we come to understand more about the Brooker Creek Preserve and some will be outdated as conditions change or research becomes available. Brooker Creek is not a pristine environment, but it is one where we can emphasize problem solving skills, and promote enduring values, attitudes and commitments

to solving our coastal environmental problems.

The task at hand is to prioritize the kinds of educational programs and methods to best educate Pinellas County, the Tampa Bay region and Florida's public about Brooker Creek's wildlife, native plants, habitats and ecosystems that can be possible at an environmental education center located at the Preserve. Such programming has been suggested during informal, open forum meetings with key members of the local environmental education community and other interested parties. These community members gave insight and wisdom on a wide variety of environmental concerns relating to environmental education needs in the area (see attached). This environmental education focus group included Pinellas County teachers, a board member from a South West Florida Water Management District Basin Board, members from Florida Native Plant Society, an employee of Florida Power Corporation, and members from two Pinellas County environmental education centers (see attached listing).

The meetings offered a great deal of information on environmental educational issues concerning the future of Brooker Creek Preserve. The thrust of the meetings developed the idea that the focus of the center should be public awareness through education about the Brooker Creek system and the surrounding population impacts. Brooker Creek is an 'island' in almost every ecological sense. The thread of the concepts and ideas of the study of island ecology should figure strongly in all educational programming, both passive and active. This message could be done in a positive manner by encouraging all visitors to "extend the island". The focus would then be on the restoration of habitat throughout the tri-county area (especially with Pinellas County's new residents).

Any interface with formal school programs should involve research- related environmental education through active or passive programs. Additionally, teacher training could be an important part of the Brooker Creek Preserve program. This training of local teachers would be part of the recertification inservice program. It would encourage teachers to learn more about their immediate environment as well as give them a data based perspective from which to teach. Most importantly it would encourage them to share with their students the benefits of "extending the island". This better educated community would of course be Brooker Creek's as well as Pinellas County's most valuable resource for the future.

COMPONENTS AND ISSUES--The content or focus of the environmental education program should be on the basics: Brooker Creek's significance in preserving native Florida wildlife and habitats. The system effects of Brooker Creek Preserve must be shown in terms of providing habitat for northwest Pinellas County's remaining indigenous species of plants and animals. The special role for Brooker Creek is that it can provide host sites for habitat restoration and serve as a role model for surrounding developed areas.

Flora and fauna that have otherwise been diminished because of human population impacts can thrive again in Brooker Creek. This must be emphasized while demonstrating what is possible even in the most impacted areas outside the Preserve. Here we can have a truly educational laboratory for local citizens via the understanding of restoration programs for Brooker Creek as well as their own back yards. The basic message must be the role that good land management plays in small tracts and large.

The Preserve acts as one of the last domains in Pinellas County for one to view or research turkey, bobcat and white-tailed deer along with many other species of plants and animals. The Preserve can be a naturalist's haven and it must encourage viable populations

of native species. It is an opportunity for local government to set the standard for responsible action by employing conservation principles and activities via support of an environmental education program at Brooker Creek Preserve.

Education about the Brooker Creek system of wetlands and uplands should be a part of the program. Wetlands together with other surface water and ground water features should be described in a system context, and their contribution to the maintenance of the Preserve's native habitats and wildlife should be one of the points of emphasis of the environmental education program.

The roles of the Preserve's upland areas must also be described as they supply important habitat as well as act as large "filters" as precipitation is absorbed. Understanding upland relationships are also important because of the serious nature of recent human impacts in some of the more accessible areas of the preserve. This understanding will be critical to beginning sound land management practices.

Education about Brooker Creek wetland and upland systems is extremely important in developing public support for the restoration and management efforts for the Preserve. This must be the first step in "extending the island."

EDUCATIONAL GOALS

* Provide passive as well as volunteer- led educational programs and facilities for the study of Brooker Creek Preserve's natural history. The program will target the general public as well as provide access for local school groups K-12, post secondary, and continuing education/community service programs.

* Provide inservice training for local certified Florida educators.

* Provide educational background and training for those volunteers interested in assisting staff or scientists with Brooker Creek Preserve environmental research and management projects.

* Create an outlet for the development of a locally focused environmental philosophy through a better understanding of regional natural history, as well as a more focused environmental awareness.

* Serve as a community resource to bring people to a state of environmental awareness and appreciation, provide a research setting for Brooker Creek Preserve concerns and management issues and give understanding through the knowledge of principles about the Brooker Creek Preserve ecosystem.

EDUCATIONAL INVOLVEMENT--Programs and passive educational opportunities should be available for students of all ages, educators, civic organizations, casual participants, including handicapped persons. Specific programs, particularly winter season programs for seasonal residents and summer programs for youth, should be devised to target a variety of topical audience interests. Basically, it will be essential to work first with those groups of residents that are perceived to be interested in the programs of the Preserve. Other groups, not as easy to include in programs such as those recommended, should become special targets of an increased effort to promote involvement in the Preserve.

K-12/ Area Public and Private Schools

It is estimated that science and social studies students from the formal educational sector will be major users of Brooker Creek during weekdays. All programs and activities important to these students should be designed with the State of Florida Department of Education State Course Standards for each topic, and in conjunction with the goals of the state Office of Environmental Education. Special attention should also be given to the goals of the State Science, Technology and Society standards for middle school students.

Specific courses currently offered by the Pinellas County Public Schools could be enhanced with hands-on activities at the Preserve. Concepts, theories and field techniques which were taught in the classroom can be applied to the natural biological communities which will be studied during field trip activities. Local teachers would be encouraged to work with the school system in developing programs that could be utilized when visiting Brooker Creek Preserve.

Whenever possible the effort should be to focus on the unique management issues found in the Preserve, from deer or other wildlife management issues to discussion of the meaning of the urban wilderness interface in the coming century. The recurrent theme of blurring the sharp definition of that urban/wilderness interface by facilitating the extension of urban islands such as Brooker Creek into the landscaped backyard must be of the utmost importance. All lands must be managed by responsible stewards, be they back yards or the greatest of our parks. The Brooker Creek watershed, while a classic example of island ecology, should be managed with the utmost care.

College and Universities

Requests from post-secondary institutions for project opportunities or educational programs should be met whenever possible. Institutions in Pinellas County which should be informed of such opportunities include the University of South Florida, St. Petersburg Junior College, the University of Tampa, Eckerd College, Florida College, Florida Southern College, St. Leo College, Pasco-Hernando Community College and Hillsborough Community College. It is anticipated that these activities will greatly enhance the regular classroom activities of area college courses. Projected activities would include, but are not limited to, field trips, lectures, and student research activities (See also section on Research on the Preserve, below).

General Public

Programs at Brooker Creek Preserve will be made available especially to the general public. This will include but not be limited to community groups, private groups, civic organizations, and casual visitors. Through the activities provided by this site, members of the general public will benefit by learning about the ecological, economic, historic, recreational and aesthetic importance of our natural resources. The entire program should focus on what is different about Brooker Creek and present a special message to the urban dweller. For example, it should be important that even casual visitors know about the adjacent well field and its importance to the water supply.

Programming for Special Students

Included in the site's development will be an area for visually and/or physically challenged persons. This area should provide the facilities and associated activities so those with visual or physical limitations can participate in meaningful environmental education

learning opportunities and activities.

Special Event Programming

Special events offer unparalleled opportunity to not only develop community support for the Peserve but to also create unusual and very memorable learning events for participants. For example, restoration efforts such as a longleaf pine planting event accompanied by informative handouts and seedlings to take home can be a great start on the message to "extend the island." Many a well- meaning volunteer can become a better educated citizen through such efforts. In the process they will also become more dedicated volunteers as their understanding of the issues increases. Even mundane tasks like general help on trails can become educational events if the concept of routine and regularly scheduled work days are planned with educational components in mind.

Summer Programs and Elder Hostel Programs

Summer programs especially short-term residential fee-assessed programs for older children offer the most exciting, demanding, labor intensive, profitable, hands-on action available to an environmental education center. It will be the best incentive for membership and financial support of the Friends of Brooker Creek groups for families. It is the kind of program that will offer more media coverage on a slow news day in the summer than any other. And it will always be guaranteed to be the community favorite. Such programs are sure to win community support, and long term, they will do the best job of securing community commitment. Given the demographics of Pinellas County, it would also be a good idea to offer Elder Hostel-style educational programs of this sort through out the rest of the year for both year- round residents and seasonal visitors.

FACILITIES, IMPACTS AND FUTURE CONSIDERATIONS--Critical to the success of the Preserve must be a well developed plan that includes trails for passive education and a modular educational facility that will be used for a variety of public interactions. This facility must serve as a base of operation for volunteer groups as well as a center for multi-functional interactions for informal as well as formal general public as well as school group visitors. Pragmatically we must conclude there are other needs including a "gift shop", a biological field station (see further discussion, below), and storage facilities. Recommendations for educational use are as follows:

* Nature trails/boardwalks/signage

Nature trail loops and boardwalks should provide access to the various biological communities and points of interests at Brooker Creek Preserve to the greatest extent that is possible from the perspectives of security, safety and financial considerations. These should be placed so as to access the greatest environmental diversity and points of topical importance. Signage will also be provided for those wishing self-interpretation vs. formal environmental education activities.

* Environmental Center Building

This building should serve as the central staging area for all activities at the site. Walk-in participants and those participating in self-interpretation activities will receive an introduction to Brooker Creek Preserve through innovative three dimensional and free standing ecosystem displays as well as interactive audio-visual presentations such as those

currently under development at University of Florida and particularly Florida State University. A modular design for the building would allow not only for greater flexibility in programming and less congestion, but more importantly it could offer a more peaceful arena to learn about the Preserve. By blending indoor and outdoor spaces in a modular fashion, making optimal use of passive heating and cooling systems, such a facility could also further encourage the concept of "extending the island." It would be a critical message for visitors to understand that design with nature is possible to a greater extent than is normally found in the institutional buildings that are typical of environmental education centers around the state. This is an opportunity for Pinellas County to become a state leader in a manner that does not have to be excessively cost intensive. For example, by working with the Florida Solar Energy Center, and perhaps the architecture program at the University of South Florida a concept could be developed that would be both affordable as well as conceptually enlightening to the environmental perspectives of the casual visitor. In the design of such a facility thought could be given to expansion over time that would be structurally and conceptually compatible.

Schools and other groups participating in formal environmental education programs should have a special area away from exhibits, volunteer spaces, or administrative spaces that would allow for an introduction by a volunteer or staff member. All trails and boardwalks should depart from and return to the environmental center. The center could be used for the usual lectures and demonstrations for program participants but also allow for unique opportunities dealing with environmental education programs such as small stages or amphitheaters. The center could then be used for public seminars, forums and to accommodate larger groups or non-credit classes. Restroom facilities will be provided in this building as well.

The most difficult task for the Preserve is convincing taxpayers that another environmental educational center is needed in a county that has several. The size and unique nature of the Preserve in Pinellas County must be emphasized as the strongest asset while at the same time encouraging the establishment of an endowment fund such as the one which the Florida Audubon Society has established over the past ten years (now totaling two million dollars). Centers totally funded by county tax dollars have in recent years been much more difficult to establish. For example, the Marion County facility was literally on the drawing board for years and not what it was first envisioned when it was finally built. A building or even an endowment campaign sponsored by the Friends group is one strong option. Another might be to piece together funding from the various local water agencies, both supply side and regulatory. There is some precedent for this from at least SWFWMD and there seems to be good promise of other assistance of this sort for this facility.

* Gift Shop

Defraying the operating costs of such an EE facility should also be considered. A gift shop can be of good educational value if it is done more in the style of, for example, the Tallahassee Junior Museum.

Another most viable opportunity comes with the fact that there is not a quality natural history/environmental bookstore in the Tampa Bay area. While no small shop can afford to carry such costly inventory, there are many book wholesalers, particularly of popular environmental science, that are willing to have limited stock on consignment or with buy-back arrangements. Other items such as bat or blue bird houses or plans for butterfly gardens might be viable as might Brooker Creek wild flower honey or Brooker Creek

Prickly Pear jelly.

* Biological Field Station

In conjunction with these facilities there would be some space provided for a research and environmental education lab and library. Having such an arrangement would benefit the County in a variety of other ways. Lab space similar to that at Mote Marine Labs greatly enhances the opportunities for local community involvement in research activities, particularly by retirees (as the program at Mote clearly demonstrates). By providing some limited lab space as well as short term housing the chances of getting additional "free" research information from, for example, graduate students, would be dramatically increased. This would allow the county to quickly take a leadership role for understanding and successfully managing such an innovative urban island concept, especially in areas such as hydrology, controlled burning, and wildlife management. A better understanding of this kind of urban ecology will provide benefits not only to the county but to all of Florida. A solid library facility would be essential to this effort. To provide such a lab and library center for urban ecology, with a total focus on environmental integrity in urban areas would place the county in a most admirable position for very little, if any, capitol outlay. These would be particularly good facilities to incorporate business support for required capital costs. See also discussion on the Brooker Creek Preserve Biological Field Station, below).

Considerations and Future Promise

Ideally all of this built environment area should interface with the projected nature trails on the south property. We must attend to what make the environmental education program different, more viable, more unique, and more self sustaining than other environmental education programs. Brooker Creek facilities such as these being suggested for the south property offer exponentially more opportunity the typical environmental educational facility around the state. Usually the kinds of programs that the suggested facility could afford are only found in private facilities such as Sea Camp in the Keys, or perhaps programs offered by state agencies such as the Game and Fish Commission or the Department of Forestry. Yet these residential education and research opportunities are usually not joined with an ability to truly provide excellent short visit educational experiences. Pinellas County, with it's large population has special problems and concerns for it's remaining natural Florida. Brooker Creek can offer special opportunities to answer those problems and concerns with a tailored and well planned educational complex of facilities, trails, exhibits and urban wilderness management opportunities.

Consideration must be made for the mundane and the educational facility should be viable, including: parking facilities, roads and surrounding housing. The environmental education meetings brought to the surface the following recommendations. Keep paved parking facilities to a minimum and use cinder, paver block, wood chip or ash surface whenever possible. Minimize roads and those that are used should be paver block or a similar surface so that grasses can grow. Erect proper fencing along the property that borders surrounding housing so that trespassing and poaching will be kept to a minimum. Even the most mundane items should be educational in that they should set examples to follow.

ENVIRONMENTAL EDUCATION ADVISORY COMMITTEE--An on-going environmental education advisory group should be formed to assist the director of Brooker

Creek Preserve in making sound educational decisions and to provide policy advice as needed. It should be a balanced representation not only of environmental educators from Pinellas County schools but educators from surrounding counties, higher education facilities, corporate or agency personnel involved in environmental education programming, SWFWMD's Education Co-ordinator, Pinellas County Water Department's Environmental Planning Manager, and, possibly, environmental education consultants. It is recommended that formal sector educators be represented as well as supportive non-formal members such as representatives from the Florida Native Plant Society. The environmental education advisory group should be encouraged to be involved in the creation of the Brooker Creek Preserve master plan and on-going management activities for appropriate environmental education programming.

The advisory committee would provide input to the Preserve manager, and assist the "Friends of Brooker Creek" CSO alliance in understanding appropriate educational strategies for the preserve. Activities for the education committee include but are not limited to the following:

* Implementing plans;
* Conceptualizing center exhibits and displays;
* Research on methods and programs;
* Defining public interests and needs;
* Developing policy for educational program content;
* Maximizing public involvement in projects; and
* Defining audience messages for public awareness work.

The environmental education group that was used as a resource for this plan has expressed interest in continuing such involvement. The group was made up of formal and informal educators, corporate and agency representatives. Recommended membership for the environmental education advisory committee might include persons from the following organizations:

* American Association for Retired Persons;
* Florida Academy of Science;
* League of Environmental Educators of Florida;
* Florida Native Plant Society;
* Local Audubon chapters;
* Hillsborough Committee of 100;
* Pinellas Economic Development Council;
* University of South Florida or other area college
* Local Sierra Club chapters;
* WMD Basin Board representative;
* Pinellas County environmental education resource teachers; and
* Friends of Brooker Creek.

CONCLUSION–The Brooker Creek Preserve educational program offers a unique opportunity to inform the public about issues concerning the environment. A focus group was formed to discuss the environmental education concerns of Brooker Creek Preserve. The group was comprised of formal and informal educators as well as members of the

community that have an interest in the environment. They originated some good ideas and created a foundation in which to build the Brooker Creek Preserve environmental education program. Educational programs must be prioritized to best educate Pinellas County, the Tampa Bay region and Florida's public about wildlife, native plants, habitats, and ecosystems.

The recommendations of our ad hoc advisory committee made up of the most active of the local environmental education community felt strongly that the focus of the Brooker Creek environmental education program should cover the basics that include: wildlife habitats, including the aquatic, the wetlands and the uplands, as well as the overall system effects. Initial goals for the program were developed and recommendations made as to what type of facilities to construct. An on-site environmental education center is strongly encouraged to be an integral part of the Preserve's education program. This facility will act as a focal point for all Brooker Creek Preserve activity as well as serve as a learning environment for education in this unique urban wilderness, a core area for the island that must be extended to the greater community.

MISSION STATEMENT--The environmental education advisory group which assisted inthe development of the above information considered the development of a mission statement for the Preserve. The group strongly felt that a mission statement should be a consensus of all individuals having an interest in the Preserve; therefore, the group recommended that such a statement be deferred to a later time.

List of Participants in the Environmental Education Workshops

1. Gwen Tillotson, Basin Board Member, Southwest Florida Water Management District
2. Terri Garnhart, Guglielmo & Associates, Inc.
3. Juliet A. Gradual, Florida Power Corporation
4. Judith Buhrman, Florida Native Plant Society
5. Chuck Parsons, President of the League of Environmental Educators of Florida
6. Candace Weller, Florida Native Plant Society
7. Kevin Cook, Breuggeman & Assoc.
8. Judi Breuggeman, Breuggeman & Assoc.
9. Patricia Dooris, Institute for Environmental Studies, University of South Florida
10. Jan Zerbe, Hillsborough Community College
11. Guy Warner, Environmental Education Teacher, Pinellas County Schools, Moccasin Lake Nature Park
12. Greg Howe, Moccasin Lake Nature Park
13. Barbara Gugliotti, Secretary, League of Environmental Educators of Florida
14. Ellen Manning, Dayspring
15. Francia Smith, Environmental Education Teacher, Pinellas County Schools, Sawgrass Lake Park

Herbarium and arboretum--Environmental education can include other activities. For example, an herbarium should be established to catalog the species of plants found on the Preserve. A very good start on an herbarium has been made as part of the plant survey done for this report. As part of the plant inventory of the site, voucher specimens were collected. These are deposited in the University of South Florida Herbarium. Once

administrative and research facilities are built at Brooker Creek Preserve and staff employed by Pinellas County to curate or supervise the curation of the collections, an on-site herbarium can be established. At that time a standard curatorial protocol and a herbarium policy should be developed.

A number of small herbaria have been established over the years by various agencies and groups that have been lost through neglect or eventually combined with larger collections elsewhere. These collections can be very helpful to researchers on the Preserve, and it is recommended that an herbarium be established in the biological research station (described below) to be located in the environmental education center.

It was originally proposed that part of the preserve be used for an arboretum. Recently, a similar facility, McKay Creek Botanical Park, has been proposed for Pinellas County. Until the mission of McKay Creek Botanical Park is more firmly established it seems premature to do much planing for an arboretum at Brooker Creek.

If it is decided that an arboretum is to be built at Brooker Creek, it is very important that a mission statement for the arboretum be developed in early phases of planning. Such a statement will include such items as the type of collection development (e.g. native or non-native species, plant groups emphasized), education programs (e.g. grade level and level of involvement), community involvement and support groups, and possibly research programs.

The mission of existing arboreta and botanical gardens in the southeastern United States, especially those in west central Florida will need to be examined so that the mission of the Brooker Creek Arboretum will not only serve the specific needs of the region, but will not be duplicated in the mission of other arboreta. Once the mission has been determined, specific and realistic goals will be established. These should include short-term (i.e., 2-year, 5-year) and long-term (i.e., 10-year, 25-year) plans and will include facilities, staffing, educational programs, research, and funding development.

Another item which will assist both researchers and the public interested in the environment is a library of materials specific to Brooker Creek and west central Florida in general. The library can occupy a small room in the environmental education center which can be supervised by volunteers from the Friends of Brooker Creek. As the library grows, it can participate in the statewide network of small technical libraries. Funding for such a facility will not be burdensome, and foundation support should be easily obtained. The library can easily be accommodated in the biological research station (described below).

Research--Research programs conducted on the Preserve, either by the Preserve Manager or by outside researchers, should be incorporated into the environmental education program and the volunteer program at the Preserve. Such an incorporation or merging of the three programs offers several benefits to the community and to the Preserve. First, volunteers participating in the research take home valuable experience in environmental work. Second, the use of volunteers can reduce costs of research projects. Third, the data can be translated immediately into the environmental education program materials and exhibits available at the Preserve. Fourth, additional pathways for public involvement in the Preserve are provided, thereby increasing the Preserve's base of support in the community.

In order to encourage the interaction of the research, environmental education, and volunteer programs at the Preserve, it will be necessary to establish a means to link researchers with individuals who are interested or wish to assist in research projects. The Preserve Manager, as the Resident Scientist (see the section on Staffing, below). Therefore, would be the likely contact to bring the individuals together. The Preserve Manager will

have knowledge concerning the research being conducted on the Preserve, and he can inform the Environmental Education Co-ordinator (see Section on Staffing) and the President of the Friends of Brooker Creek. These individuals, in turn can assess the interest in participating in specific research projects in their respective groups and contact the Preserve Manager accordingly. The Preserve Manager can then inform the researchers of potential assistance for their work.

Researchers seeking to conduct work on the Preserve should be notified that the Preserve has an active volunteer program and that volunteer participation in research projects is strongly encouraged. This information should be included in any materials addressing the major programs on the Preserve, and it should be mentioned in the description of the Brooker Creek Biological Research Station in the Guide to Biological Field Stations (for additional discussion on the role of research on the Preserve, see the section Research on the Preserve, below).

Recreation--Ideally, recreational opportunities on the Preserve should not duplicate those available in adjoining areas. Within 10 miles of the Preserve, various parks and other public facilities offer interpretive walking trails, picnicing, ball diamonds, tennis courts, handball courts, playgrounds, swimming, fishing, equestrian trails, boat ramps, canoeing, and bicycling. Therefore, many recreational opportunities needed by County residents are provided by other public facilities for which a primary emphasis is recreation. On the Preserve, where the focus is not entirely on recreation, activities should be consistent with the goals and mission of the Preserve. Therefore, recreational programs on the Preserve should be of a passive non-consumptive nature, and they should reinforce displays and materials viewed in the environmental education center. Recommended activities include: trails designed for walking, bird watching, and photography; trails for long hikes by small groups (not now provided on other facilities); equestrian trails, and limited primitive camping for small groups by arrangement.

A network of short walking trails should be developed which provides easy access to representatives of the variety of habitats on the Preserve. While a specific design of the trails will be necessary eventually, a few guidelines gleaned from conversations with the public are provided here. The trails should be constructed which allow continuous walking but which invite stopping at several locations on the trail. Rest stops with benches should be out of the path of the main trail in order to allow quiet activities such as bird watching and photography. A large proportion of the trails should be accessible to visitors using wheelchairs, canes, or walkers. Interpretative materials describing the trails should incorporate sounds where possible in addition to visual information. Trails should be as close to ground level as practical, giving due consideration for the seasonal wetness of the property. The opportunity for night time trail walking should be provided to groups on an appointment basis after sufficient staffing has been procured for the Preserve to accommodate such requests.

The Florida Trail Association (FTA) has expressed a willingness to work with the County and SWFWMD in developing a 15-mile hiking trail in the Preserve. This trail would be for use by the Association members and the public at the discretion of the Preserve Manager. Arrangements between various agencies and FTA have been mutually beneficial, and it is recommended that the County pursue an agreement with FTA. This part of the recreational program could be initiated immediately.

Equestrian trails should be developed in Section 2 (T27S/R16E). Perimeter trails in

the area south of Keystone Road could be constructed in the future where practical. Co-ordination with representatives of the equestrian community is strongly recommended before a specific design for the facilities and trails is done.

Some recreational activities are not considered compatible with the goals and mission of the Preserve. Non-compatibility is most often the result of concerns related to public safety, ecosystem preservation, and maintenance of a preserve-like environment (ie. free from excessive noise, etc.) Non-compatible activities include, but are not limited to, off-road vehicular use, bicycles on walking trails, radio-controlled airplanes and other devices, and active sports. In general, activities which are encouraged and allowed on the Preserve must represent a balance between the various needs of the citizens and the needs of the land within the Preserve. Because it is necessary to balance these needs, it is not possible to allow all desired activities on the Preserve while still maintaining the mission of the Preserve. The facilities and activities recommended in this report represent a concerted effort to strike a reasonable balance.

Research on the Preserve--Brooker Creek Preserve is ideally situated and suited for the development of an ecological research program to be conducted within the mission of a biological research station located on the Preserve. In the state of Florida, there are approximately seven facilities which function, at least in part, as considered biological research stations: (1) Archbold Biological Station, (2) the MacArthur Agro-ecology Research Center, (3) the Indian River Marine Science research Station, (4) the Harbor Branch Laboratory, (5) Mote Marine Laboratory, (6) Tall Timbers Fire Ecology facility, and the (7) Gulf Breeze Ecological Research facility. Of these seven, only the first three are listed in the Guide to Biological Field Stations (Merritt and Hannakan, 1992), the official listing of the Organization of Biological Field Stations (OBFS). Of the seven, four (#3, 4, 5, & 7) are primarily concerned with research in the marine environment; one (6) is involved in work on fire ecology in North Florida; one (2) investigates chiefly into the relationship between cattle ranching and citrus production and the native ecosystems of Florida; and one (1) emphasizes research on the ecology and evolutionary biology of organisms native to southern Florida, particularly the scrub habitat. None of these facilities are located in central Florida, and none is heavily involved with the research issues which are of chief concern in the area from which Preserve visitors will come, Pinellas, Pasco, and Hillsborough Counties. Therefore, the establishment of a biological field station on the Preserve would not duplicate the work done by other formally-established facilities in the state.

Research on issues relating to Brooker Creek has been and is being conducted in various areas by faculty of the Departments of Biology and Chemistry at the University of South Florida. This work is done from the university using grant funds from a variety of sources and is not conducted via the programs of a biological research station. The development of a biological research station at Brooker Creek may well enhance the opportunities for research in central Florida and may serve to focus research efforts on areas of direct interest to the Preserve.

The research program can and should be implemented as part of the environmental education program, and it should benefit the Preserve in three ways:

1. It should be directly relevant to the management needs of the Preserve and should provide low cost, site-specific information which would be available to the Preserve

Manager.

2. It should reduce the need for full-time staff somewhat, thereby saving money for other uses.

3. It will enhance the environmental education program by providing unequalled opportunity for the involvement of the public in environmental work having immediate value to the Preserve and to the county.

The Preserve has several characteristics which serve to make the area a highly desirable location for applied research. First, the Preserve has been the site of several different types of activities which have left their mark on the land. Therefore, the Preserve would be an excellent location in which to investigate the specific long-term effects of disturbances such as the swath clearing in wetlands, maintenance clearing on wetlands, etc.

Second, the Preserve would be suitable for the study of any restoration programs which may be implemented on site. For example, the rehydration of wetlands in Sections 13 & 14 (T27S/R16E), if undertaken, would provide an unparalleled opportunity to evaluate the specific benefits and costs of long-term augmentations in central Florida. This information would be extremely useful to the county, to SWFWMD, and to the West Coast Regional Water Supply Authority in the management of wellfields.

Third, the Preserve is being encroached upon by urban development on all sides, and it provides a rare opportunity develop long-term projects monitoring the effects of urbanization on natural systems. Certain plant and animal species are highly sensitive to changes in air and water quality and are therefore useful as pollution indicators. No other areas of public ownership exist in Pinellas County that can be used for this type of long-range research. Further, because the Preserve is surrounded by suburban development, it can be viewed as an island of relatively undeveloped land--a situation which is becoming more and more common in Florida. Research on the wildlife in the Preserve and on adjacent private lands would be invaluable for assessing this "island effect" and would materially aid the management of animal populations on the Preserve. A research program at the Preserve having an emphasis on urban wildlife ecology would serve as a model throughout the state and would generate data which would be very helpful to other urbanizing areas.

Fourth, because of the abundance of fire-maintained communities, the opportunity for permanent fire ecology studies exists. Few sites within the state provide this opportunity. The Tall Timbers facility in north Florida is the only facility dedicated to fire ecology study. Two other facilities, the Eco-area administered by USF and the tract administered by Archbold Biological Station, are involved in fire management studies. No fire ecology facility exists in the service area of the Preserve.

Fifth, the Preserve has been surveyed for the occurrence of plant and animal species, but many species which should be present on site have not been observed. A program to identify 100% of the species on the Preserve should be developed in order to aid the Preserve Manager in his activities.

The proximity of the Preserve to the University of South Florida and other colleges, universities, and community colleges in central Florida provides the opportunity to develop collaborative research projects of which Pinellas County can take advantage.

Because the research projects should generate information which should benefit the

Preserve specifically, it would be productive to conduct research in applied aspects of ecology. The five categories described above should be used as guidelines for the development of a cohesive research program on the Preserve. Examples of research projects within those categories are listed in the following table.

RESEARCH CATEGORIES	RESEARCH PROJECT EXAMPLES
Disturbance ecology	1. Vulnerability of wildlife to predation in swath-cut forested wetlands. 2. Wetland continuity as a factor in bobcat survival. 3. Evaluation of different vegetational control methods in improving wildlife utilization of the FPC ROW.
Restoration ecology	1. Response of desiccated forested & herbaceous wetlands to water augmentation. 2. Wildlife utilization benefits in augmented herbaceous wetlands. 3. Augmentation alone versus augmentation + planting to restore dessicated herbaceous wetlands.
Urban wildlife ecology	1. Bobcat/human interaction on lands adjacent to an urban preserve. 2. Involving the public in wildlife inventories using novel participation methods.
Fire ecology	1. Effects of fire frequency on small versus large xeric oak communities. 2. Fall burns as a method to reduce shrubbiness in cypress ponds. 3. Test burn 5 acres of the old field community in Sections 13 & 14; compare with unburned acreage & assess for recruitment success of xeric species.
Descriptive ecology	1. Frequency of occurrence of gopher frog and eastern indigos in tortoise burrows. 2. Systematic survey of the Preserve for listed plants. 3. Efficacy of wood duck and kestrel nest boxes on the FPC ROW in enhancing breeding in the Preserve. 4. Mapping of areal extent of exotic plant species on the Preserve.

In order to translate the information collected during research on the Preserve into a directly useable form for the public, researchers should be required to present their work as part of an informal series of talks available to all interested parties. Copies of any reports or papers resulting from the work as well as duplicates of photographs taken should be provided to the Preserve library and the SWFWMD's library.

To encourage research on the Preserve, it will be necessary to have some limited facilities available to those conducting the research, that is, a biological research station. We recommend that the laboratory facility be included as part of the environmental education center building. Accordingly, the proposed environmental education center building should include a two laboratories, microscope room, computer room, herbarium, library, and storage rooms. The facility should contain several standard items to facilitate

research work and should provide equipment which is difficult for researchers to transport to the site. The laboratories should contain: lab benchs with and without sinks, lab tables and chairs, glassware, drying oven, electronic testing equipment (pH, temperature, specific conductance, dissolved oxygen), ice machine, refrigerator, and balances.

The herbarium should be equipped to receive material from field presses in a preparation room and to store approximately 3,000 individual specimens on a permanent basis. For this purpose, lab tables and benches, plant dryers, shelves, and herbarium cabinets will be needed.

The microscope room should contain both compound and dissecting microscopes, shelves, damping lab tables, standard lab tables, and chairs. The computer room should house at least three PC's with standard word processing, spreadsheet, and data base software.

The library should house copies of publications directly relevant to Brooker Creek, appropriate keys to the taxonomic identification of plant and animal specimens (including insects), references of a general nature which address the central Florida area, copies of papers and slides produced as a result of research on the Preserve, and a PC for collection searching. In effect, most of the citations in the Bibliography section of this report should be included in the library. It will be necessary to develop a library policy restricting the use of the materials to in-library use only, particulary in the case of the copies of Preserve-specific documents. Nevertheless, the library should be open to researchers at the station, to teachers, to high school and college students, and the interested adult public.

The microscope room, the computer room, and the library should be accessible to the other parts of the facility but should not be immediately adjacent to areas in which field specimens or field equipment are handled or stored.

Storage rooms should be of two types. One type of room should be available for the storage and cleaning of field equipement (eg. traps) brought to the station by researchers. The other type of storage room should be "clean rooms" in which electronic instruments and other delicate equipment brought by researchers can be safely stored.

When sufficient funding commitment is secured, a stand-alone dormitory for researchers needing to stay overnight at the Preserve should be constructed in Section 2 (T27S/R16E). This building should include a work room, one exterior storage area, communal cooking facilities, two 4-person dormitories with bathrooms, and 4 2-person rooms with bathrooms.

There is considerable interest in the academic community in doing research on the Preserve and in including students in certain research activities. Therefore, the Preserve represents an opportunity to generate scientific information to be used in the management of the Preserve while providing students with a research experience. To establish a scientific research program on the Preserve, it is recommended that informational materials and an invitation to do research on the Preserve be sent to the Chairpersons of the Departments of Geology, Biology, and Chemistry at the University of South Florida, to the Division of Science and Mathematics at the University of Tampa, to the Department of Mathematics and Sciences at Saint Leo College, to the Biology Department at Eckerd College, to the Biology Department at Florida Southern College, to Hillsborough Community College, and to Saint Petersburg Junior College. Also, it would be advisable to contact the science co-ordinators at the local high schools, particularly East Lake Road and Tarpon Springs High Schools, to determine how they would like to participate in a research program on the Preserve.

The BCPBFS should be administered by the County as a stand-alone facility. A

Scientific Advisory Board, which would work directly with the Preserve Manager, should be established to accomplish the following objectives: to generate interest in the Preserve on the part of potential researchers; to develop a funding base for research on the Preserve; and to prepare a set of standards for any research conducted on the Preserve. This volunteer Board would provide a means to involve educational institutions, scientists, and students in the Preserve's programs and would supply a resource for the Preserve Manager to call upon for presentations to groups, etc. Representatives from the colleges and universities mentioned above should be invited to participate actively in the Scientific Advisory Board.

The University of South Florida is very interested in participating in the field station. In addition to serving on the Scientific Advisory Board, researchers from the Departments of Chemistry (Institute for Environmental Studies), Biology, and Geology will seek funds to conduct projects on the Preserve and will encourage their students to do work on the Preserve as well. In terms of other participation, the university will consider the field station in the future long-term planning for the College of Arts and Sciences.

To begin to establish the reputation of the Brooker Creek Biological Field Station and to provide opportunities for collaboration with other field stations, a membership in the Organization of Biological Field Stations should be obtained, and the Preserve Manager or his designee should attend the group's annual conference. A listing of the research station in OBFS' Guide to Biological Field Stations would also assist in attracting researchers having funds to the Preserve.

Funding for specific research projects will be necessary, but such support generally can be obtained from agencies and other granting entities. See Funding Analysis section of this report. In addition, several of the research project examples mentioned above would be of interest to FPC, and funding might be secured from the company for work done on the ROW. For development and operational purposes, it should be possible to obtain support for at least some of the station's facilities, particularly the herbarium, computer room, and library. Funds can be sought from a variety of public and private sources, including those mentioned in the Funding Analysis section of this document.

The mission of the Brooker Creek Biological Field Station (BCPBFS) should be consistent with the goals and mission of the Preserve itself, and work done at the station should further the mission of the Preserve. Therefore, the station should encourage and support scientific research which will result in a greater understanding of natural communities on the Preserve and in the generation of information which will directly benefit the management of the Preserve. Research emphasis should be placed on three areas:

1. restoration ecology, using the many opportunities to acquire funding for both upland and wetland restoration;

2. urban ecology, capitalizing on the Preserve's unique location and its capability to encourage this extremely important area of ecological research; and

3. public involvement in research, incorporating what we believe will be a very interested community in the collection and interpretation of ecological data.

Accordingly, the mission statement for the BCPBFS (BCPBFS) should approximate the following: The mission of the BCPBFS shall be to conduct and encourage research leading

to an increased understanding of the environmental relationships operating in the native and ruderal communities located within the Preserve boundaries. At the same time, the BCPBS shall developing a strong link between its programs and the community for the purpose of increasing the public's participation in environmental research, thereby enhancing the public's understanding and support for the all of the Preserve's programs.

Staffing for the Preserve--To accomplish the mission of the Preserve, it is necessary to consider the personnel required in the long term and the short term. This report will address the short term personnel needs of the Preserve, with the recommendation that a staffing plan be developed within 18-24 months to address long term needs.

The Preserve has several facets as above described, and after a short time, the Preserve Manager will need assistants to insure that the Preserve is fully meeting its stated goals and mission. Within 2-3 years, the Preserve Manager will need assistants to (1) oversee the development of the environmental education program (Environmental Education Co-ordinator), (2) implement the land management strategies included in the report (Land Manager), and (3) co-ordinate the research aspects of the Preserve (Assistant Scientist). The Preserve Manager, himself, should function in the areas of administration, public liaison (including working with the Friends of Brooker Creek), environmental education resource specialist, and Resident Scientist. Volunteers from the Friends of Brooker Creek should participate in the Preserve in a meaningful way, thereby reducing the need for full-time staff.

The Preserve Manager's assistants will require assistance in their respective areas. The Environmental Education Co-ordinator will need assistance which, at first, can be in the form of volunteers. At a later date, as the program matures, it is possible that paid staff will be needed.

The Land Manager will need help in performing those tasks which require laborers. Some of the Land Manager's work can be done using volunteers on a "Work Day" basis. Other tasks, such as fire management, fence repair, etc. will require laborers which should be available from the County when needed.

Staffing is an issue which should be addressed within the next six months in order to provide the assistance to the Preserve Manager necessary to make quick progress on the development of Preserve programs.

C. PROPOSED FACILITIES--The facilities mentioned here are a compilation of those facilities already described in previous sections of the report (Figure 7). Because the Preserve aims at providing access to and preservation of the representatives of native Florida habitats on site, it is recommended that buildings and other facilities be minimized. Facilities which are constructed should directly support the stated mission and goals of the Preserve. Even these, when constructed, should be as unobtrusive as possible. Care should be taken in the selection of the specific site for construction, in the materials chosen for construction, in the landscaping surrounding the facilities, and in the use of water-saving plumbing fixtures. Before construction, the contractor should be made aware of the requirement to do as little damage as is practical to the construction area and to clean up the site thoroughly after the job is done. Appropriate language to that effect should be present in the plans and specifications for the facilities, and the contractor should be suitably instructed during the pre-construction conference. In addition, the County's construction inspection staff should include these two items on their inspection reports for later evaluation prior to the County's acceptance of the job. Co-ordination with FPC, the County

Water Department, and SWFWMD will be necessary to bring the facilities into reality. Further, as discussed in the section on Funding Sources (below), monies should be sought from a variety of organizations in order to expedite the design and construction of the necessary facilities. The facilities proposed for the Preserve (approximate locations of facilities are shown on Figure 7) are:

1. ENTRANCE TO THE PRESERVE: The entrance to the Preserve is proposed off of the south side of Keystone Road in Section 13 (T27S/R16E). The specific point proposed is at the location of an existing trail which leads south from Keystone Road. The entrance should be marked with appropriate signage which includes the logos of the County, the Preserve, and SWFWMD. The area around the sign should be landscaped in a low-key fashion with native species. From the entrance point, a paved roadway will be needed to provide all-weather access to the environmental education center. If practicable, the roadway and the parking facility for the center should be constructed of non-toxic recycled material, and item for which grant funds may be available.

2. ROADWAY TO THE ENVIRONMENTAL EDUCATION CENTER:The entrance roadway should be used to involve the visitor in the mission of the Preserve immediately upon entering the property rather than waiting until they arrive at the environmental education center. The roadway should follow the alignment of the existing trail for approximately 200' at which point it should diverge from the trail and follow an easterly route for approximately 600' to the eastern side of the large wetland, thence south 500' to the location of the environmental education center. This route for the roadway will allow visitors to pass by several communities, including cypress pond, old field, and marsh. It is hoped that these communities will be undergoing restoration work in the near future, and the roadway route will allow visitors to see the results firsthand. Appropriate explanatory signage should be erected on the entrance roadway near the restoration sites which are close to the road, and small gravel pull-offs should be available to allow visitors to park and read the signs. Short trails, including wooden boardwalks, should lead from the pull-offs to these restoration sites to permit visitors to gain close access to the sites.

While visitors are still in their automobiles, a restricted AM broadcast should be available on the car radios which will broadcast some of the natural sounds audible on the Preserve. The vocalizations and other noises of insects, birds, frogs, toads, alligators, and squirrels together with the sounds of wind through the slash pine flatwoods, rustling cabbage palmetto fronds, the scraping of sawgrass, deer breaking through the woods, the rubbing of tree limbs against each other, slowly running water, and rain can be recorded on the preserve, and they can be used in the broadcasts in order to immerse the visitor in the environment of the Preserve. Signage alerting the visitor to this availability of this broadcast should be erected at the entrance to the Preserve.

3. ENVIRONMENTAL EDUCATION CENTER: The proposed location of the environmental education center is in the NW1/4 of Section 13 (T27S/R16E) on the approximately eight acres of old field on the hill bounded to the south by the east-west trending cypress strand. This location sets the building off of Keystone Road by approximately 900' and from the FPC ROW by approximately 1900'. The center would be virtually surrounded with forested and herbaceous wetlands which are candidates for restoration. Proximity to the restoration site will be convenient for education and passive

recreation purposes, and it will have adequate area for auxiliary facilities such as parking.

The center and its environs should continue the introduction of the visitor to native Florida which was begun on the entrance roadway. Upon entering the center, visitors should hear natural sounds, particularly that of running water, recorded on the Preserve. Brochures should be available at the entrance which describe the Preserve and the facilities available at the center. Native Florida communities should be represented inside the center's display area. Here, no taxidermist-prepared dead animals, artificial vegetation, or plastic water should be present. Instead, the visitor should marvel at a to-scale mural rendered on the walls of the building. the mural should depict the major native habitats on the Preserve starting with the xeric oak and sandhill communities, proceeding through the high flatwoods to the low flatwoods, to the cypress ponds and marshes, and, finally, to the dense riverine forest of Brooker Creek itself. The mural should be done on both sides of wide corridor, with the ceiling of the corridor obscured with native materials through which lighting fixtures penetrate unobtrusively. The walls upon which the mural is rendered should be continuous but not entirely straight; rather, it should bend, allowing some degree of separation of one habitat from another. The floor should slope very slightly downward to mimic the decrease in elevation as one proceeds from the higher elevation habitats to the lower elevation habitats, that is, from the xeric to the wetland communities on the Preserve. The lighting should be controlled to reflect (within safety limits), the lighting conditions in the habitat in a particular area of the mural (shady in the xeric oak habitat, bright in the sandhill habitat, darker in the cypress ponds, etc.). Natural sound appropriate to a particular habitat should be emitted from camouflaged speakers as the visitor passes along the corridor. Flooring in the corridor should be of some resistant natural material such as unpolished granite or natural slate, and it will have to be even enough to accommodate wheelchairs. The "corridor tour" of the Preserve should lead out to the short walking trail which encircles the center and runs through the nearby restoration areas where the outdoor experience will reinforce the experiences of the visitors as they drove into the Preserve and as they walked through the center.

A competition to execute the mural should be advertized throughout the state, with special notification provided to artists specializing in natural history subjects (A list of such artists is available from SWFWMD which has sponsored the Education through Art program). A panel of judges should be constituted from members of the Preserve's target audiences to whom the competing designs will be submitted. While the competion is being conducted, funding should be sought from SWFWMD, the State of Florida, the U. S. government, and several private foundations (see the section on Funding Sources) for the execution of the winning design. The entire competion process may take up to 2 years; therefore, an effort to initiate the process should begin within the next year. The competion will provide a unique opportunity to meld art, environment, and education on a large scale, and it will generate enormous interest in the community in the outcome and final execution of the work.

The center should also include: a classroom/meeting room having seating for about 70 people and having built-in projection capability; the BCPBFS facilities as described above in the section on Research on the Preserve; a 10' X 10' storage room with shelves and cabinets; office space for the Preserve Manager and his staff, including the Director of Volunteers; a small conference rom, a 10' X 10' preparation room for the video displays; restrooms; outdoor classroom having a covered shelter and seating for approximately 50 people on low, semi-circular risers; a small theater having wooden benches and high quality

audio reproduction capability; and a 12' X 14' gift shop/book shop with an attached 10' X 10' storage room. Certain equipment will be needed, particularly audio/video equipment for recording and reproducing natural sights and sounds from the Preserve. An exterior storage building (12' X 12') will also be needed for landscape maintenance equipment.

Outside of the center, landscaping should employ native plant materials and should promote water-saving plantings of native species. In planning the landscaping, no effort should be made to suggest a park or suburban setting. Rather, the landscaping plan should call for the replanting of some of the species which formerly occupied the site, including native flowering perennials to attract butterflies and other insects and other species having wildlife food value. Signage should be erected at appropriate points in the landscape describing the habitat value of species used.

Short walking trails should be constructed which lead the visitor away from the center, through nearby restoration sites, and back again. Along the way, visitors should be encouraged via discreet audible direction and signage to: stop and listen to the outdoor sounds; to touch interesting surfaces such as magnolia leaves, lichens, and Spanish moss ; to experience fragrances such as crushed wax myrtle leaves, bay leaves, and damp dirt; and feel the wind and sun as they stand in the middle of a wetland undergoing restoration. Opportunistic wildlife observations should be encouraged by providing materials to the visitor which describe clearly what species are normally present in each area (This will require some site-specific species surveys on the particular areas in which the trails take visitors). Trails should be at existing grades where possible and protected with pine straw. Where water makes at grade trails impossible, boardwalks should be constructed which are as close to ground elevations as practicable to make the visitor feel a part of the Preserve. Boardwalks should be taken across restoration areas to provide visitors a good view of the sites. No overlook structures should be built as such a facility removes the visitor from a close experience with the Preserve.

A limited outdoor eating area should be provided in the form of natural backless benches. No picnic tables should be present to encourage group picnicing. That activity should be directed to the facility recommended for the south end of the Preserve in Section 11 (T28S/R16E).

Parking areas around the center should be pervious paving blocks except in handicap spaces.

Construction of the center should be done using energy-saving and water-saving measures where practical; passive heating and cooling should be utilized if possible.

The Environmental Education Center and its associated facilities offer several opportunities for obtaining grant funds to defray the cost to the County. Aspects of the center which could attract outside funding include: the merging of art and environment in the center's mural; the innovative use of audio and visual techniques for environmental purposes; the employment of native landscaping around the center; the use of recycled material in paved areas; the energy-efficient construction of the building; the development of the trails and boardwalks; the preparation of center and Preserve brochures and signage; and, of course, the restoration projects themselves, discussed in the sections of the report dealing with Restoration and Research on the Preserve. Several of the funding organizations described in the Funding Sources section of this report could be approached with an application to support many of the aspects of the center's operation and construction.

3. BIOLOGICAL FIELD STATION: Please see discussion above concerning the facilities for this part of the Preserve's program.

4. HIKING TRAIL: This trail could be built without cost to the County by the Florida Trail Association (FTA) following an agreement with the County and SWFWMD. Water facilities will be needed at one location along the trail, assuming the trail intercepts the Environmental Education Center in Section 13 (T27S/R16E) and the picnic area in Section 11 (T28S/R16E). The trail can begin on the existing vehicular trial in Section 13 (T27S/R16E) immediately to the SW of the environmental education center. At this point, the trail would proceed through the thin cypress strand at the existing crossing, proceed south across the old field, progress across Brooker Creek at the existing crossing, and continue south. At its exit from the Brooker Creek riverine forest, the trail can make use of existing vehicular trails as it makes its way to the south end of the Preserve, terminating at the picnic facility in Section 11 (T28S/R16E). There are sufficient existing trails on the property that no new trails need be cut for hiking purposes. FTA has indicated a strong interest in marking and maintaining the hiking trail, and it is recommended that an agreement with that organization be executed within the year in order to open the Preserve to the serious hiker.

5. CONTROLLED GROUP CAMPING: Controlled group camping is a compatible land use for the Preserve, and it can be allowed in Section 2 (T27S/R16E) in the existing pine plantation. Facilities to accommodate groups will include potable running water, covered picnic shelter, trash barrels, and basic toilet facilities. Camping will be allowed by prior appointment only and for groups not exceeding 20 individuals. Use of this facility will require access through property currently leased by the County for water production pruposes.

6. SECURITY OFFICER'S RESIDENCE: A security officer's residence in Section 11 (T28S/R16E) to control access at the extreme southern end of the Preserve, as described above in the section on Restoration of Original Habitats, will be essential in reducing the environmental damage which is occurring presently. The residence must meet existing zoning codes, and the construction of the building will require SWFWMD's approval as that organization owns that part of the Preserve.

7. ADDITIONAL FACILITIES IN SECTION 11 (T27S/R16E): A picnic area and one loop trail in the disturbed area of Section 11 would be beneficial to the city of Oldsmar and other residents to the south. For additional discussion, please see the section above on Restoration of Original Habitats.

8. EQUESTRIAN FACILITIES: Equestrian facilities in the form of riding trails, improved road, and parking facilities for vehicles towing horse trailers should be constructed in Section 2 (T27S/R16E) to accommodate the equestrian community. Trails should be constructed in Section 2. The road leading into Section 2 from Old Keystone Road will need improvement to allow the passage of horse trailers. Discussions with GIREH, Inc. indicated an interest to participate in a joint planning of equestrian and hiking trails in connection with the Pinellas Trail. Future facilities may include the potential for (1) additional riding trails leading from the trails in Section 2 into the Eldridge-Wilde wellfield in the event the county acquires the wellfield property, and (2) riding trails for the equestrians who join the Friends of Brooker Creek located in the Preserve south of Keystone Road. Use of this facility will require access through property currently leased by the County for water production pruposes.

D. FUNDING SOURCES--To develop the programs and facilities described in this report, it will be necessary to secure a reliable source of funding. A funding acquisition plan for

the Preserve will be multi-faceted, and monies should be acquired from diverse sources. In this way, the County will not be solely responsible for the monetary needs of the Preserve, and program development can be expedited.

There are five primary sources for the direct funding of the facilities and programs of the Preserve: Pinellas County; FPC; the Friends of Brooker Creek; various federal, state, and private organizations; and SWFWMD. In addition, indirect support can be obtained through the use of volunteers and from universities and colleges whose researchers would develop information which would benefit the management of the Preserve at no cost to the County. Lastly, voluntary donations from visitors to the Preserve can be collected.

A major source of funds is Pinellas County itself. Within the County, two departments would potentially budget monies for activities on the preserve: the Department of Environmental Management and the Water Department. It is anticipated that the first of these departments would be responsible for salaries and operating costs associated with the Preserve, while the second department could provide funds for water-related restoration projects on the Preserve. A third organization within the County, the Mosquito Control Division, has already contributed to the Preserve by initiating a tire removal project which will likely continue into the next year. Further, the Engineering Department has supported in the Preserve by providing the funding to conduct the work which has led to this report. Needless to say, any funds that are provided from sources other than the County would assist in reducing the contribution which the County itself would have to make to the Preserve.

Florida Power Corporation is a likely source of funds. FPC is interested in projects which would assist in the development of techniques to manage the ROW's in the Preserve and in projects which would promote environmental education in Florida. Projects related to the two ROW's in the Preserve which would benefit both the Preserve and FPC include those which would restore the flow characteristics of Brooker Creek, test burns of the marshes in the southern portion of the Preserve, and restoration efforts in Section 13 (T27S/R16E). Proposals for these projects should be developed within six months in co-operation with FPC and submitted to the company for funding consideration.

The Friends of Brooker Creek will be a source of funds once the group is firmly established. The group can generate funds via dues, gift shop sales, and grants. The Friends, as a private, non-profit organization, will be eligible to apply to a number of grant programs, particularly those programs administered by private foundations. An executive committee for grants should be established within the Friends group, with the purpose of preparing grant applications within 1-2 years.

The County can apply for grants from federal, state, and private organizations. Grants should be sought for both operating needs and specific project needs. There are many grant programs from which monies can be requested; the organizations listed below represent a sampling of those organizations. Two methods are generally employed when determining the source of funds which should be pursued. The first method involves identifying all possible organizations which provide grants, and the second involves a systematic evaluation of potential granting organizations with respect to their applicability to the project(s) at hand. In preparing the list below, we have taken the second approach and have evaluated the applicability to Preserve funding needs of over 1200 federal, 135 state, and 1400 private granting organizations on the basis of the following parameters: availability of funds; location; funding history; interest in environmental education, resource conservation, and

research; and eligibility requirements for the grantee. The following list includes those organizations which have provided grants in Florida for environmentally-related projects within the last three years. The list is not comprehensive because the evaluation was done on the basis of broad parameters. There are likely many more organizations which could be approached for funding activities on the Preserve. To identify all of the potential private granting organizations, it is recommended that the County acquire a computerized data base of governmental and private funding sources (for example, the F.I.N.D. data base or one similar to it).

In applying for grants, it is recommended that large projects be handled with a "shotgun" approach, that is, the grant application should be sent to all of the relevant granting organizations simultaneously in order to maximize success potential. Smaller projects, which often have greater possibility of being funded, should be sent to a more restrictive list of granting organizations. Care should be taken, however, not to send requests for small projects to an organization which is likely to fund large projects. Those organizations should be reserved only for the more costly projects.

Table 5. Sources of project and operational funding for the Preserve.

A. FEDERAL
1. National Science Foundation, Biological Sciences Directorate: Biological Sciences Grant Program
2. Environmental Protection Agency, Office of Environmental Education: Environmental Education Grant Program
3. National Endowment for the Arts, Visual Arts Program, Promotion of the Arts: Visual Arts
4. U.S. Forest Service, Southern Region Timber Bridge Program

B. STATE
1. Department of Agricultural and Consumer Services, Division of Forestry: America the Beautiful Grant Program
2. Department of Environmental Protection, Division of Recreation and Parks: Land and Water Conservation Grant Program
3. Department of State, Division of Cultural Affairs, Bureau of Grants Services: Science Museum Grants, Media Arts Program, Visual Arts Program, and Youth and Children Grants Programs
4. Department of State, Division of Cultural Affairs, Bureau of State Programs: Arts in Education Program and Local Arts Agency/State Service Organization Program
5. Florida Game and Fresh Water Fish Commission: Non-game Wildlife Grant Program

C. PRIVATE FOUNDATIONS
1. Amaza Foundation Charitable Trust, Naples, FL.
2. Bates (Vernal W. and Florence H.) Foundation, Bradenton
3. Bush (Edyth) Charitable Foundation, Inc., Winter Park
4. Chapman, (Alvah H. and Wyline P.) Foundation, Miami
5. Chingos Foundation, Boynton Beach
6. Davis (Arthur Vining) Foundation, Jacksonville
7. Dively (George S.) Foundation, Key West

8. Dunn (Elizabeth Ordway) Foundation, Inc., Miami
9. Dunspaugh-Dalton Foundation, Inc., Miami
10. Eckerd (Jack) Foundation, Clearwater
11. Falk, (David) Foundation, Tampa
12. Gardner Foundation, Miami
13. Glantz Family Foundation, Inc., Lake Worth
14. Hollis (William M. and Nina B.) Foundation, Lakeland
15. Hopkins Research Foundation, Miami
16. Kaufman (David E. and Morgan S.) Foundation, Naples
17. Knight Foundation, Miami
18. Leigh (Charles N. and Eleanor Knight) Foundation, Coral Gables
19. Link Foundation, Fort Pierce
20. Mendillo (John C.) Family Foundation, Inc., West Palm Beach
21. Phipps Florida Foundation, Tallahassee
22. Price Foundation, Longboat Key
23. R & R Foundation, Inc., Bradenton
24. Schechter (Aaron and Martha) Private Foundation, Hollywood
25. Sorenson (Richard W.) Family Foundation, Stuart
26. Stockton Foundation, Inc., Ponte Vedra Beach
27. Storer (George B.) Foundation, Islamorada
28. Vaughn (Jordan) Foundation, Jacksonville
29. Walter Foundation, Tampa
30. Wertheim (Herbert A.) Foundation, Inc. Miami
31. Winn Foundation Trust, Jacksonville
32. Whitehall Foundation, Inc., Palm Beach
33. Yablick Charities, Inc., Miami Beach

In addition to foundation support, funds should be sought from the Pinellas-Anclote Basin Board of SWFWMD and the Co-operative Funding Program of SWFWMD. To garner funds from the basin board, it will be necessary to submit a proposal for consideration by the board during its budget cycle which begins approximately in March of each year. The projects for which funding can be requested include facilities design and construction and specific education and research projects. It would be appropriate to begin the preparation of project proposals now in anticipation of the budget cycle time schedule.

Funding from SWFWMD's Co-operative Funding Program can be requested by submitting project proposals from the County to SWFWMD by January 15. Projects must also have partial funding from the County and result in benefits to the water resources of an area. An immediate effort should be undertake to develop the required materials and to accomplish the necessary co-ordination with SWFWMD in order to be ready with proposals to this program by the 1995 deadline.

All granting organizations will require detailed grant proposal for review prior to providing funds. In some cases, the County should be the applicant, such as grant requests to SWFWMD; in other cases, the Friends of Brooker Creek, as a non-profit organization, could secure support more easily (eg. certain foundations). In either case, the grant process can be short or lengthy, depending on the entity involved; therefore, it will be necessary to begin the process soon in order to get funding in the near future.

The Preserve itself may generate funds from the selective harvest of pine trees;

however, the environmental damage generally associated with such an operation may be judged to be in excess of the financial benefits derived.

VI. RECOMMENDATIONS AND IMPLEMENTATION SCHEDULE

IMPLEMENTATION SCHEDULE--The development of the Preserve's facilities and programs will occur over a period of years, and there will always be changes and improvements which have to be made to the Preserve itself and to the Management Plan. Although we recognize that the Preserve represents a long-term commitment by the County and will provide long-term benefits to County residents, we believe that it is critical to accomplish certain essential tasks in a short time frame in order to maintain the momentum gained thus far in the project. Therefore, we recommend that four groups of activities be considered. Group 1 includes items needing to be done immediately (within the next three months) to address the needs of the Preserve. Group 2 includes items which will lay the foundation for the near-term development of the Preserve's facilities and programs; delay of these items will result in a slower project maturation, and these items should be accomplished within the next 12 months. Group 3 activities, those items which can be done within the next 24 months in order to maintain a reasonable rate of progress. Group 4 includes items which can be accomplished within three-five years.

A fifth group of items should be mentioned. These are items which will be on-going at the preserve, and they include: seeking funding for programs at the Preserve; fire management; liaison with the public and with other departments of the County; maintenance of Preserve facilities; research; exotic plant detection and control; and the development of education programs and materials.

RECOMMENDATIONS--The following recommendations are excerpted in abbreviated form from the foregoing portions of the report. Further discussion on each recommendation may be found in the appropriate section of the report. The recommendations are listed according to the three groups described under Implementation Schedule.

Group 1 Recommendations--Items to be done within three months

There are five items which are essential to the successful future of the Preserve, and attention should be directed to them immediately.

1. **SECURITY:** Complete the immediate security measures for the Preserve.

2. **FRIENDS OF BROOKER CREEK:** Maintain public interest in the Preserve by formally establishing the Friends of Brooker Creek Preserve as a non-profit organization and by conducting evening programs about the Preserve in local churches and schools. This group will also be instrumental in developing a localfunding base for the Preserve.

3. **PUBLIC ACCESS:** Begin to conduct occasional educational programs on the Preserve in the form of day field trips for specific groups. Also allow controlled equestrian use of the site.

4. **FUNDING:** Develop the final list of funding sources and prepare materials for the initial approach for funds. Acquire funding source data base.

5. **DESCRIPTION OF THE RESOURCES OF THE PRESERVE:** Continue the wildlife and plant survey through May, 1994 at a minimum; provide a report on the year's worth of data collected. The survey should include some sampling of aquatic systems in the Preserve and should be comprehensive enough to include a map of the areas infested with exotic plant species. In particular, it will be essential to do the survey during this fall in order not to miss the fall-blooming species.
6. **AERIAL MAPPING:** Prepare contract specifications for aerial mapping of the Preserve to obtain controlled aerial maps and photographs for use in presentations and in Preserve management. Completing the survey is necessary to decisions regarding the immediate management of the Preserve.
7. **STAFFING: A** review of tasks for the coming year indicates that, in order to maintain the momentum gained thus far in the project, it will be necessary to provide the Preserve Manager with assistance as described earlier in this report. The initial staff memeber should be an individual able to oversee the land management aspects of administering the Preserve, freeing the Preserve Manager for grant writing, development of the Friends group, preparation of RFP's for built facilities, development of the Scientific Advisory Board, and public liaison.

Group 2 Recommendations--Items to be completed within 12 months

1. Prepare an annual update of the Management Plan.
2. Discontinue the practice of relocating animals on the Preserve.
3. Continue removal of trash eligible under the County's grant from the Florida Department of Environmental Protection.
4. Encourage research on the Preserve by making presentations at the University of South Florida and local colleges.
5. Prepare RFP's for engineering/architecture services to perform the design of all built facilities on the Preserve: the Environmental Education Center, the picnic facilities and security officer's residence, and the controlled camping area in Section 2 (T27S/R16E).
6. Install signage at the future entrances to the Preserve; have ground breaking ceremony.
7. Begin the rehydration study of wetlands in Sections 13 and 14 (T27S/R16E) as part of the restoration program. This should be done in co-ordination with the Water Department which may provide funding for the work and associated monitoring. These wetlands should be done first, as they are part of the environmental education program.
8. Finish the less critical security measures.
9. Meet with FPC formally to advise them of the Plan, when approved, and explore ways in which the County and FPC can work together in the areas of restoration, fire management, and funding.
10. Provide copies of the Plan to: FPC; the Real Estate and Land Management Departments of SWFWMD; Pinellas County Real Estate, Water, and Engineering Departments; and Hillsborough County ELAPP.
11. Present the Plan to the Land and Resource Management Committee of the Governing Board of SWFWMD.
12. Provide copies of the Plant Survey and Animal Survey Reports to Florida Natural Areas Inventory, Florida Audubon Society, SWFWMD's Environmental Section.
13. Provide copies of the Executive Summary of the approved Plan to individuals and groups which have assisted in the surveys on the Preserve (Clearwater Audubon, Tampa

Audubon, Florida Sierra, Florida Native Plant Society, members of the environmental education focus groups).

14. Initiate the prescribed burn program, beginning with the flatwoods having excessive fuel accumulation.
15. Perform the aerial mapping of the Preserve
16. Install needed culverts, fill ditches, and grade trails to restore hydrology.
17. Continue seeking funds for Preserve Programs.

Group 3 Recommendations-Items to be done within 24 months

1. Complete the design of the built facilities on the Preserve.
2. Prepare Invitations to Bid for the construction of the Environmental Education Center, award contracts, and initiate construction.
3. Grade spoil mounds in Section 11 (T28S/R16E) to ground level after first testing the material in the mounds for hazardous materials.
4. Initiate construction of the equestrian facilities in Section 2 (T27S/R16E).
5. Continue seeking funds for Preserve programs.
6. Initiate mural design competition.

Group 4 Recommendations-Items to be completed in three-five years

1. Complete the construction of the Environmental Education Center and Equestrian facilities within 2 1/2 years.
2. Issue Invitations to Bid for the construction of the other built facilities on the Preserve. Award contracts and complete construction within five years.
3. Begin mural execution following completion of Environmental Education Center.
4. Conduct an archeological and historical survey on the Preserve to identify and recover any significant cultural resources for cataloging and future display.
5. Join the Organization of Biological Field Stations.

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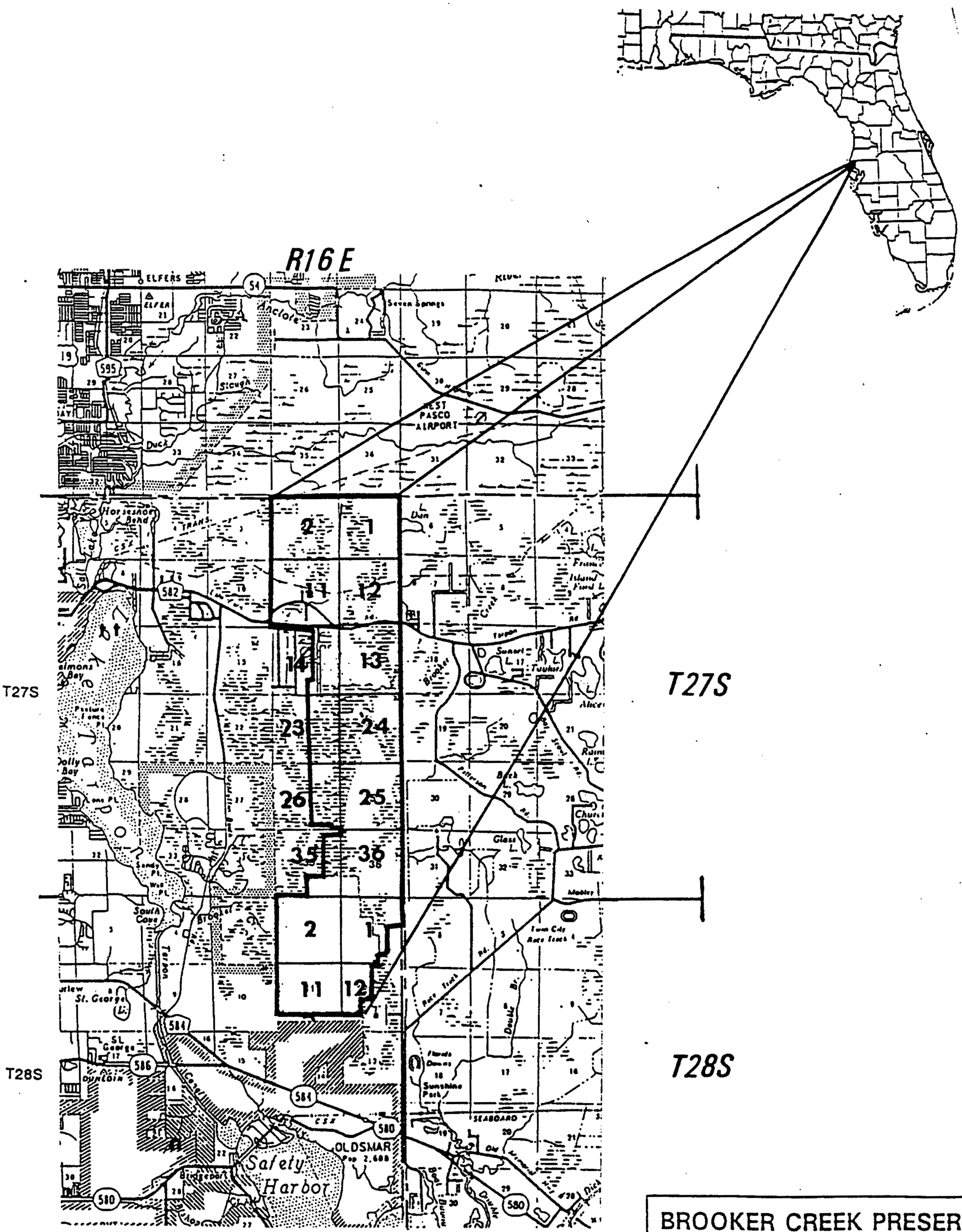
IX. APPENDICES

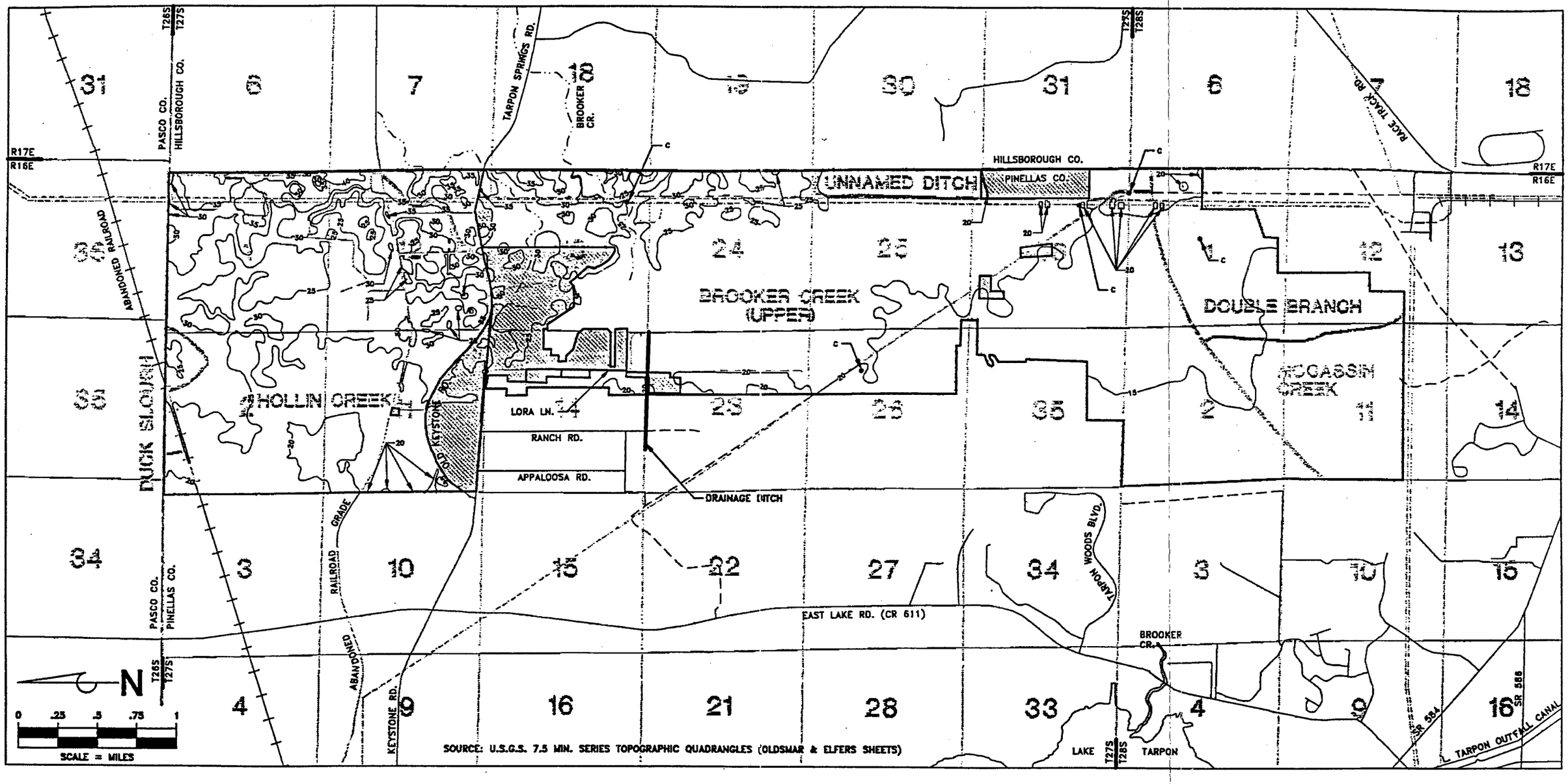
APPENDIX A--MAPS



BROOKER CREEK PRESERVE

PROJECT LOCATION MAP

FIGURE NO. 1



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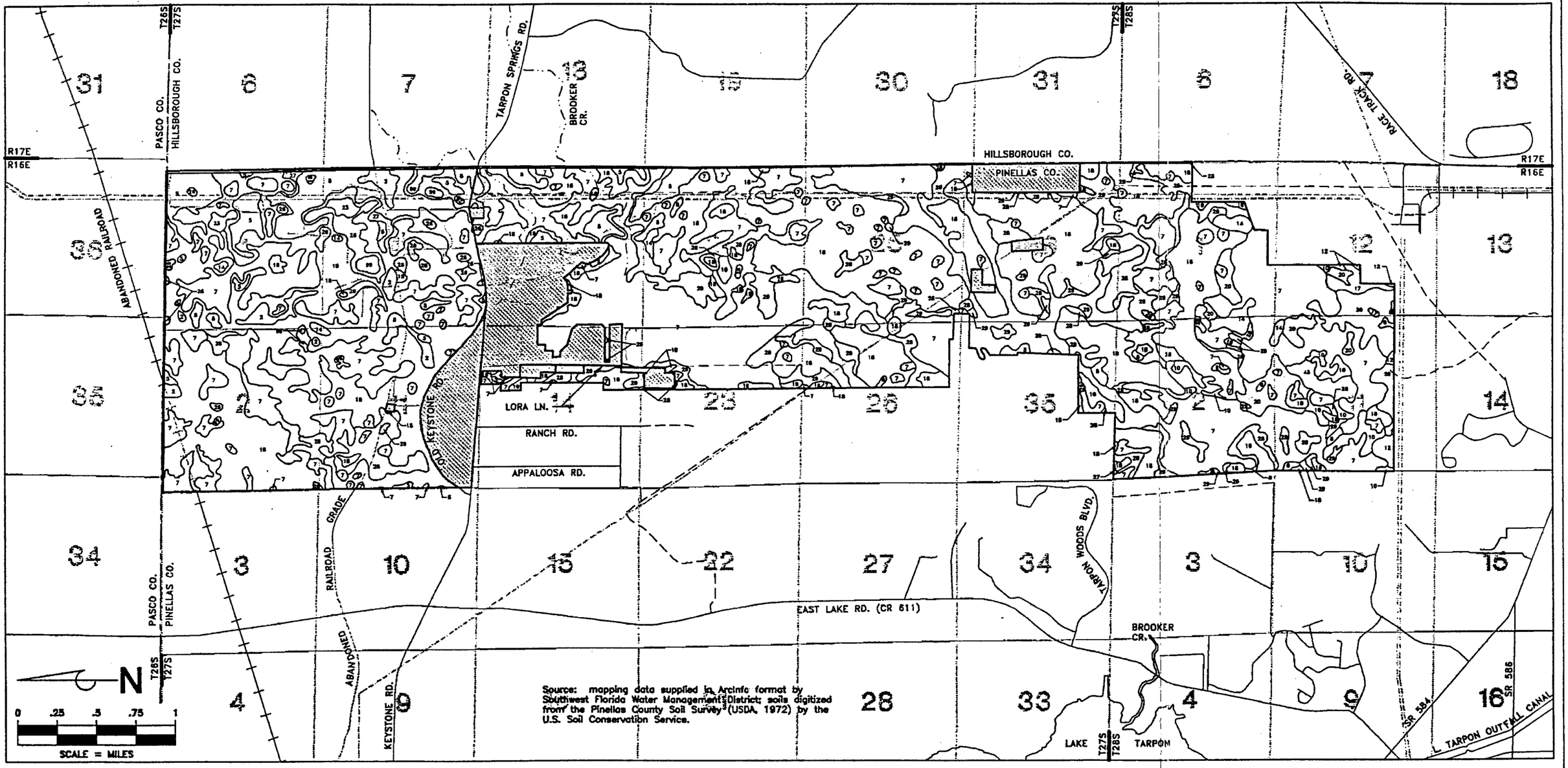
BROOKER CREEK PRESERVE

SURFACE DRAINAGE AND TOPOGRAPHY OF THE BROOKER CREEK PRESERVE

FIGURE 2



SOIL TYPES

2	Adamsville fine sand
3	Astatula fine sand, 0–5% slopes
5	Astatula fine sand, moderately deep water table
6	Astor fine sand
7	Astor soils
8	Charlotte fine sand
10	Elred fine sand
12	Felda fine sand, ponded
14	Immokalee fine sand
15	Made land
17	Manatee loamy fine sand
18	Myakka fine sand
20	Oldsmar fine sand
23	Pamlico muck
26	Placid fine sand
27	Pomello fine sand
28	Pompano fine sand
29	Pompano fine sand, ponded
43	Wabasso fine sand
99	Water

BROOKER CREEK PRESERVE

SOILS MAP OF THE BROOKER CREEK PRESERVE

FIGURE 3

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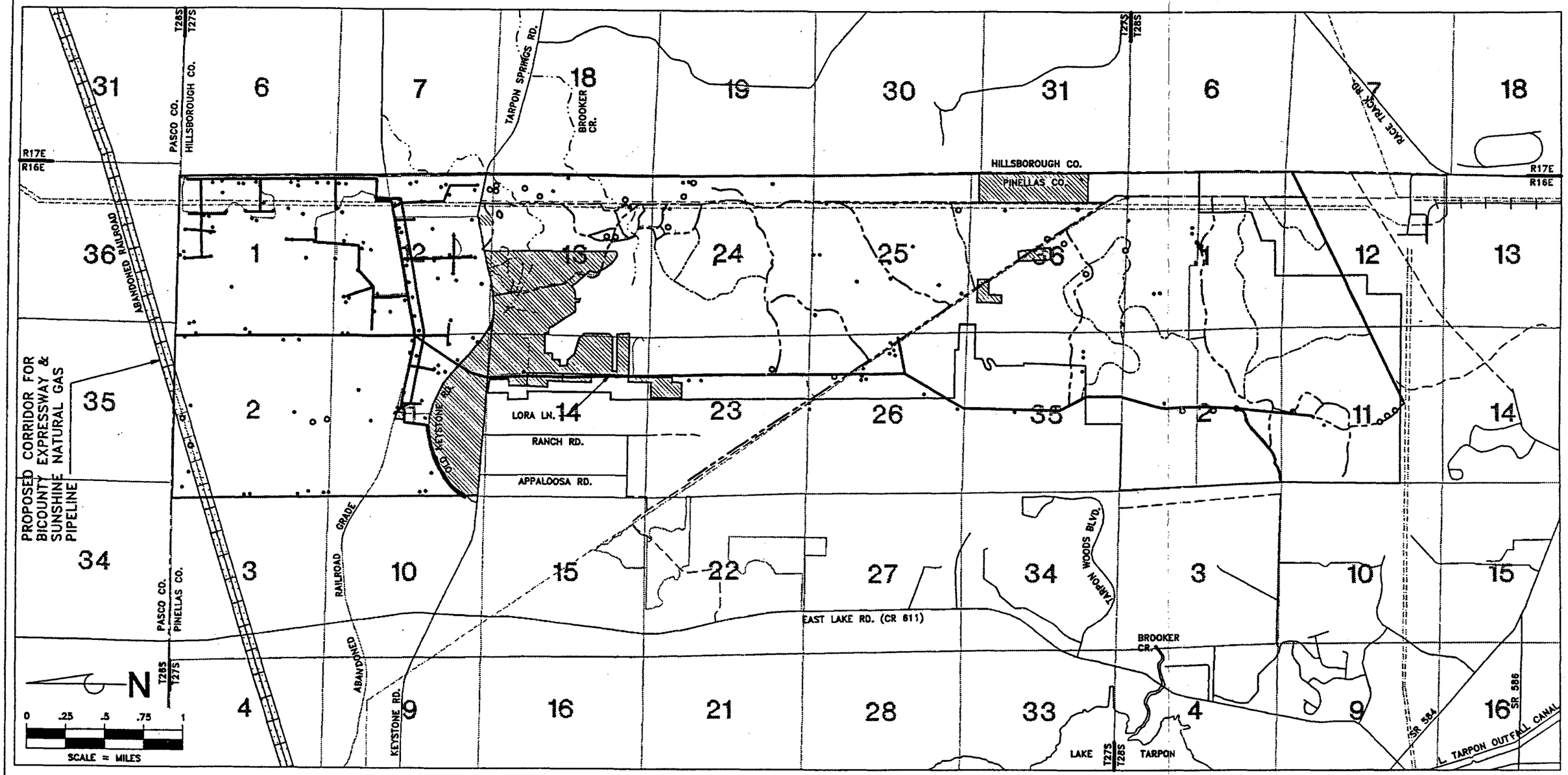


LEGEND

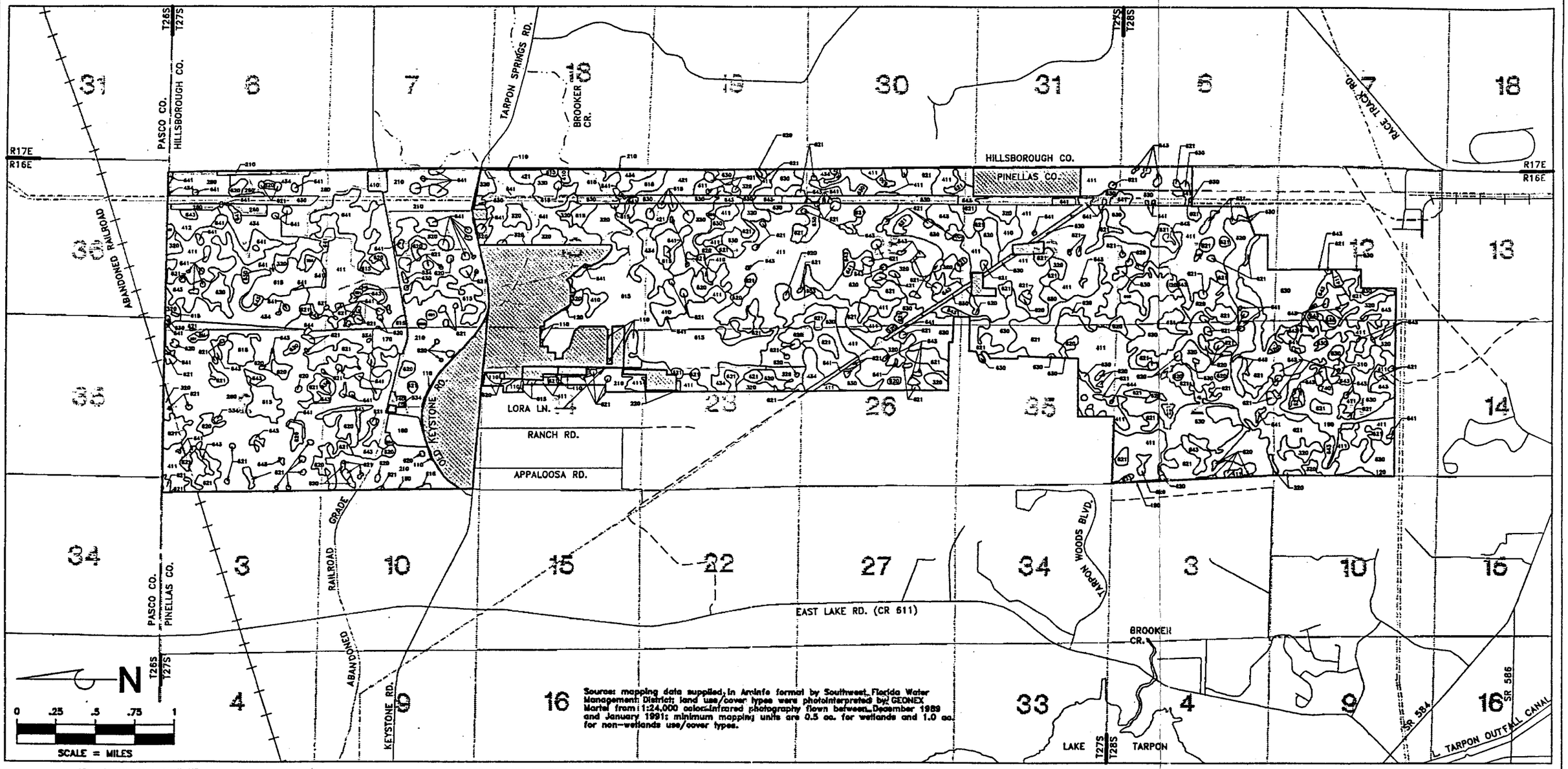
- ROADS
- ROADS–DIRT
- MAIN TRAILS
- BACK TRAILS
- POWER LINES
- WATER LINES
- WELL LOCATION
- TRASH DUMP

Y:\BROOKER\OUTLINE4.DWG

BROOKER CREEK PRESERVE

UTILITIES, ROADS, TRAILS, TRASH DUMPS AND OTHER MAN-MADE FEATURES ON THE BROOKER CREEK PRESERVE

FIGURE 4



Source: mapping data supplied in Arcinfo format by Southwest Florida Water Management District; land use/cover types were photointerpreted by GEONEX Martel from 1:24,000 color-infrared photography flown between December 1989 and January 1991; minimum mapping units are 0.5 ac. for wetlands and 1.0 ac. for non-wetlands use/cover types.

100 URBAN AND BUILT-UP
- 110 Residential, Low Density (less than 2 dwelling units per acre)
- 120 Residential, Medium Density (2 to 5 dwellings units per acre)
- 130 Residential, High Density (greater than 5 dwelling units per acre)
- 140 Commercial and Services
- 150 Industrial
- 160 Extractive
- 170 Institutional
- 180 Recreational
- 190 Open Land

200 AGRICULTURE
- 210 Cropland and Pastureland
  - 214 Row Crops
- 220 Tree Crops
- 230 Feeding Operations
- 240 Nurseries and Vineyards
- 250 Specialty Farms
  - 255 Tropical Fish Farms
- 280 Other Open Lands (Rural)

300 RANGELAND
- 310 Herbaceous
- 320 Shrub and Brushland
- 330 Mixed Rangeland

400 UPLAND FORESTS
- 410 Upland Coniferous Forests
  - 411 Pine Flatwoods
- 420 Upland Hardwood Forests
- 434 Mixed Coniferous/Hardwood

500 WATER
- 510 Streams and Waterways
- 520 Lakes
  - 521 Lakes larger than 500 acres
  - 522 Lakes larger than 100 acres but less than 500 acres
  - 523 Lakes larger than 10 acres but less than 100 acres
  - 524 Lakes less than 10 acres which are dominant features
- 530 Reservoirs
  - 531 Reservoirs larger than 500 acres
  - 532 Reservoirs larger than 100 acres but less than 500 acres
  - 533 Reservoirs larger than 10 acres but less than 100 acres
  - 534 Reservoirs less than 10 acres which are dominant features
- 540 Bays and Estuaries
  - 541 Embayments opening directly into the Gulf or Atlantic Ocean
  - 542 Embayments not opening directly into the Gulf or Ocean

600 WETLANDS
- 610 Wetland Hardwood Forests
  - 611 Bay Swamp
  - 612 Mangrove Swamps
  - 615 River/Lake Swamp
- 620 Wetland Coniferous Forests
  - 621 Cypress
- 630 Wetland Forested Mixed
- 640 Vegetated Non-Forested Wetlands
  - 641 Freshwater Marsh
    - 6411 Sawgrass Marsh
    - 6412 Cattail Marsh
    - 6413 Spike Rush Marsh
  - 642 Saltwater Marsh
    - 6421 Cordgrass (Spartina)
    - 6422 Needlerush (Juncus)
  - 643 Wet Prairies
  - 644 Aquatic Vegetation
    - 6443 Water Hyacinth
    - 6444 Duckweed
- 650 Non-Vegetated
  - 651 Tidal Flats
  - 652 Shorelines
  - 653 Intermittent Ponds
  - 654 Oyster Bars

700 BARREN LAND
- 710 Beaches
- 720 Sand Other Than Beaches
- 730 Exposed Rocks
- 740 Disturbed Land

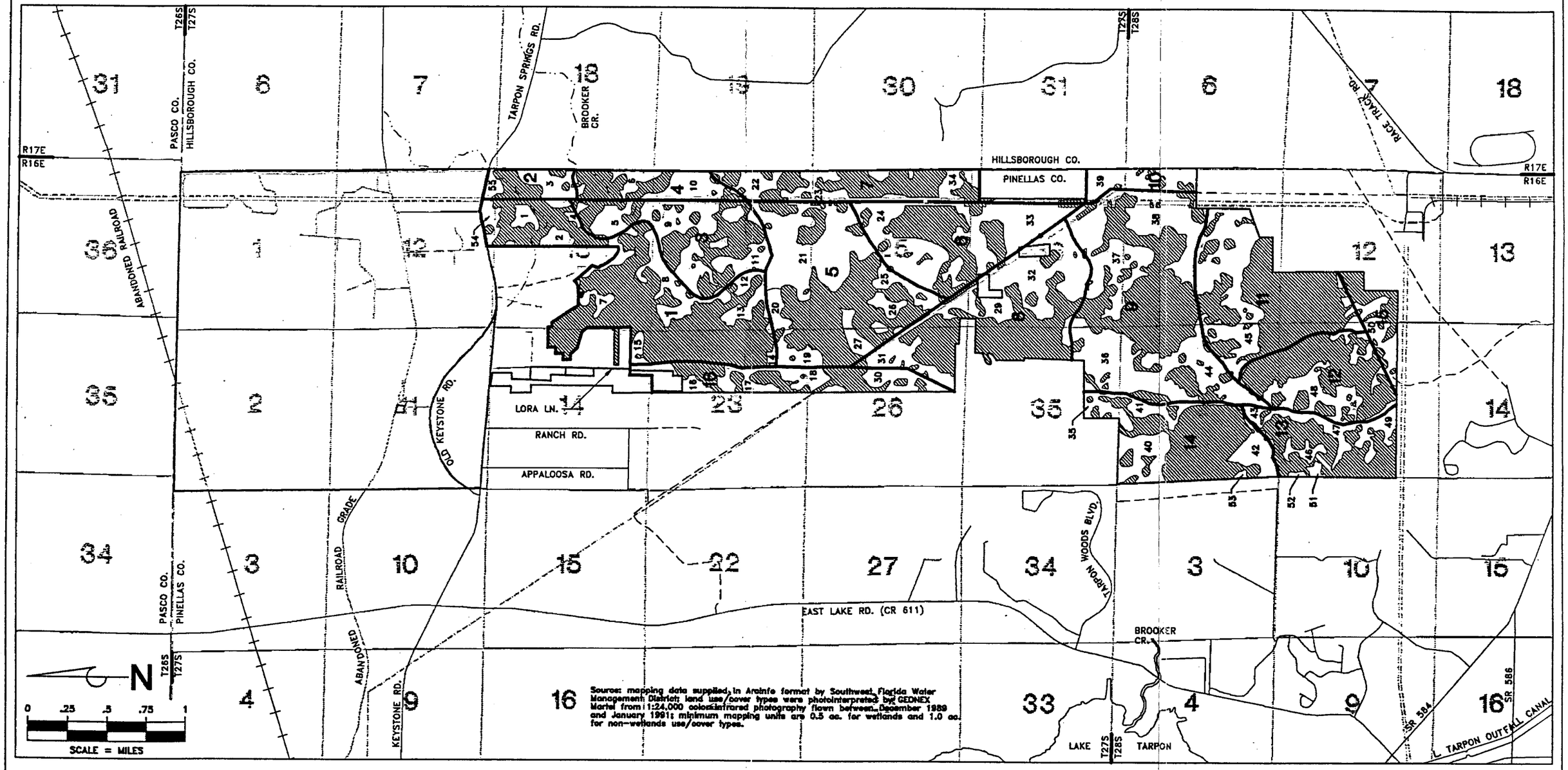
800 TRANSPORTATION, COMMUNICATION AND UTILITIES
- 810 Transportation
- 820 Communications
- 830 Utilities

BROOKER CREEK PRESERVE

LAND USE AND COVER TYPES ON THE BROOKER CREEK PRESERVE

FIGURE 5

Y:\BROOKER\OUTLINE2.DWG



Source: mapping data supplied in Arcinfo format by Southwest Florida Water Management District; land use/cover types were photointerpreted by GEDNEX Martel from 1:24,000 color infrared photography flown between December 1989 and January 1991; minimum mapping units are 0.5 ac. for wetlands and 1.0 ac. for non-wetlands use/cover types.

LEGEND

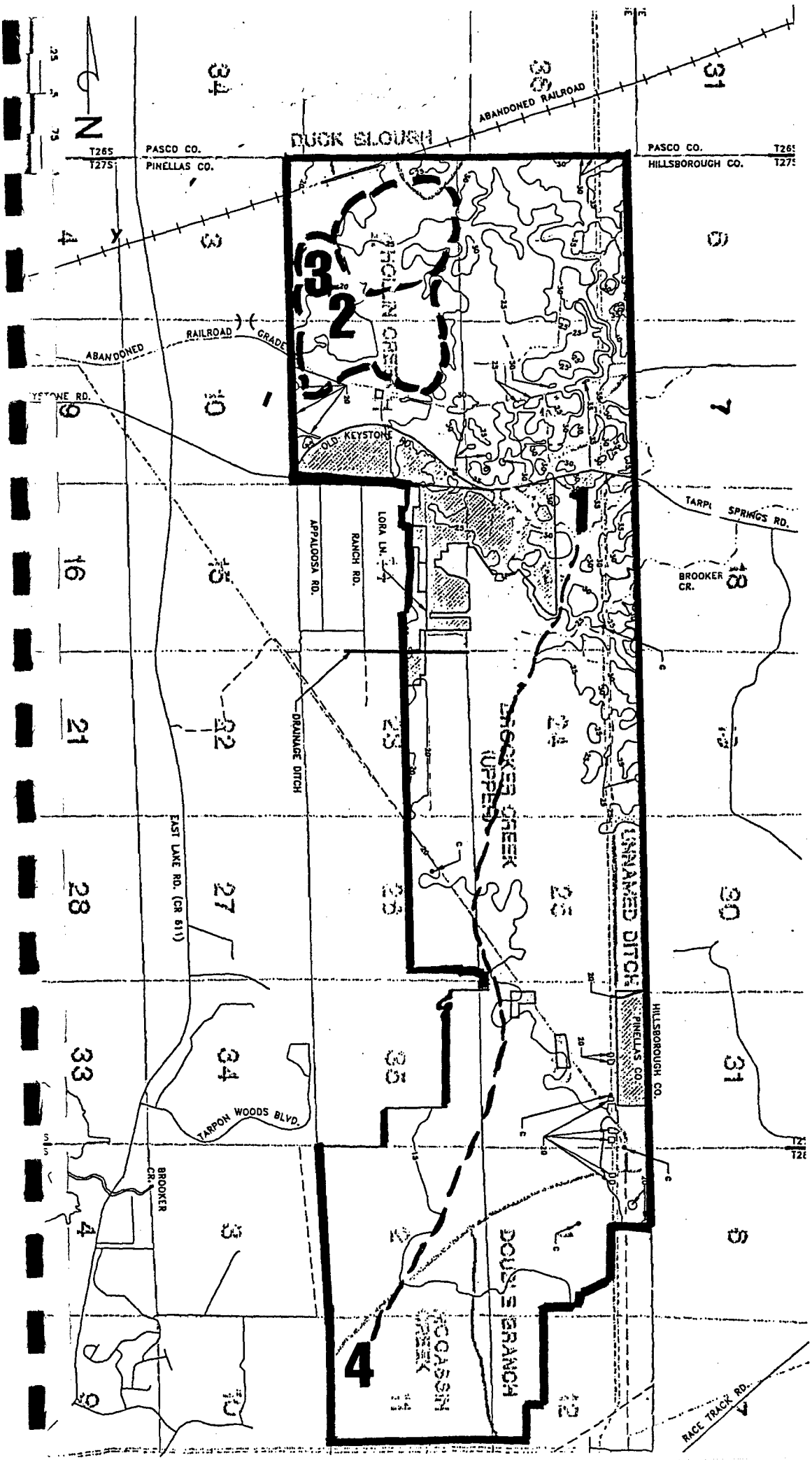
- WETLAND
- 5 BURN BLOCKS
- 30 PRESCRIBED BURN UNITS
- PRIMARY CONTROL NETWORK (COMPRISED OF MAJOR TRAILS)

Y:\BROOKER\OUTLINE8.DWG

BROOKER CREEK PRESERVE

FIRE MANAGEMENT MAP

FIGURE 6



LEGEND

1- ENVIRONMENTAL EDUCATION CENTER/BIOLOGICAL FIELD STATION with WALKING TRAIL

2- GROUP CAMPING

3- FIELD STATION DORMITORY

4- SOUTH ACTIVITY AREA

RIDING TRAIL

HIKING TRAIL

BROOKER CREEK PRESERVE
PROPOSED FACILITIES
FIGURE 7

APPENDIX B--PLANT SURVEY REPORT

(Imperata cylindrica), leadtree (Leucaena leucocephala), punk tree (Melaleuca quniquenervia), latex plant (Morrenia odorata), parrot's-feather (Myriophyllum aquaticum), and Brazilian pepper (Schinus terebinthifolius). An area of concern is Section 11, NW quarter, which is a highly disturbed fill area with Australian pine, leadtree, ear tree, and air potato.

Table 1. BROOKER CREEK PRESERVE PLANT SPECIES LIST

1	Acer rubrum (v)	southern red maple
2	Acmella repens	creeping spotflower
3	Aeschynomene americana	shyleaf
4	Agalinis fasciculata	beach false foxglove
5	Aletris lutea (v)	yellow colicroot
6	Alternanthera philoxeroides *	alligator-weed
7	Alysicarpus ovalifolius *	false moneywort
8	Amaranthus spinosus (v) *	spiny amaranth
9	Ambrosia artemisiifolia	common ragweed
10	Ammannia latifolia (v)	toothcups
11	Amorpha herbacea	cluster-leaf indigo-bush
12	Ampelopsis arborea (v)	pepper vine
13	Amphicarpum muhlenbergianum	blue maidencane
14	Anagallis minima	false pimpernel
15	Andropogon glomeratus	bushy bluestem
16	Andropogon ternarius (v)	splitbeard bluestem
17	Andropogon virginicus	broomsedge
18	Apios americana (v)	groundnut
19	Aristida beyrichiana	wiregrass
20	Aristida spiciformis (v)	bottlebrush threeawn
21	Asclepias humistrata	pinewoods milkweed
22	Asclepias lanceolata (v)	few-flowered milkweed
23	Asclepias longifolia (v)	long-leaf milkweed
24	Asclepias pedicellata (v)	savannah milkweed
25	Asclepias tuberosa	butterfly-weed
26	Asimina pygmea (v)	dwarf pawpaw
27	Asimina reticulata (v)	netted pawpaw
28	Aster adnatus	scale-leaf aster
29	Aster carolinianus	climbing aster
30	Aster dumosus (v)	rice-button aster
31	Aster reticulatus (v)	white-top aster
32	Aster subulatus	annual saltmarsh aster
33	Aster tortifolius	white-topped aster
34	Axonopus fissifolius (v)	common carpetgrass
35	Axonopus furcatus (v)	big carpetgrass
36	Azolla caroliniana	mosquito fern
37	Baccharis glomeruliflora	silverling
38	Baccharis halimifolia	groundsel tree
39	Bacopa caroliniana (v)	blue water-hyssop
40	Bacopa monnieri (v)	coastal water-hyssop
41	Balduina angustifolia (v)	yellow buttons
42	Befaria racemosa (v)	tarflower
43	Berchemia scandens (v)	rattan vine
44	Berlandiera subacaulis	greeneyes

45	Bidens alba (v)	beggar-ticks
46	Bidens mitis (v)	small-fruit beggar-ticks
47	Bigelowia nudata	pineland rayless goldenrod
48	Blechnum serrulatum (v)	toothed mid-sorus fern
49	Boehmeria cylindrica (v)	false nettle
50	Boltonia diffusa (v)	false aster
51	Broussonetia papyrifera *	paper mulberry
52	Buchnera americana (v)	blueheart
53	Bulbostylis stenophylla (v)	sandy-field hairsedge
54	Bumelia reclinata (v)	Florida bully
55	Callicarpa americana (v)	beautybush
56	Calopogon barbatus T	beared grass-pink
57	Campsis radicans (v)	trumpet-vine
58	Canna flaccida (v)	golden canna
59	Carex comosa (v)	bearded sedge
60	Carex longii (v)	Long's sedge
61	Carex lupulina (v)	hop sedge
62	Carex verrucosa (v)	warty sedge
63	Carphephorus corymbosus (v)	coastal-plain chaffhead
64	Carphephorus odoratissimus (v)	vanilla plant
65	Casuarina equisetifolia (v) *	Australian pine
66	Catharanthus roseus (v) *	Madagascar periwinkle
67	Ceanothus microphyllus	little-leaf buckbrush
68	Cenchrus incertus	coast sandspur
69	Centella asiatica (v)	coinwort
70	Centrosema virginianum (v)	butterfly-pea
71	Cephalanthus occidentalis (v)	buttonbush
72	Chamaecrista fasciculata (v)	partridge-pea
73	Chamaecrista nictitans var. nictitans	wild sensitive plant
74	Chamaecrista nictitans var. aspera (v)	hairy wild sensitive plant
75	Chamaesyce hirta (v)	hairy spurge
76	Chamaesyce hypericifolia (v)	tropical sandmat
77	Chamaesyce hyssopifolia (v)	eyebane
78	Chaptalia tomentosa	pineland-daisy
79	Chenopodium ambrosioides (v) *	Mexican tea
80	Chrysopsis subulata (v)	scrubland goldenaster
81	Cinnamomum camphora (v) *	camphor tree
82	Cirsium horridulum (v)	yellow thistle
83	Cirsium nuttallii (v)	Nuttall's thistle
84	Cladium jamaicense (v)	sawgrass
85	Clematis baldwinii	pine-hyacinth
86	Cnidoscolus stimulosus	tread softly
87	Colocasia esculenta (v) *	wild taro
88	Commelina diffusa	day-flower
89	Commelina erecta	erect day-flower
90	Conyza canadensis var. pusilla (v)	dwarf horseweed
91	Coreopsis leavenworthii (v)	Leavenworth's' tickseed

92	Cornus foemina	swamp dogwood
93	Cortaderia selloana *	pampasgrass
94	Crotalaria lanceolata (v) *	lance-leaf rattlebox
95	Crotalaria pallida *	smooth rattlebox
96	Crotalaria rotundifolia (v)	rabbitbells
97	Crotalaria spectabilis (v) *	showy rattlebox
98	Croton michauxii (v)	rushfoil
99	Cuphea carthagenensis (v)	Columbian waxweed
100	Cuscuta sp.	dodder
101	Cuthbertia ornata	roseling
102	Cynodon dactylon (v) *	Bermudagrass
103	Cyperus croceus (v)	Baldwin's flatsedge
104	Cyperus distinctus (v)	marshland flatsedge
105	Cyperus haspan (v)	sheathed flatsedge
106	Cyperus lanceolatus (v)	epiphytic flatsedge
107	Cyperus ligularis (v)	Alabama swamp flatsedge
108	Cyperus odoratus (v)	rusty flatsedge
109	Cyperus polystachyos (v)	many-spike flatsedge
110	Cyperus retrorsus (v)	pine-barren flatsedge
111	Cyperus rotundus (v) *	purple flatsedge
112	Cyperus surinamensis (v)	tropical flatsedge
113	Cyperus virens	green flatsedge
114	Dactyloctenium aegyptium *	crowfootgrass
115	Dalea carnea	whitetassels
116	Desmodium incanum (v)	tick-trefoil
117	Desmodium paniculatum	panicled tick-trefoil
118	Desmodium tortuosum (v) *	Dixie tick-trefoil
119	Desmodium triflorum *	three-flower tick-trefoil
120	Dichanthelium aciculare	needle-leaf witchgrass
121	Dichanthelium acuminatum	tapered witchgrass
122	Dichanthelium commutatum (v)	variable witchgrass
123	Dichanthelium dichotomum	cypress witchgrass
124	Dichanthelium ensifolium (v)	sword-leaf witchgrass
125	Dichanthelium erectifolium (v)	erect-leaf witchgrass
126	Dichanthelium laxiflorum	lax-flower witchgrass
127	Dichanthelium ovale	egg-leaf witchgrass
128	Dichanthelium portoricense (v)	hemlock witchgrass
129	Dichanthelium strigosum (v)	rough-hair witchgrass
130	Dichondra carolinensis (v)	ponyfoot
131	Digitaria ciliaris (v)	southern crabgrass
132	Digitaria pentzii (v) *	pangolagrass
133	Diodia teres (v)	poor joe
134	Diodia virginiana (v)	buttonweed
135	Dioscorea bulbifera (v) *	air potato
136	Diospyros virginiana (v)	persimmon
137	Drosera brevifolia	dwarf sundew
138	Drosera capillaris (v)	pink sundew

233	Indigofera spicata (v) *	trailing indigo
234	Ipomoea cordatotriloba (v)	tievine
235	Ipomoea sagittata (v)	glade morning-glory
236	Iris hexagona var. savannarum (v)	prairie iris
237	Itea virginica (v)	Virginia willow
238	Iva microcephala (v)	piedmont marsh-elder
239	Juncus dichotomus	forked rush
240	Juncus effusus (v)	soft rush
241	Juncus elliottii (v)	bog rush
242	Juncus marginatus (v)	grass-leaf rush
243	Juncus megacephalus (v)	big-head rush
244	Juncus polycephalus (v)	many-head rush
245	Juncus repens (v)	lesser creeping rush
246	Juncus scirpoides (v)	needle-pod rush
247	Krigia virginica	dwarf-dandelion
248	Kyllinga brevifolia (v)	short-leaf flatsedge
249	Lachnanthes caroliana	redroot
250	Lachnocaulon anceps (v)	bog-buttons
251	Lactuca graminifolia (v)	grass-leaf lettuce
252	Lantana camara (v)	shrub verbena
253	Lechea minor (v)	thyme-leaf pinweed
254	Lechea torreyi (v)	piedmont pinweed
255	Lemna sp.	duckweed
256	Lepidium virginicum (v)	poorman's pepper
257	Leucaena leucocephala (v) *	leadtree
258	Liatris gracilis	slender gayfeather
259	Liatris tenuifolia	short-leaf gayfeather
260	Licania michauxii (v)	gopher-apple
261	Lilium catesbaei T	Catesby's lily
262	Limnobium spongia	frog's-bit
263	Linaria canadensis	blue toadflax
264	Lindernia anagallidea (v)	yellowseed false
265		pimpernel
266	Lindernia grandiflora (v)	savannah false
267		pimpernel
268	Linum floridanum (v)	Florida yellow flax
269	Lobelia feayana	bay lobelia
270	Lobelia glandulosa (v)	glade lobelia
271	Lobelia paludosa (v)	white lobelia
272	Ludwigia curtissii (v)	Curtiss' primrose- willow
273	Ludwigia linifolia (v)	southeastern
274		primrose-willow
275	Ludwigia maritima (v)	seaside primrose- willow
276	Ludwigia microcarpa (v)	small-fruit primrose-
277		willow
278	Ludwigia octovalvis (v)	Mexican primrose- willow
279	Ludwigia palustris	marsh primrose-willow

280	Ludwigia peruviana (v)	Peruvian primrose- willow
281	Ludwigia pilosa (v)	hairy primrose-willow
282	Ludwigia repens (v)	creeping primrose- willow
283	Ludwigia suffruticosa (v)	shrubby primrose- willow
284	Lupinus diffusus	sky-blue lupine
285	Lycopus rubellus	water hoarhound
286	Lygodesmia aphylla (v)	rose-rush
287	Lyonia ferruginea	rusty lyonia
288	Lyonia fruticosa (v)	staggerbush
289	Lyonia ligustrina (v)	maleberry
290	Lyonia lucida (v)	fetterbush
291	Lythrum alatum var. lanceolatum (v)	loosestrife
292	Macroptilium lathyroides (v) *	wild bush-bean
293	Magnolia virginiana (v)	sweet-bay
294	Medicago lupulina (v) *	black medick
295	Melilotus albus (v) *	white sweet-clover
296	Melaleuca quinquenervia *	punk tree
297	Melothria pendula (v)	creeping-cucumber
298	Merremia dissecta (v)	noyau-vine
299	Micranthemum umbrosum (v)	shade mudflower
300	Mikania scandens (v)	climbing hempweed
301	Mimosa quadrivalvis var. angustata	sensitive briar
302	Mitreola sessilifolia (v)	swamp hornpod
303	Momordica charantia *	wild balsam-apple
304	Morrenia odorata (v) *	latexplant
305	Musa x paradisiaca *	banana
306	Myrica cerifera (v)	wax myrtle
307	Myriophyllum aquaticum (v) *	parrot's-feather
308	Nephrolepis cordifolia (v)	Boston fern
309	Neptunia pubescens (v)	tropical puff
310	Nuphar lutea	spatter-dock
311	Nymphaea odorata (v)	white waterlily
312	Nyssa sylvatica var. biflora (v)	swamp black gum
313	Oenothera laciniata (v)	cut-leaf evening-primrose
314		
315	Opuntia humifusa (v)	prickly-pear cactus
316	Osmunda cinnamomea (v) CE	cinnamon fern
317	Osmunda regalis (v) CE	royal fern
318	Oxalis corniculata (v)	yellow wood-sorrel
319	Oxypolis filiformis	water dropwort
320	Palafoxia integrifolia	coastal-plain palafox
321	Panicum anceps (v)	beaked panicum
322	Panicum hemitomon (v)	maidencane
323	Panicum hians (v)	gaping panicum
324	Panicum maximum (v) *	Guineagrass
325	Panicum repens (v)	torpedograss
326	Panicum rigidulum	redtop panicum

327	Panicum virgatum	switchgrass
328	Parthenocissus quinquefolia (v)	Virginia creeper
329	Paspalum conjugatum (v)	sour panicum
330	Paspalum dissectum (v)	mudbank paspalum
331	Paspalum laeve (v)	field paspalum
332	Paspalum notatum (v) *	Bahiagrass
333	Paspalum praecox (v)	early paspalum
334	Paspalum repens (v)	water paspalum
335	Paspalum setaceum (v)	thin paspalum
336	Paspalum urvillei (v) *	Vaseygrass
337	Passiflora incarnata (v)	maypop
338	Peltandra virginica (v)	green arum
339	Pentadon pentandrus (v)	Hale's pentadon
340	Persea borbonia	red bay
341	Persea palustris (v)	swamp bay
342	Phlebodium aureum (v) T	golden polypody
343	Phoebanthus grandiflorus	Florida false
344		sunflower
345	Photinia pyriformis	red chokeberry
346	Phyla nodiflora (v)	frog-fruit
347	Phyllanthus urinaria (v) *	chamber-bitter
348	Physalis angulata (v)	cut-leaf ground- cherry
349	Physalis walteri (v)	starry-hair ground- cherry
350	Phytolacca americana (v)	pokeberry
351	Piloblephis rigida (v)	wild pennyroyal
352	Pinguicula lutea (v) T	yellow butterwort
353	Pinquicula pumila (v) T	small butterwort
354	Pinus clausa (v)	sand pine
355	Pinus elliottii	slash pine
356	Pinus palustris	longleaf pine
357	Piriqueta caroliniana var. glabra (v)	Carolina stripeseed
358	Pityopsis graminifolia (v)	coastal-plain
359		silkgrass
360	Plantago virginica (v)	southern plantain
361	Pluchea foetida (v)	stinking camphorweed
362	Pluchea longifolia	long-leaf camphorweed
363	Pluchea odorata (v)	saltmarsh fleabane
364	Pluchea rosea (v)	rosy camphorweed
365	Poinsettia heterophylla	fiddler's spurge
366	Polygala balduinii (v)	Baldwin's milkwort
367	Polygala cymosa (v)	tall pine-barren
368		milkwort
369	Polygala grandiflora (v)	showy milkwort
370	Polygala incarnata	procession flower
371	Polygala lutea (v)	orange milkwort
372	Polygala nana (v)	dwarf milkwort

373	Polygala ramosa (v)	low pine-barren
374		milkwort
375	Polygala setacea (v)	coastal-plain milkwort
376	Polygonella gracilis	wireweed
377	Polygonum hydropiperoides (v)	mild water-pepper
378	Polygonum punctatum (v)	dotted smartweed
379	Polypodium polypodioides var. michauxianum (v)	resurrection fern
380	Polypremum procumbens (v)	rustweed
381	Pontederia cordata (v)	pickerelweed
382	Proserpinaca palustris (v)	marsh mermaid-weed
383	Proserpinaca pectinata (v)	comb-leaf mermaid-
384		weed
385	Pteridium aquilinum (v)	bracken
386	Pteris vittata (v) * T	ladder brake
387	Pterocaulon pycnostachyum (v)	coastal blackroot
388	Ptilimnium capillaceum (v)	mock bishop's-weed
389	Pyrrhopappus carolinianus	false dandelion
390	Quercus chapmanii	Chapman's oak
391	Quercus geminata (v)	sand live oak
392	Quercus incana (v)	bluejack oak
393	Quercus laevis (v)	turkey oak
394	Quercus laurifolia (v)	laurel oak
395	Quercus minima (v)	dwarf like oak
396	Quercus myrtifolia (v)	myrtle oak
397	Quercus nigra (v)	water oak
398	Quercus pumila (v)	running oak
399	Quercus virginiana(v)	Virginia live oak
400	Rhexia mariana (v)	pale meadow-beauty
401	Rhexia nuttallii (v)	Nuttall's meadow- beauty
402	Rhus copallina (v)	winged sumac
403	Rhynchelytrum repens *	Natalgrass
404	Rhynchosia michauxii	Michaux's snout-bean
405	Rhynchospora cephalantha (v)	bunched beaksedge
406	Rhynchospora chapmanii (v)	Chapman's' beaksedge
407	Rhynchospora colorata (v)	white-tops
408	Rhynchospora corniculata (v)	short-bristle horned
409		beaksedge
410	Rhynchospora fascicularis (v)	fasciculate beaksedge
411	Rhynchospora grayi (v)	Gray's beaksedge
412	Rhynchospora inundata (v)	narrow-fruit horned
413		beaksedge
414	Rhynchospora megalocarpa	sandy-field beaksedge
415	Rhynchospora microcarpa	southern beaksedge
416	Rhynchospora microcephala (v)	small-head beaksedge
417	Rhynchospora miliacea (v)	millet beaksedge
418	Rhynchospora plumosa (v)	plumed beaksedge
419	Rhynchospora pusilla (v)	small beaksedge

420	Richardia brasiliensis (v) *	tropical Mexican- clover
421	Ricinus communis (v) *	castorbean
422	Rosa palustris	swamp rose
423	Rottboellia cochinchinensis (v) *	itchgrass
424	Rubus argutus (v)	blackberry
425	Rubus cuneifolius (v)	sand blackberry
426	Rudbeckia hirta (v)	blackeyed Susan
427	Rumex hastatulus (v)	hastate-leaved dock
428	Rumex verticillatus	swamp dock
429	Sabal palmetto	cabbage palm
430	Sabatia brevifolia	short-leaf rose-
431		gentian
432	Sabatia grandiflora (v)	large-flower rose-
433		gentian
434	Saccharum giganteum	sugarcane plumegrass
435	Sacciolepis indica (v) *	India cupscale
436	Sacciolepis striata (v)	American cupscale
437	Sagittaria graminea var. chapmanii (v)	grass-leaf arrowhead
438	Sagittaria lancifolia (v)	common arrowhead
439	Salix caroliniana (v)	Carolina willow
440	Salvinia minima (v)	water spangles
441	Sambucus canadensis (v)	elderberry
442	Samolus valerandi subsp. parviflorus (v)	pineland pimpernel
443	Saururus cernuus	lizard's-tail
444	Schinus terebinthifolius *	Brazilian pepper
445	Schizachyrium scoparium	little bluestem
446	Scirpus cyperinus (v)	woolgrass
447	Scleria ciliata var. pauciflora (v)	few-flowered nutrush
448	Scleria ciliata (v)	fringed nutrush
449	Scleria georgiana	slender-fruit nutrush
450	Scleria reticularus (v)	netted nutrush
451	Scleria triglomerata (v)	tall nutgrass
452	Scoparia dulcis (v)	sweet broom
453	Scutellaria arenicola	Florida scrub skullcap
454	Senecio glabellus	butterweed
455	Serenoa repens (v)	saw palmetto
456	Sesbania vesicaria (v)	bladderpod
457	Setaria geniculata (v)	knotroot foxtail
458	Sida acuta (v)	broomweed
459	Sida cordifolia *	pantropical fanpetal
460	Sida rhombifolia (v)	arrow-leaf fanpetal
461	Sisyrinchium angustifolium	narrow-leaf blue-eyed
462		grass
463	Sisyrinchium nashii (v)	Nash's blue-eyed grass
464	Smilax auriculata (v)	ear-leaf greenbrier
465	Smilax bona-nox	saw greenbrier
466	Smilax glauca	wild sarsaparilla

467	Smilax laurifolia (v)	laurel-leaf greenbrier
468	Smilax walteri	coral greenbrier
469	Solanum americanum	common nightshade
470	Solanum nigrescens (v) *	black nightshade
471	Solidago chapmanii (v)	Chapman's goldenrod
472	Solidago fistulosa (v)	pine-barren goldenrod
473	Solidago sempervirens (v)	seaside goldenrod
474	Sonchus oleraceus *	common sow-thistle
475	Sorghastrum secundum	lopsided Indiangrass
476	Spartina bakeri	sand cordgrass
477	Spermacoce assurgens	woodland false
478		buttonweed
479	Spermolepis divaricata (v)	rough-fruit scaleseed
480	Spermolepis echinata (v)	bristly-fruit scaleseed
481	Spiranthes praecox (v) T	green-vein ladies- tresses
482	Spiranthes vernalis (v) T	spring ladies-tresses
483	Sporobolus indicus *	smutgrass
484	Sporobolus jacquemontii (v)	West Indies dropseed
485	Sporobolus junceus	pineywoods dropseed
486	Stenotaphrum secundatum (v)	St. Augustinegrass
487	Stillingia aquatica (v)	corkwood
488	Stillingia sylvatica (v)	queen's delight
489	Syngonanthus flavidulus (v)	bantam-buttons
490	Taxodium ascendens (v)	pond cypress
491	Tephrosia spicata (v)	spiked hoary-pea
492	Thalia geniculata (v)	alligator-flag
493	Thelypteris kunthii (v) T	widspread maiden fern
494	Thelypteris palustris T	marsh fern
495	Tillandsia fasciculata var. densispica (v) CE	air plant
496	Tillandsia recurvata (v)	ball-moss
497	Tillandsia simulata (v) T	wild pine
498	Tillandsia usneoides	Spanish-moss
499	Tillandsia utriculata (v) CE	spreading air plant
500	Toxicodendon radicans	poison-ivy
501	Tradescantia ohiensis (v)	spiderwort
502	Triadenum virginicum	marsh St.-John's-wort
503	Trichostema dichotomum	forked bluecurls
504	Tripsacum dactyloides (v)	eastern gamagrass
505	Typha domingensis (v)	southern cattail
506	Typha latifolia (v)	common cattail
507	Ulmus americana	American elm
508	Urena lobata (v)	ceasarweed
509	Urochloa mutica *	paragrass
510	Utricularia foliosa (v)	leafy bladderwort
511	Utricularia purpurea	purple bladderwort
512	Utricularia subulata	zigzig bladderwort
513	Vaccinium corymbosum (v)	highbush blueberry

514	Vaccinium darrowii (v)	Darrow's blueberry
515	Vaccinium myrsinites (v)	shiny blueberry
516	Vaccinium stamineum	deerberry
517	Verbascum virgatum (v) *	wand mullein
518	Verbena brasiliensis (v) *	South American vervain
519	Verbesina virginica	white crownbeard
520	Veronica peregrina	purslane speedwell
521	Vicia acutifolia (v)	four-leaf vetch
522	Vigna luteola (v)	piedmont cow-pea
523	Viola lanceolata	long-leaf violet
524	Viola palmata	early blue violet
525	Vitis aestivalis	summer grape
526	Vitis rotundifolia (v)	scuppernong
527	Vitis shuttleworthii (v)	Calusa grape
528	Wedelia trilobata (v) *	creeping oxeye
529	Woodwardia areolata (v) T	netted chain fern
530	Woodwardia virginica (v)	Virginia chain fern
531	Xyris ambigua (v)	coastal-plain yellow-
532		eyed grass
533	Xyris brevifolia	short-leaf-yellow- eyed
534	grass	
535	Xyris caroliniana (v)	Carolina yellow-eyed
536		grass
537	Xyris difformis var. floridana (v)	Florida bog yellow- eyed
538	grass	
539	Xyris elliottii (v)	Elliott's yellow-eyed
540		grass
541	Xyris fimbriata (v)	fringed yellow-eyed
542		grass
543	Xyris jupicai (v) *	Richard's yellow-eyed
544		grass
545	Yucca aloifolia *	Spanish-dagger
546	Yucca filamentosa	Adam's' needle
547	Zigadenus densus (v)	crow-poison

(v) - Specimens vouchered and deposited in University of South Florida Herbarium.

* - Non-native species.

E, T, CE - Endangered, threatened, or commercially exploited species listed by the Florida
Department of Agriculture and Consumer Affairs (FDA) list.

Table 2. LIST OF ENDANGERED & POTENTIALLY ENDANGERED PLANT SPECIES EXPECTED AT BROOKER CREEK PRESERVE
(Based on species known to occur in Pinellas County [*] and adjacent Hillsborough or Pasco counties and on existing habitat)

	FDA	USFWS	CITES	VERIFIED
Botrychium dissectum	T			
Calopogon barbatus*	T		II	*
Calopogon multiflorus*	T		II	
Calopogon pallidus*	T		II	
Calopogon tuberosus	T		II	
Campyloneurum phyllitidis	T			
Ceratopteris pteridoides*	T			
Ceratopteris thalictroides	T			
Coelorachis tuberculosa		C2		
Corallorhiza wisteriana*	T		II	
Dryopteris ludoviciana*	T			
Encyclia tampensis*	T		II	*
Epidendron conopseum	T		II	
Equisetum hyemale*	T			
Eulophia alta	T		II	
Glandularia tampensis*	E	C1		
Habenaria floribunda*	T		II	*
Habenaria quinqueseta	T		II	
Habenaria repens*	T		II	
Harrisella filiformis*	T		II	
Hexalectris spicata	E		II	
Hypolepis repens*	T			
Ilex ambigua*	T			*
Ilex cassine*	CE			*
Ilex decidua*	T			
Isoetes flaccida	T			
Lilium catesbaei*	T			*
Listera australis	T		II	
Lobelia cardinalis	T			
Lycopodiella alopecuroides	T			
Lycopodiella appressa*	T			
Lycopodiella carolinianum*	T			
Lycopodiella cernua*	T			
Lycopodiella prostrata	T			
Malaxis spicata	T		II	
Ophioglossum crotalophoroides	T			
Ophioglossum engelmannii	T			
Ophioglossum nudicaule	T			
Ophioglossum petiolatum	T			
Opuntia humifusa	T		II	
Osmunda cinnamomea*	CE			*

	FDA	USFWS	CITES	VERIFIED
Osmunda **regalis***	CE			*
Phlebodium **aureum***	T			*
Pinguicula **caerulea***	T			
Pinguicula **lutea***	T			*
Pinguicula **pumila***	T			*
Platanthera **blephariglotis**	T		II	
Platanthera **ciliaris**	T		II	
Platanthera **cristata**	T		II	
Platanthera **flava**	T		II	
Platanthera **nivea**	T		II	
Pecluma **dispersa**	T			
Pecluma **plumula**	T			
Pecluma **ptilodon***	T			
Pogonia **ophioglossoides***	T		II	
Polygala **boykinii***		C2		
Polygala **rugelii***	T			
Psilotum **nudum***	T			
***Pteris tripartita**	T			
Pteris vittata	T			*
Pteroglossaspis **ecristata***	T		II	
Rhododendron **viscosum**	T			
Rhynchospora **decurrens**		C2		
Sabal **minor**	T			
Sacoila **lanceolata***	T		II	
Selaginella **apoda***	T			
Spiranthes **praecox***	T		II	*
Spiranthes **vernalis***	T		II	*
Thelypteris **dentata**	T			
Thelypteris **hispidula**	T			
Thelypteris **interrupta***	T			
Thelypteris **kunthii***	T			*
Thelypteris **palustris***	T			*
Tillandsia **bartramii**	T			
Tillandsia **fasciculata***	CE			*
Tillandsia **setacea**	T			
Tillandsia **simulata**	T			*
Tillandsia **utriculata***	CE			*
Vittaria **lineata***	T			
Woodwardia **areolata***	T			*
Zamia **pumila***	CE		II	
Zephranthes **atamasca***	T			
Zephranthes **simpsonii***	E			

Species **expected** - **83**
Species **verified** - **20**
* preceding **name** is actually a non-native species listed in error.

APPENDIX C--WILDLIFE SURVEY REPORT AND SPECIES LISTS

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BROOKER CREEK PRESERVE WILDLIFE SURVEYS

Introduction

A comprehensive baseline wildlife survey is an essential element in developing a land management plan with the objective of restoring and maintaining native habitats and natural biodiversity. The goal of the Brooker Creek wildlife surveys is to compile baseline faunal composition/habitat utilization data essential to the development of the Preserve Management Plan.

The Brooker Creek Preserve wildlife surveys directly address two fundamental questions: which species potentially utilize the habitats represented on the Preserve, and of those, which currently occur on site. To definitively answer this latter question would require a long-term comprehensive survey. Therefore, the initial focus was on developing survey methods specifically designed to:

(1) identify terrestrial vertebrates and their habitat utilization. This includes the compilation of information from past surveys that have been conducted on site. This focus initiates a long term data base with species sorted by season (specifically for birds) and habitat.

(2) determine the presence/absence of listed species (Wood, 1992). Because the Preserve represents the last area in the County large enough to potentially support viable populations of some listed species, it is necessary to identify which species occur on site and eventually address the questions of each species' overall and habitat-specific abundance.

(3) provide an understanding of life history requirements of priority species and identify management strategies that create/sustain these requirements. Priority species, as used here, include listed species and species which are good indicators of habitat quality. For example the Eastern Woodrat[1] is an indicator of minimally disturbed mature forests (Layne. J. pers. comm.); the Bachman's Sparrow, a candidate for federal protection, is an indicator of open flatwoods with a frequent burn regime (Allaire and Fisher, 1975).

(4) recognize on site conditions that increase the site's overall suitability to a priority species. For example, a seasonally flooded wetland near sandhill is optimal habitat for the Florida Gopher Frog, a state listed species (Altig, R., and R. Lohoefener, 1983). Southeastern Pocket Gopher and Gopher Tortoise colonies in sandhill are optimal sites for Pine Snake (Franz, 1986).

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[1]Scientific names appear in Tables C-1 through C-3.

Recommendations on wildlife habitat management are based on the results of these surveys and habitat evaluations. The management plan identifies methods to enhance specific habitat requirements of target species. Known and potential wildlife populations were considered in recommending prescribed burning guidelines, site selection for the Nature Center, identifying areas (and opportunities) for continued research, and areas where public access is compatible with the goals of the Preserve.

Procedure

1) Identify species that potentially occur on the Preserve based on specific species' range information and site characteristics.

2) Conduct habitat specific surveys in all major habitat types represented on site while emphasizing survey work in habitat types that have not been previously studied. Compare results to predicted species.

3) Refine survey methodologies to identify listed species presence/absence.

4) Conduct initial surveys that may be used as a baseline for all future surveys. (ie.; surveys designed to measure and track the success of any restoration efforts) Therefore, use methods that are replicable and offer an opportunity for comparative studies throughout the management process.

5) Based upon consideration of survey findings and site wildlife habitat evaluations, develop management recommendations to restore, enhance, and maintain wildlife habitats on the Preserve.

6) Establish a Geographic Information System (GIS) database with all relevant findings so that information can be queried by species, habitat, location, season of occurrence, and protected status.

7) Archive all field notes, survey data, (etc.) by appropriate means so that it will be available for future analyses.

Methods and Materials

Background Data

Species that potentially occur on the Preserve were identified using local and regional sources (Ashton, 1988; Burt and Grossenheider, 1976; Collins et al., 1982; Harrison, 1975; Humphrey, 1992; Kale and Maehr, 1990; Layne et al., 1977; Jones et al. 1992; Moler, 1992; Peterson, 1980; Robertson and Woolfenden, 1992.). The on site habitat characteristics considered were habitat types as delineated using the Florida Land Use, Cover and Forms Classification System (FLUCFCS, Florida Department of Transportation, 1985). Bird species that only migrate through the site are not included in this list.

Wildlife surveys had been conducted on site for a period of one year in all major wetland (Floodplain [hardwood] swamp, dome swamp, strand swamp, hydric hammock) and mesic natural plant communities (pine flatwoods) represented on site (Joiner, 1992. [the GFC Survey]). This study did not survey any xeric plant communities (xeric hammock and sandhill), old field, or marshes.

The site was surveyed for the Florida Breeding Bird Atlas from 1986 to 1991.

Florida Natural Areas Inventory (FNAI) data base was queried for any element occurrence records on or near the site.

Habitat Sampled

All habitats represented on site are described in the management plan (Section III.A.). The Preserve was mapped by the Southwest Florida Water Management District using FLUCFCS codes (1990). Bird surveys were conducted in all habitat types throughout the Preserve. The following habitat descriptions are of areas surveyed in this study for herpetofauna and small mammals (Figure C-1).

Site 1: Xeric Hammock (FLUCFCS Code 421: Xeric Oak) - This area was mis-classified in the mapping effort as mixed coniferous/hardwood forest (Code 434). There are very few conifers within this area (scattered sand pine and slash pine). The overstory is dominated by live oak with turkey oak and bluejack oak prevalent in the subcanopy. The shrub layer is sparse, comprised mainly of scattered saw palmetto, beautyberry, and fox grape. Leaf litter and open sand dominate the ground strata. The soils are classified as Astatula fine sand, an excessively drained sandy soil that occurs along upland ridges. In this case, xeric hammock is an advanced successional stage of sandhill resulting from a lack of burning. (Source: modified from FNAI Xeric Hammock habitat description, 1990)

Site 2 and 3: Sandhill (Code 421: Xeric Oak) - These sites were also mis-classified in the mapping effort; Site 2 was classified as mixed coniferous/hardwood forest and Site 3 was classified as mixed rangeland (FLUCFCS Code 330). These areas do not contain any pine overstory as is often characteristic of sandhill. The sub canopy is dominated by oaks including turkey oak, live oak, sand live oak, and blue jack oak. Winged sumac, persimmon, partridge berry , and queen's delight dominate the sparse shrub layer. Wire grass, open patches of sand, and leaf litter dominate the ground layer. The sandhills on site average subcanopy coverage of between 40 and 60%. The soils are classified as Astutula fine sand. The natural fire regime in sandhills is between 2 and 5 years. In both sandhills surveyed, turkey oak co-dominates with live oak. This is an indicator that these communities are beginning to succeed into a hammock. (Source: modified from FNAI Sandhill habitat description, 1990)

Sites 4 and 5: Pine Flatwoods (Code 411: Pine Flatwoods) - There are many recognized variations to pine flatwoods. Site 4 consists of a typically open canopy forest of slash pine with saw palmetto and gallberry dominating the shrub layer. Site 4 is predominantly palmetto and gallberry with intermittent patches of wet meadow (bog buttons, yellow-eyed grass, sphagnum moss, red root, sedges, sundew). Site 5 has a denser canopy of slash pine and is poorly drained. The ratio of wet prairie to palmetto/gallberry in Site 5 is approximately 1:1. Soils in both areas are classified as Myakka fine sand; a nearly level, poorly drained soil on broad flats. (Source: modified from FNAI mesic flatwoods description, 1990)

Site 6: Old Field (Code 330: Mixed Rangeland): This area is dominated by bahia grass and dog fennel. Live oak and persimmon are scattered throughout the habitat. Underneath the grass layer, a relatively diverse array of xeric species, including prickly-pear cactus and gopher apple, are re-emerging. The soils are sandy and classified as Astatula, a sandhill soil.

Site 7: Hardwood Swamp (Code 615: Bottomland Hardwood Forest): This habitat type extends along Brooker Creek and it's tributaries. The area is dominated by red maple, sweet gum, and laurel oak. Dahoon holly and red maple dominate the sub canopy. Buttonbush and fetterbush dominate the sparse shrub canopy. The ground surface exhibits mound and pool microtopography with lizards tail and arrowhead in the lower area. Royal fern, cinnamon fern, chain fern, and swamp fern are other common components of the herbaceous strata. The soils are classified as Astor soils, a nearly level poorly drained sandy soil that occurs in swamps.

Surveys

Wildlife survey methodologies were designed to best meet the stated goals and objectives within the time constraints of the contract. Surveys were conducted from March to the first of September 1993.

Literature review revealed that no survey work had been conducted in the xeric habitats on site. Additionally, listed species of mammals and herptiles potentially present on site are most likely to occur in native xeric plant communities. Therefore, surveys for mammals, reptiles, and amphibians were predominantly concentrated in xeric habitat types.

Birds - Monthly bird surveys were conducted from 7:00 AM to 11:00 AM in May, June, and July using from 12 to 16 volunteers from the local Audubon Chapters (Clearwater, St. Petersburg, and Tampa). Volunteers were split into four groups and assigned to routes that covered the majority of the Preserve. Each group included at least two individuals with several years of experience in local bird identification. One person in each group was delegated the task of recording all species observations by location and habitat on data sheets (Figure C-2). Audio tapes of Eastern Screech-Owl calls were used during these efforts to elicit responses from song birds. Species targeted included listed species and species that are locally less common but known to have nested recently on the Preserve (Breeding Bird Atlas Surveys; 1991). These were the Short-tailed Hawk, Brown-headed Nuthatch, King Rail, and Bachman's Sparrow. All personnel involved in the bird surveys were carefully briefed on the identification of these species prior to the monthly surveys.

While playing an audio tape of the King Rail call, transects were walked throughout some of the best rail habitat on site; the marshy borrow pits within the north/south powerline easement. Several of these borrow pits were surveyed three to four times using this method.

Pine flatwoods burned within the last three years were surveyed for Bachman's Sparrows using an audio tape of the Bachman's Sparrow song.

Several random searches for nocturnally active species were conducted between dusk and 10:00 PM from April through August, 1993. The screech owl/barred owl tapes were used during these efforts.

Incidental observations were recorded throughout the trapping efforts (25 field days) and during other site visits (>10 days).

H3.1
M3.1
H2.2
M2.2
SANDHILL
H2.3
H2.1
SANDHILL
M2.1
M4.1
M1.2
RAIL & MUSKRAT SURVEYS
H4.1
OLD FIELD
M6.1
H6.1
XERIC HAMMOCK
PINE FLATWOODS
M4.1
H7.1
H1.2
H1.1
HARDWOOD SWAMP
M7.1
24
25
H5.1
M5.1
PINE FLATWOODS
BACHMAN'S SPARROW SURVEYS
LORA LN.
14
23
26
N
0 .25 .5 .75 1
SCALE = MILES

M1.1 THROUGH M7.1 SMALL MAMMAL TRANSECTS (20 TRAPS / TRANSECT)

H1.1 THROUGH H7.1 HERPETOFAUNAL / DRIFT FENCE TRAPS

OSPREY NEST

Y:\BROOKER\OUTLINE6.DWG

BROOKER CREEK PRESERVE

LOC. OF SMALL MAMMAL TRANSECTS AND HERPETOFAUNAL ARRAYS

FIGURE C-1

Page____

BROOKER CREEK BIRD SURVEYS

Date: _____

Personnel: _____

Location (TS/R/S)	Species	Habitat (1)	Comments

(1) Habitat types are: *(1) Sandhill (2) xeric hammock (3) Pine Flatwood (4) Palmetto Prairie (5) Cypress Swamp (6) Hardwood Swamp (Creek floodplain) (7) Marsh (8) Old Field (9) Powerline (marsh or shrub) (10) Other Ruderal Community*

Figure C-2. Brooker Creek Bird Survey data recording sheet.

Reptiles and Amphibians - Surveys were conducted for at least 4 days in all major habitats: hardwood swamp, pine flatwoods, hydric pine flatwoods adjacent to a cypress strand, old field, and xeric uplands. With respect to the uplands, two sandhills and one xeric hammock were surveyed for 21 days over a period of 5 months (April through August, 1993). These three xeric areas constitute the majority of the xeric natural plant communities that occur on the Preserve. The trapping methods selected were designed to : (1) catch reptiles and amphibians (and small mammals) that move on the ground both within and between habitat types, and (2) to capture gopher tortoise burrow associates. All listed species of herpetofauna that may occur within the Preserve are tortoise burrow associates and/or prefer xeric habitat.

A modification of the drift fence arrays described by Jones (1986) were positioned in all major habitats for at least four nights with special emphasis on xeric habitats (at least 20 drift fence trap nights/site). Each array consisted of a single 50 ft. fence with open buckets dug in at both ends and four double-opening funnel traps placed two to each side of the fence. Many species of herpetofauna, most notably anurans (frogs), move between wetland and upland habitats particularly after heavy rains. Fences were positioned parallel to adjacent wetlands to increase the likelihood of capturing these species. When the water table was too high for the buckets, two more funnel traps were positioned at either end of the drift fence. Holes were punched in the bucket to allow water to drain. To reduce the likelihood of dehydration, sponges placed in the funnel traps were re-moistened each day, and shades were placed over each bucket and funnel trap. When the traps were set, they were checked daily.

Gopher tortoise associates were sampled by placing double-opening funnel traps at the mouth of inactive and active burrows. Traps were rotated to different burrows every two days. Shade covers and moistened sponges were used to reduce trapping mortality and traps were checked daily when set. Burrows in sandhill, xeric hammock, and old field were surveyed collectively for 165 trap nights.

At least three 36" X 60" aluminum sheets were randomly placed flat on the ground at the xeric sites in shady and sunny areas and checked periodically. Past experience indicates that herptiles often use metal cover for thermoregulation and/or shelter.

Audio surveys of frogs and toads were conducted in and along all wetland types throughout the study period and particularly after heavy rains. Nocturnal surveys were conducted for frogs and snakes.

Gopher tortoise populations were estimated by censusing burrows as described by Cox et al. (1987) in all xeric habitats (xeric hammock, sandhills, and old field).

Incidental observations were recorded throughout the trapping operations and other

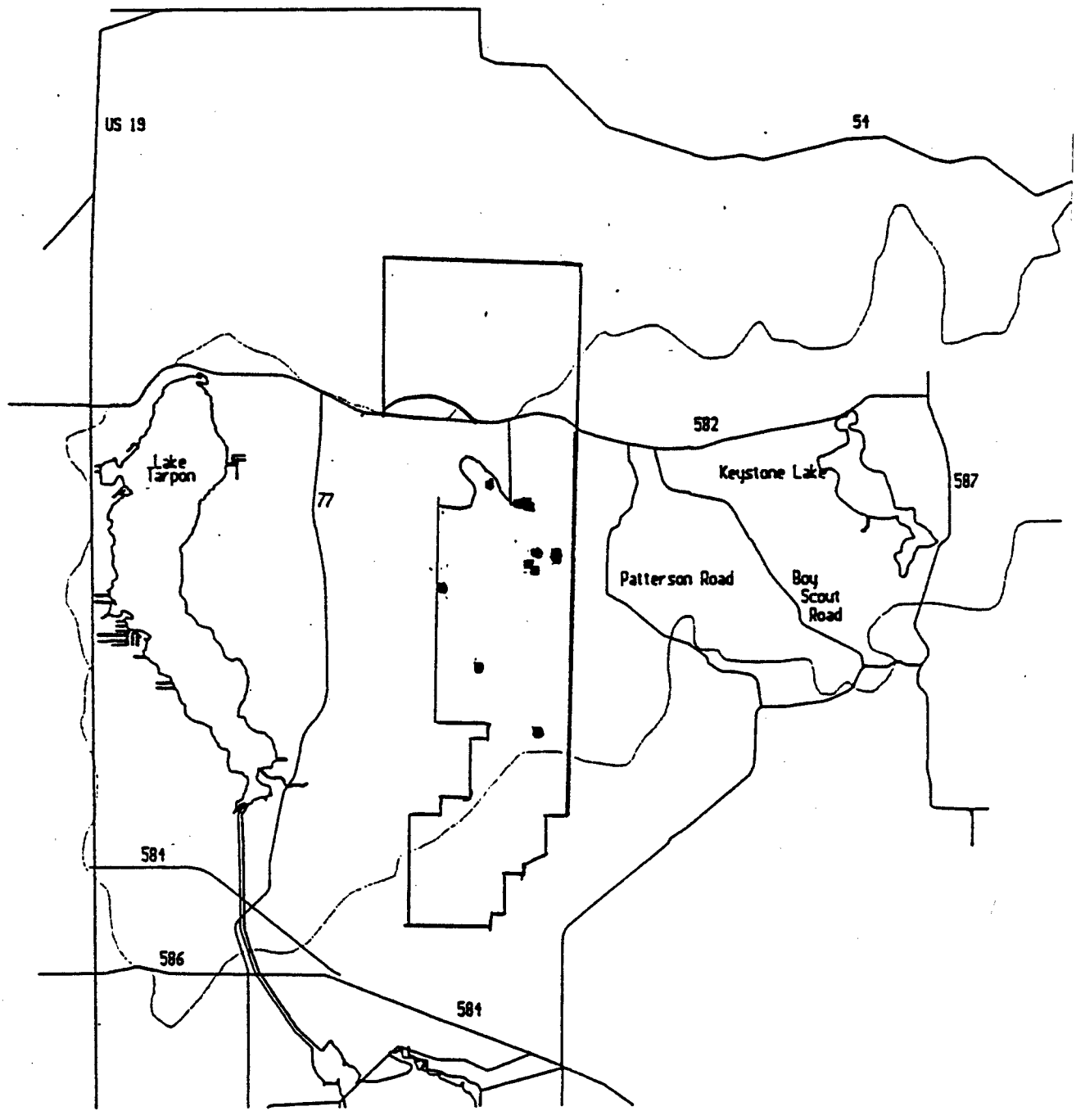

Figure C-3. Sampling site locations within the Lake Tarpon watershed, Florida. from *Final Report: Aquatic and terrestrial wildlife Survey in the Lake Tarpon Watershed.* 1992. FGFWFC.

site visits. Techniques include overturning logs, raking through leaf litter and detrital debris, and checking tracks.

The GFC Survey dip-netted for amphibians and found the four species expected to occur on site (two-toed amphiuma, eastern lesser siren, greater siren, and peninsula newt). The Brooker Creek Preserve Surveys did not repeat these efforts.

All captured amphibians and lizards were marked by toe clipping. Snakes (with the exception of poisonous snakes) were marked by notching the anal scale.

Mammals - Live trapping surveys were conducted for at least four days in all major habitats: hardwood swamp, pine flatwoods, hydric pine flatwoods adjacent to a cypress strand, and old field. Surveys were conducted in two sandhill areas and one xeric hammock for 21 days over a period of 5 months (April through August, 1993).

Traps were set along 450 foot transects for at least 80 trap nights. Each transect consisted of 10 stations with two 3" x 3" x 10" Sherman live traps baited with a combination of rolled oats, sesame seeds, and sunflower seeds. Traps were set in the shade and checked daily.

Larger live traps (6" x 6" x 18") were set in flatwoods for 21 nights and hardwood swamp for 8 trap nights.

All captures were marked with an ear notch.

Pedestrian transects were conducted in potential Round-tailed Muskrat habitat to determine the absence/presence of any muskrat lodges.

Incidental observations were recorded throughout the trapping efforts and other site visits.

Data collected were sorted by species, location, habitat, trap number, and date of observation for input into Arc Info GIS.

Data Analysis - All observations recorded during this survey were sorted by location (1/2 section/township/range), habitat, date, and season. Recent surveys conducted on site were evaluated and pertinent information was extracted and compiled.

Relative abundance of mammals and herptiles on transects and arrays was expressed as number of individuals/100 trap nights. Trap nights were adjusted by subtracting one-half the number of sprung traps without animals, on the assumption that a sprung trap was on average open half the night.

Gopher tortoise populations were estimated as per Cox (et al. 1987) who recommends calculating population size by multiplying .614 x (# of active and inactive burrows).

Results

Background Data

Based upon review of known geographic ranges, specific distributional records, and habitat requirements, 159 species of birds, 22 species of amphibians, 52 species of reptiles, and 41 species of mammals potentially occur on the Brooker Creek Preserve (Table C-1, C-2, C-3; located at the end of the narrative). Nineteen protected species potentially utilize the site (Table C-4). This does not include bird species that migrate through the area.

Of the nineteen listed species that potentially occur on site, six potentially utilize gopher tortoise burrows. These are the Eastern Indigo Snake, American Alligator, Gopher Frog, the Florida Pine Snake, Florida Mouse, and Burrowing Owl.

The GFC Survey encompassed the entire Lake Tarpon Watershed. Data collected within the Preserve boundaries were the results of the small mammal and herpetofaunal trapping and bird fixed-radius point count surveys (See Figure C-3). Species observations from the GFC Surveys collected within the Preserve boundaries were merged with the results of the surveys conducted for this study (Management Plan Surveys). The GFC bird survey data does not indicate the seasons in which the data were collected, therefore it includes birds documented in winter, spring, and fall. These data were omitted from the compilation because the Management Plan Surveys were only conducted through the summer.

The Breeding Bird Atlas identified 47 species that nested on site between 1986 and 1991 (Table C-5). With the exception of one species, the Least Bittern, all were observed during the course of this study.

Florida Natural Areas Inventory (FNAI) Element Occurrence Records - FNAI has one record of the Florida Mouse within the Preserve boundaries. This was reported as a result of the GFC survey.

Survey Results

A total of 143 species of wildlife was observed on the Brooker Creek Wildlife Preserve during the study period. Fourteen additional species were recorded during previous survey efforts (1 species: Breeding Bird Atlas; 13 species GFC survey).

Birds

Species sighted were sorted by season, habitat, and habitat/season (See Tables C-7 through C-18). Of the 94 species that potentially utilize the Preserve in the summer, 74 were documented (78.8%). Predicted species documented on site were sorted by habitat (Table C-19).

Seven of the 10 species of listed birds that potentially utilize the Preserve were observed on site. These are the Little Blue Heron, Snowy Egret, White Ibis, Tri-colored Heron, Wood Stork, Southeastern American Kestrel, and the Sandhill Crane. All were observed foraging. None are known to nest on site. The Kestrel and the Crane were observed only once; the other species were observed on several occasions.

There is a Southern Bald Eagle nest approximately 1 mile west of the Preserve on Lake Tarpon.

The Bachman's Sparrow, a federal candidate species, was observed in several flatwood areas on site. Based on visual and audio observations of singing males in optimal breeding habitat during the breeding season, these sparrows are believed to nest on the Preserve. Bachman's were observed both during the designed sparrow surveys using the audio tape and incidentally.

An Osprey , a candidate species for federal listing, was nesting last year on one of the NE/SE transmission towers.

None of the King Rail surveys resulted in any rail observations, however one rail was observed incidentally.

The Short-tailed Hawk was observed three times during the summer. Two groups of Brown-headed Nuthatches were observed in the Pine Flatwoods on the Water Management District Property.

Reptiles and Amphibians

Species Richness - Of the 22 amphibian species that potentially utilize the Preserve, 19 were documented (86.4%). Predicted amphibian species documented on site were sorted by habitat (Table C-23). No protected species of amphibians were encountered during these surveys. The species most likely to occur is the Gopher Frog and more intensive monitoring of Gopher Tortoise burrows for the species is warranted.

Twenty-six of the 52 reptilian species that potentially utilize the Preserve, were documented (55.8%). Predicted reptilian species documented on site were sorted

by habitat (Table C-24). Two listed species of reptiles were documented on site; the Gopher Tortoise and the Eastern Indigo Snake.

Trapping - Trapping efforts resulted in the capture of 13 species of herpetofauna. The remaining observations were predominantly the result of incidental observations and audio anuran surveys conducted near wetlands after rains.

Ten species were caught in the xeric hammock with drift fences open a total of 40 trap nights and tortoise burrow funnel traps open for 47 trap nights (Table C-25). The most common amphibian captured was the Southern Leopard Frog, (20/100 drift fence trap nights). The leopard frog and the Eastern Spadefoot were the most active after evening rains. The Six-lined Racerunner was the most frequently captured reptile (20/100 drift fence trap nights).

In the two sandhill sites, the Six-lined Racerunner was the species most commonly captured (37.5/100 drift fence trap nights: see Table C-26 and C-27). The Southern Toad was the most common amphibian (15.6/100 drift fence trap nights).

Seven species were trapped in the two flatwood sites (Table C-28 and C-29). The Southern Black Racer was the most common reptile (30/100 trap nights) and the Eastern Spadefoot Toad was the most common amphibian (18.2/100 trap nights). The spadefoot was only trapped on mornings after heavy rains.

Two species were caught at the old field site: the Dusky Pygmy Rattlesnake, and Six-lined Racerunner (Table C-30). One individual of each species was caught in 4 drift fence trap nights.

The only species recorded in Hardwood Swamp (Table C-31) was the Southern Black Racer (25/100 trap nights).

Gopher tortoise population size and demographics were estimated in four areas: a xeric hammock, two sandhills, and old field (Table C-32). All four areas surveyed currently support a viable population of gopher tortoises as defined by Cox (1987). The population densities in all habitats surveyed is statistically the same. Each area surveyed exceeds the definition of valuable gopher tortoise habitat which is defined by Cox (1987) as 0.8 tortoises/acres.

Mammals

Of the 41 species that potentially utilize the Preserve in the summer, 18 were documented (43.4%). The number of species that potentially occur on site were

compared to the number of species documented on site (Table C-33). All species documented with this survey effort and previous studies were sorted by habitat (Table C-34).

Two of the three listed species of mammals that potentially occur on site were documented: the Sherman's Fox Squirrel (SSC) and the Florida Mouse (SSC). There have been unsubstantiated reports of Florida Black Bear (SSC) occurrence on the Southwest Florida Water Management District property. No sign of this species was observed during the course of this study.

Trapping - Five species were caught in live traps: the Hispid Cotton Rat, Cotton Mouse, Florida Mouse, Southern Flying Squirrel, and Opossum. The Cotton Rat was caught in xeric hammock once and several times in both flatwood sites. The Cotton Mouse and Southern Flying Squirrel were caught in the xeric hammock and sandhill, the Florida Mouse was caught twice in sandhill, and the Opossum was caught once in Pine Flatwoods.

Three species were caught on the standard transect in xeric hammock (Table C-35). The Southern Flying Squirrel was captured with the most frequency (1/100 trap nights).

Five species were caught on sandhill transects including the state protected Florida Mouse (Table C-36 and C-37). The Cotton Mouse was captured with the most frequency (0.65/100 trap nights). A Southern Flying Squirrel nest was located just off one of the transects.

Two species were caught in the flatwood sites: the Opossum and the Hispid Cotton Rat (Table C-38 and C-39). The Hispid Cotton Rat was captured more than any other species (5.2/100 trap nights at Site 4; 1.9/100 trap nights at Site 5). An Opossum was caught in one of the 8" x 8" x 16" live traps.

No small mammals were caught at either the old field site (Site 6) or the hardwood swamp site (Site 7). Throughout the trapping period, over 50% of the traps were sprung, presumably by raccoons, at Site 7.

No Round-tailed Muskrat sign was observed in the marsh surveys conducted along the powerline (Figure C-1). These species possibly occur in the perennially flooded pond north of Tarpon Springs Road.

Incedental observations included several sightings of Bobcat, White-tailed Deer, Raccoon, River Otter, Armadillo, and one sighting of a Gray Fox.

Discussion/Conclusions

All major habitat types represented within the Preserve boundaries have been surveyed for terrestrial vertebrates. The percentage of predicted species documented appears to be directly proportional to the amount of time spent in each habitat. For example, the flatwoods on the Preserve are pervasive throughout; the hardwood swamp and old field areas are relatively isolated in distribution. These efforts resulted in documentation of all common, visible, species and eleven of nineteen protected species predicted to utilize the Preserve. In each class of animal surveyed, there were families that were not documented:

- As mentioned previously, amphibians in the order *Caudata* (Two-toed Amphiuma, Sirens, Peninsula Newt) were documented during the GFC Survey and sampling for these species was not repeated in favor of increased emphasis on xeric upland and other habitats not studied earlier..

- Arboreal, fossorial, and large snakes are less likely to be captured with the drift fences and funnel traps and were only documented through incidental observation. Since permanent aquatic habitats are scarce within the Preserve, and the majority of the marsh habitat on site is within the managed powerline easements, survey methods designed to assess the absence/presence of aquatic turtles were omitted.

- Birds that potentially utilize the Preserve include a long list of species that are most likely to occur in the marshes. Neither the Management Plan Survey or the GFC Survey trapped herpetofauna or small mammals in marsh. Consequently, less time was spent in this habitat. Additionally, since marshes are relatively uncommon on the Preserve and vegetative cover in the marshes is dense (particularly in the summer), several species that may utilize the marsh were not observed.

- Larger mammals, such as the Coyote, Red Fox, Gray Fox, Bobcat, and Florida Black Bear, are generally nocturnal and secretive, and less likely to be observed incidentally. Although bats were observed on all night site visits, species identifications were not made. Adequate surveys for bats would require specialized techniques.

Although the data for birds have been sorted by season, only the summer observations represent a complete season of surveying. Species richness for avifauna will increase significantly in the winter months. To complete the avifaunal baseline inventory, surveys need to be conducted using consistent methods for a period of at least one year. All research throughout the active management process needs this preliminary data for comparison of present to past conditions.

Bird species were observed in areas where they were not predicted to occur (Table C-1; Table C-19). The use of the Screech Owl tape to attract birds within the immediate vicinity may partially account for these observations. When the tape is palyed, individuals may be drawn into habitats they normally would not utilize.

Efforts were concentrated in the xeric habitats specifically to determine the presence/absence of four tortoise burrow associates. With the exception of the Florida Mouse, none of the targeted protected species were documented. There are several explanations that may contribute to these results.

(1) Only 71.5 acres of natural xeric habitat (xeric hammock and sandhill) occur on the Preserve. Approximately 21 acres of this is hammock, which is not optimal for Gopher Tortoises and consequently not optimal for tortoise burrow commensals.

(2) Although the gopher tortoise populations exceeds both significant and valuable tortoise habitat densities as defined by Cox (1987), these numbers are suspect due to subsequent research. Mushinsky and McCoy (1994) found that under less than optimal conditions, tortoises tend to dig more burrows. This suggests the 0.614 multiplier recommended by Cox (1987), may have resulted in an overestimate of the tortoise population.

(3) Although all xeric sites surveyed are adjacent to bayheads, cypress domes, and/or hardwood swamp, Gopher Frogs are less likely to breed in the summer and therefore are less likely to move between wetland and upland habitats. This reduces the likelihood of catching these frogs with drift fences positioned between sandhill and wetland. Additionally, since surveys were conducted during a dry summer, these habitats were dry for a majority of the trapping period.

(4) The Short-tailed Snake is a rarely observed or captured fossorial animal that feeds most readily on Florida Crowned Snakes in captivity (Mushinsky 1984). No Florida Crowned Snakes were caught.

(5) The old field and one sandhill area (Site 3) appear optimal for the Pine Snake. Not only is there a large concentration of tortoise burrows, there is a large population of Southeastern Pocket Gophers, a primary food source of the Florida Pine Snake. Franz (1986) reports that the Florida Pine Snake is extremely fossorial, particularly seeking out the tunnel systems of pocket gophers and, to a lesser extent the burrows of Gopher Tortoises. This suggests that they may utilize pocket gopher burrows more frequently than tortoise burrows perhaps reducing the likelihood of catching an individual with a burrow trap.

Based in part on these factors, it is reasonable to assume that these commensals may occur on site. Trapping may be more productive outside the growing season when many of these species are more likely to breed (Indigo Snake: November - April; Short-tailed Snake: October - April; Gopher Frog: February - April). Short-tailed Snakes, for example, are most frequently sighted above ground in April and October. Gopher Frogs, are explosive breeders that have a highly distinctive call. Winter surveys should include visiting the isolated wetland systems adjacent to the xeric sites after rains to listen for this call. Gopher Frogs may also be seen at the entrance to tortoise burrows in the early morning, particularly on overcast, damp, days.

The gopher tortoise surveys suggest that viable populations exist in all areas surveyed. A comparison of the densities between habitat types reveals no statistical difference. As suggested above, in less than optimal conditions, these estimates may be inaccurate. There is still room for improvement of existing gopher tortoise habitats through the reestablishment of a natural burn regime and consideration of conditions favorable to the tortoise. This will increase the potential of these areas for burrow associates.

There are a number of smaller burrows suggesting that the populations are reproducing. The small number of large tortoises may suggest that the area was subject to poaching recently.

By marking all captured individuals, an attempt was made to discern relative abundance. The number of individuals captured of a given species was not large enough ($n = 30$) to make this comparison. Mammals are less likely to be captured with baited traps during the growing season when forage is plentiful (J. Layne, per. comm.).

The Hispid Cotton Rat was the most common small mammal in Pine Flatwoods where it was caught repeatedly at both flatwood sites. Only one cotton rat was caught elsewhere (Site 1: xeric hammock). Because there were less than 1/2 as many trap nights in the flatwood sites, it is reasonable to assume that the Hispid Cotton Rat occurs in higher densities within the flatwoods. Southern Flying Squirrels and Cotton Mice were only caught in the two xeric habitats. As discussed in the *Data Analysis* section, these results may reflect different foraging strategies by any given species in different habitats which make them more or less vulnerable to the trapping techniques used.

Recommendations and Management Implications

(1) A majority of the listed bird species rely on the marsh systems and open water areas that are predominantly located within the Florida Power Corporation easements. Florida Power has expressed a willingness to work with the County

and should be consulted/instructed on how to best restore these areas. Site security is also essential to reduce "mud-bogging" activities in potential nesting and/or foraging habitat for species such as the King Rail, American Bittern, Common Moorhen, herons, and egrets. Other measures that would reduce disturbance to the marsh are the selection and maintenance of one access road per easement. This is currently difficult because under various wet and dry conditions, portions of the roadway are impassable. Perhaps if Brooker Creek and other watercourse crossings were culverted, powerline and security traffic would restrict travel to this roadway. Cattail monocultures should be discouraged and bulrush habitat promoted by drying and discing wetlands during drought periods, then flooding shortly afterwards.

(2) Soil surveys indicate that portions of the north/south Florida Powerline easement were historically xeric habitat. Through coordination with Florida Power, methodologies need to be developed to restore these areas without the use of fire. This may involve discing and mechanical removal of exotics.

(3) The Southeastern Kestrel was observed during the study. Kestrels typically use woodpecker holes for nests. Efforts to retain isolated pines and snags in open areas would benefit kestrel populations. Nest boxes may also increase the kestrel population. Optimal areas to place nest boxes are along the powerline, particularly to the north and adjacent to the sandhills, and in the old field. Nest boxes should be spaced at least 0.5-km apart, the average distance recorded between kestrel nest sites in Florida. Nest boxes should be placed 4 to 5 meters off the ground. A 1-m wide strip of sheet metal around the pole below the box would deter climbing predators. Boxes should be oriented to the south or east to allow warming in the morning but not overheating in the afternoon (Wood et al. 1991). Dimensions and a construction plan for kestrel nest boxes is presented in Foran et al. (1984).

(4) Wood Duck boxes may be positioned adjacent to the large marsh area north of the power station and the permanent water body north of Tarpon Springs Road. Dimensions for these nests are presented in Cerulean (et al. 1989; Figure C-4).

(5) Bluebird Boxes may be positioned along edges of the old field and power line easement (Cerulean et al. 1989; Figure C-4).

(6) The remaining sandhill areas should be managed as optimal habitat for gopher tortoise (Cox, 1987). Therefore the canopy densities should be maintained at less than 25% coverage, and burned in the early summer to enhance the growth of wire grass. These areas should be burned frequently (2 - 5 yrs.) with variation in frequency determined by the responses of the habitat to fire.

(7) The old field habitats and the de-watered wetlands predominantly located north of Brooker Creek are in need of restoration. One habitat type is critical to the

other. The soil types in the old field indicate that a large portion could be restored as sandhill (Astatula soils) and another portion as pine flatwoods (Myakka soils). This could be accomplished through frequent burning or removal of the topsoil and planting of native grasses. By removing the exotic bahia grass and replacing it with a native panicum, the community should gradually succeed into a native xeric community. Early growing season burns enhance the growth of native fire-dependent grasses. By increasing the xeric habitat on site, optimal tortoise habitat and tortoise burrow commensals is increased. This effort offers a good opportunity for research. Floral and faunal surveys throughout the restoration process may contribute to an understanding of these communities and succession.

(8) Because of hydrologic variation within the Preserve's pine flatwood sites, it is likely that under natural conditions, these communities burned at variable frequencies. To sustain this natural diversity, the higher, drier, flatwoods which are more susceptible to fire, should be burned more frequently (3-7 years) to produce/maintain conditions optimal for Sherman's Fox Squirrel, Bachman's Sparrow, and Brown-headed Nuthatch. The hydric flatwoods located within a zone adjacent to the creek should be burned on a less frequent regime as conditions allow (see burn plan). This habitat is optimal for the Wood Rat, Red-eyed Vireo, and Yellow-throated Warbler. This will maintain the natural diversity of the flatwood communities represented on site. Species richness is directly proportional to habitat diversity.

(9) Where there is historical evidence that a given species occurred on site, or it is reasonable to assume upon thorough evaluation of range and habitat that a species may have occurred on site, and the species is no longer present, than restocking may be considered. Consideration should be based upon the professional judgement of a recognized expert on the species and meet with the approval of the Florida Game and Fresh Water Fish Commission.

(10) Public access should be discouraged in the sandhill areas and any active restoration/management efforts.

(11) An optimal site for the Nature Center would be just north of Brooker Creek along the southern edge of the old field. By positioning the Center in this area, no natural plant communities would need to be displaced.

Nest Box Dimensions For Florida Cavity Nesters

Species	Floor of Cavity Inches	Depth of Cavity Inches	Ht. of Entrance Above Fl. Inches	Diam. of Entrance Inches	Ht. Above Ground Feet	Special Notes
Carolina Wren	4 x 4	8	1-6	1¼	6-10	can use shelf, basket or gourd
Bluebird	5 x 5	8	6	1½	5-10	
Crested Flycatcher	6 x 6	10	6	2	8-20	
Purple Martin	6 x 6	6	1-2	2-2¼	10-20	will also use gourd
Wood Duck	10 x 10	24	20	3" high x 4" wide	land: 15-25 water: 5-25	use predator guard
Downy Woodpecker	4 x 4	10	8	1¼	6-20	put 3-4" sawdust in box
Red-bellied or Red-headed Woodpecker	6 x 6	15	9	2	8-20	put 3-4" sawdust in box
Flicker	7 x 7	18	14	2½	8-20	put 3-4" sawdust in box
Tufted Titmouse	4 x 4	8	6	1¼	5-15	
Chickadee	4 x 4	8	6	1⅛	5-15	
Screech Owl	10 x 10	24	20	3" high x 4" wide	10-30	
Barred and Barn Owl	12 x 12	25-28	12-16	7 x 7	10-30	

Figure C-4. Nest Box Dimensions for Florida Cavity Nesters.
Source: Cerulean, S., C. Botha, D. Leager. 1986. Planting a Refuge for Wildlife. Florida Game and Fresh Water Fish Commission and U.S. Dprt. of Ag., Tallahassee, FL.

Opportunities for further research:

(1) Atleast one full year of baseline data collection is critical to defining the faunal composition of the Preserve and tracking the progress or changes in any given habitat.

(2) Careful habitat evaluations should be conducted before, during, and after any restoration efforts. Examples of elements to be monitored include snag densities, canopy coverage, vertical and horizontal strata composition, tree cavity density, ground cover, faunal species richness, and perhaps relative abundance. Again, careful measurement of habitat characteristics and correlation to faunal utilization is useful in fine-tuning the management plan and better understanding the interrelationships between species and conditions.

(3) Species-specific research conducted on any of the target species observed may be useful in understanding the subtleties of what a given species special habitat requirements are and how we can actively enhance these conditions on the Preserve.

(4) The Preserve will undoubtedly be surrounded by development in the near future. This provides a unique opportunity to study a wildlife oasis. Comparison of this area to a comparably sized section of a wildlife corridor may be useful in answering questions about the utilization of corridors.

(5) The active well field has changed the character of all the wetland communities north of the Creek. There is the opportunity to compare wildlife in flatwoods (for example) north of the Creek with de-watered wetlands to flatwoods adjacent to relatively unimpacted wetlands. These studies may assist the Water Authority in their goal to define wetland impacts.

(6) The Preserve is traversed by Tarpon Springs Road, a busy thoroughfare which is likely to be widened in the next few years. This widening would further fragment the Preserve. A study to evaluate road kills along Tarpon Springs Road to assess current mortality rates within the Preserve boundaries would reveal which species were currently traversing the roadway. Data that illustrated the utilization of the Preserve may serve as justification for a wildlife crossing, perhaps at the time the road is widened.

Tables C-1 through C-39

Table C-1. Potential wildlife habitat utilization at Brooker Creek Preserve: birds.

Common Name	Scientific Name[4]	Season[5]	Habitats[6]						
			XH	SH	PF/PP	CS	HS	M	OF
Pied-billed Grebe	*Podilymbus podiceps*	y						X	
Double-crested Cormorant[1]	*Phalacrocorax auritus*	y				X		X[1]	
Anhinga[1]	*Anhinga anhinga*	y				X		X[1]	
American Bittern	*Botaurus lentiginosus*	y						X	
Least Bittern[3]	*Ixobrychus exilis*	s						X	
Great Blue Heron[1,3]	*Ardea herodias*	y				X	X	X[1]	
Great Egret[1]	*Casmerodius albus*	y			[1]	X	X	X[1]	
Snowy Egret[1]	*Egretta thula*	y				X	X	X[1]	
Cattle Egret[1]	*Bubulcus ibis*	y						X[1]	X[1]
Tricolored Heron[1]	*Egretta tricolor*	y						X[1]	
Little Blue Heron[1]	*Egretta caerulea*	y			[1]	X	X	X[1]	
Green-backed Heron[1]	*Butorides striatus*	y				X[1]	X	X[1]	
Black-crowned Night-Heron	*Nycticorax nycticorax*	y				X	X	X	
Yellow-crowned Night-Heron	*Nycticorax violacus*	y				X	X		
Wood Stork[1]	*Mycteria americana*	y				X		X[1]	
Roseate Spoonbill	*Ajaia ajaja*	y						X	
White Ibis[1]	*Eudocimus albus*	y			[1]	X	X	X[1]	

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1993).
[3]Documented during Breeding Bird Surveys (1986-1991).
[4]Source of scientific and common names: Robertson and Woolfenden (1992).

[5]Season: w = winter
s = summer
y = year round resident

[6]Habitats: XH = Xeric Hammock
SH = Sandhill
PF/PP = Pine Flatwood/Palmetto Prairies
CS = Cypress Swamp
HS = Hardwood Swamp
M = Marsh
OF = Oldfield

Shading indicates species documentation.

Table C-1 (Continued).

Common Name	Scientific Name[4]	Season[5]	Habitats[6]						
			XH	SH	PF/PP	CS	HS	M	OF
Glossy Ibis	*Plegadis falcinellus*	y						X	
Green-winged Teal	*Anas crecca*	w						X	
Wood Duck[1,3]	*Aix sponsa*	y				X	X	X[1]	
American Black Duck	*Anas rubripes*	w						X	
Mottled Duck	*Anas fulvigula*	y						X	
Mallard	*Anas platyrhynchos*	w						X	
Northern Pintail	*Anas acuta*	w						X	
Blue-winged Teal	*Anas discors*	w						X	
Northern Shoveler	*Anas clypeata*	w						X	
Gadwall	*Anas strepera*	w						X	
American Wigeon	*Anas americana*	w						X	
Ring-necked Duck	*Aythya collaris*	w						X	
Lesser Scaup	*Athya affinis*	w						X	
Hooded Merganser	*Lophodytes cucullatus*	w						X	
Ruddy Duck	*Oxyura jamaicensis*	w						X	
Black Vulture[1]	*Coragyps atratus*	y	X	X	X	X	X	X	X
Turkey Vulture[1]	*Cathartes aura*	y	X	X	X[1]	X	X	X[1]	X

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1993).
[3]Documented during Breeding Bird Surveys (1986-1991).
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Shading indicates species documentation.

Table C-1 (Continued).

Common Name	Scientific Name[4]	Season[5]	Habitats[6]						
			XH	SH	PF/PP	CS	HS	M	OF
Northern Harrier	*Circus cyaneus*	w						X	X
Bald Eagle	*Haliaeetus leucocephalus*	y	X	X	X			X	X
American Swallow-tailed Kite	*Elanoides forficatus*	s			X	X	X	X	X
Cooper's Hawk[1]	*Accipiter cooperii*	y	X	X	X				X[1]
Sharp-shinned Hawk	*Accipiter striatus*	w	X	X	X				
Red-tailed Hawk[1,3]	*Buteo jamaicensis*	y	X[1]	X[1]	X[1]	X	X	X[1]	X[1]
Red-shouldered Hawk[1,2,3]	*Buteo lineatus*	y	X	X[1]	X[1]	X[2]	X[1]	X[1]	X[1]
Short-tailed Hawk[1]	*Buteo brachyurus*	s	X		X[1]		X	X	X[1]
American Kestrel	*Falco sparverius*	w		X	X			X	X
Southeastern American Kestrel[1]	*Falco sparverius paulus*	y	X[1]	X	X			X	X
Osprey[1]	*Pandion haliaetus*	y						X[1]	X
Merlin[1]	*Falco columbarius*	w			[1]			X	X
Peregrine Falcon	*Falco peregrinus*	w							X
Wild Turkey[1,3]	*Meleagris gallopavo*	y	X[1]	X[1]	X[1]	X	X		X
Northern Bobwhite[1,3]	*Colinus virginianus*	y	X[1]	X	X[1]	X[1]		[1]	X[1]
Limpkin	*Aramus guarauna*	y				X	X	X	
Sandhill Crane[1]	*Grus canadensis*	y						X	X

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1993).
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Table C-1 (Continued).

Common Name	Scientific Name[4]	Season[5]	Habitats[6]						
			XH	SH	PF/PP	CS	HS	M	OF
King Rail[1,3]	*Rallus elegans*	y						X[1]	
Virginia Rail	*Rallus limicola*	w						X	
Sora	*Porzana carolina*	w						X	
Black Rail	*Laterallus jamaicensis*	w						X	
Common Moorhen	*Gallinula chloropus*	y						X	
American Coot	*Fulica americana*	w						X	
Purple Gallinule	*Porphyrula martinica*	y						X	
Black-necked Stilt	*Himantopus mexicanus*	s						X	
Killdeer[1,3]	*Charadrius vociferus*	y						X	X[1]
Greater Yellowlegs	*Tringa melanoleuca*	w						X	
Lesser Yellowlegs	*Tringa flavipes*	w						X	
Solitary Sandpiper[1]	*Tringa solitaria*	w						X[1]	
Spotted Sandpiper	*Actitis macularia*	w						X	
American Woodcock	*Scolopax minor*	w	X					X	X
Common Snipe	*Gallinago gallinago*	w						X	X
Least Sandpiper	*Calidris minutilla*	w						X	
Bonaparte's Gull	*Larus philadelphia*	w						X	

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1993).
[3]Documented during Breeding Bird Surveys (1986-1991).
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Table C-1 (Continued).

Common Name	Scientific Name[4]	Season[5]	Habitats[6]						
			XH	SH	PF/PP	CS	HS	M	OF
Ring-billed Gull	*Larus delawarensis*	w						X	
Forster's Tern[1]	*Sterna forsteri*	w			[1]			X	
Common Ground-Dove[1,3]	*Columbina passerina*	y		X	X[1]				X
Mourning Dove[1,2,3]	*Zenaida macroura*	y	X[1]	X[1]	X[1]	X[1,2]			X
Yellow-billed Cuckoo[1,3]	*Coccyzus americanus*	s	X[1]	X[1]	X[1]	X	X[1]		[1]
Eastern Screech-Owl[1,3]	*Otus asio*	y	X	X	X[1]	X[1]	X		X
Great Horned Owl[1]	*Bubo virginianus*	y	X	X	X[1]	X	X		X
Barn Owl	*Tyto alba*	y	X		X			X	X
Barred Owl[1,3]	*Stix varia*	y	X[1]	X[1]	X[1]	X	X[1]	X	X
Burrowing Owl	*Speotyto cunicularia*	y			X				X
Chuck-will's-widow[1,3]	*Caprimulgus carolinensis*	s	X[1]	X	X[1]			X	X[1]
Whip-poor-will	*Caprimulgus vociferus*	w	X	X	X			X	
Common Nighthawk[1,3]	*Chordeiles minor*	s	X	X[1]	X[1]			X	X
Belted Kingfisher	*Ceryle alcyon*	w				X	X	X	
Chimney Swift[1,2]	*Chaetura pelagica*	s	X[1]	X	X[1]	X[1,2]	X		X[1]
Ruby-throated Hummingbird[1,3]	*Archilochus colubris*	y	X	X	X[1]				
Pileated Woodpecker[1,2,3]	*Dryocopus pileatus*	y	X	X[1]	X[1,2]	X[1,2]	X[1]		

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1993).
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Shading indicates species documentation.

Table C-1 (Continued).

Common Name	Scientific Name[4]	Season[5]	Habitats[6]						
			XH	SH	PF/PP	CS	HS	M	OF
Northern Flicker[1]	*Colaptes auratus*	y	X	X	X[1]	X	X		X
Red-bellied Woodpecker[1,2,3]	*Melanerpes carolinus*	y	X[1]	X[1]	X[1,2]	X[1,2]	X[1]	[1]	X[1]
Yellow-bellied Sapsucker[1,2]	*Sphyrapicus varius*	w	X	X	X	X[2]	X[1]		
Red-headed Woodpecker	*Melanerpes erythrocephalus*	y		X	X				X
Hairy Woodpecker[1,3]	*Picoides villosus*	y	X	X	X[1]	X	X		
Downy Woodpecker[1,2,3]	*Picoides pubescens*	y	X[1]	X[1]	X[1,2]	X[1,2]	X[1]	X[1]	[1]
Great Crested Flycatcher[1,2,3]	*Myiarchus crinitus*	y	X[1]	X[1]	X[1,2]	X[1,2]	X[1]		X[1]
Eastern Kingbird[1]	*Tyrannus tyrannus*	s			X				X[1]
Eastern Phoebe	*Sayornis phoebe*	w	X	X					X
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	y						X	
Barn Swallow[1]	*Hirundo rustica*	y						X	X[1]
Tree Swallow[1]	*Tachycineta bicolor*	w						X	X[1]
Purple Martin[1]	*Progne subis*	w			X[1]			X	X
Blue Jay[1,2,3]	*Cyanocitta cristata*	y	X[1]	X[1]	X[1,2]	X[1,2]	X[1]	X[1]	X[1]
Fish Crow[1,2]	*Corvus ossifragus*	y	X[1]		[2]	[2]			
American Crow[1,3]	*Corvus brachyrhynchos*	y	X	X	X[1]	X[1]	X		X
Tufted Titmouse[1,2,3]	*Parus bicolor*	y	X[1]	X[1]	X[1,2]	X[1,2]	X[1]	[1]	[1]

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1993).
[3]Documented during Breeding Bird Surveys (1986-1991).
[4]Source of scientific and common names: Robertson and Woolfenden (1992).

[5]Season: w = winter
s = summer
y = year round resident

[6]Habitats: XH = Xeric Hammock
SH = Sandhill
PF/PP = Pine Flatwood/Palmetto Prairies
CS = Cypress Swamp
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M = Marsh
OF = Oldfield

Shading indicates species documentation.

Table C-1 (Continued).

Common Name	Scientific Name[4]	Season[5]	Habitats[6]						
			XH	SH	PF/PP	CS	HS	M	OF
Carolina Chickadee[1,2,3]	*Parus carolinensis*	y	X[1]	X	X[1,2]	X[1,2]	X		
Brown-headed Nuthatch[1,3]	*Sitta pusilla*	y		X	X[1]				
Brown Creeper	*Certhia americana*	w	X	X	X				
Brown Thrasher[1,3]	*Toxostoma rufum*	y	X[1]	X[1]	[1]			X[1]	X[1]
Northern Mockingbird[1,2,3]	*Mimus polyglottos*	y	X	X	X[1,2]	[1]		X[1]	X[1]
Gray Catbird[1,2]	*Dumetella carolinensis*	w	X		X[1,2]	X[2]	X	X[1]	X[1]
House Wren[1]	*Troglodytes aedon*	w	X[1]	X	X[1]				
Carolina Wren[1,2,3]	*Thryothorus ludovicianus*	y	X[1]	X[1]	X[1,2]	X[1,2]	X[1]	X[1]	X[1]
Marsh Wren[1]	*Cistothorus palustris*	w			[1]			X[1]	
Sedge Wren	*Cistothorus platensis*	w						X	
Winter Wren	*Troglodytes troglodytes*	w	X						
Hermit Thrush	*Catharus guttatus*	w	X				X		
American Robin[2]	*Turdus migratorius*	w	X		X[2]	X[2]	X		X
Eastern Bluebird[1,2,3]	*Sialia sialis*	y		X	X[1]				X
Ruby-crowned Kinglet[1]	*Regulus calendula*	w	X[1]	X	X[1]	X	X		
Blue-gray Gnatcatcher[1,3]	*Polioptila caerulea*	y	X[1]	X	X[1]	X	X[1]		[1]
Loggerhead Shrike[1,3]	*Lanius ludovicianus*	y	[1]	X					X

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1993).
[3]Documented during Breeding Bird Surveys (1986-1991).
[4]Source of scientific and common names: Robertson and Woolfenden (1992).

[5]Season: w = winter
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[6]Habitats: XH = Xeric Hammock
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Table C-1 (Continued).

Common Name	Scientific Name[4]	Season[5]	Habitats[6]						
			XH	SH	PF/PP	CS	HS	M	OF
European Starling[3]	*Sturnus vulgaris*	Y							X
Cedar Waxwing[2]	*Bombycilla cedrorum*	w	X	X	X	X[2]	X		
Solitary Vireo[1]	*Vireo solitarius*	w	X	X	X[1]	X	X		
Yellow-throated Vireo	*Vireo flavifrons*	s	X			X	X		
Red-eyed Vireo[1,2]	*Vireo olivaceus*	s	X		[1]	X[2]	X[1]		
White-eyed Vireo[1,2,3]	*Vireo griseus*	y	X[1]	X	X[1,2]	X[1,2]	X[1]	[1]	[1]
Black-and-white Warbler[1]	*Mniotilta varia*	w	X[1]	X	X[1]	X	X[1]		X[1]
Prothonotary Warbler	*Protonotaria citrea*	s				X	X		
Orange-crowned Warbler	*Vermivora celata*	w	X	X					
Yellow-rumped Warbler[1,2]	*Dendroica coronata*	w	X	X	X[1,2]	X[2]	X		X[1]
Northern Parula[1,2,3]	*Parula americana*	s	X[1]	X[1]	X[1,2]	X[1,2]	X[1]	[1]	X[1]
Yellow-throated Warbler[1,2,3]	*Dendroica dominica*	s	X[1]		X[1]	X[2]			
Prairie Warbler[2]	*Dendroica discolor*	s			X	[2]			X
Pine Warbler[1,2,3]	*Dendroica pinus*	y	[1]	X[1]	X[1,2]	X[1,2]			
Palm Warbler[2]	*Dendroica palmarum*	w	X	X	X[2]	X[2]	X	X	X[1]
Common Yellowthroat[1,2,3]	*Geothlypis trichas*	y	[1]		X[1,2]	X[1,2]	X[1]	X[1]	
Ovenbird[2]	*Seiurus aurocapillus*	w	X	X	X	X[2]	X		

[1]Documented between March and August, 1993.
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[4]Source of scientific and common names: Robertson and Woolfenden (1992).

[5]Season: w = winter
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[6]Habitats: XH = Xeric Hammock
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Table C-1 (Continued).

Common Name	Scientific Name[4]	Season[5]	Habitats[6]						
			XH	SH	PF/PP	CS	HS	M	OF
Red-winged Blackbird[1,3]	*Agelaius phoeniceus*	y			[1]			X[1]	[1]
Boat-tailed Grackle[1,3]	*Quiscalus major*	y			[1]			X[1]	
Brown-headed Cowbird[2]	*Molothrus alter*	y	X	X	X[2]			X	X
Common Grackle[1,2,3]	*Quiscalus quiscula*	y	X[1]		X[1,2]	X[1,2]			X
Eastern Meadowlark[3]	*Sturnella magna*	y							X
Northern Oriole	*Icterus galbula*	w	X						
Summer Tanager[1,2,3]	*Piranga rubra*	s	X	[1]	X[1,2]				
Northern Cardinal[1,2,3]	*Cardinalis cardinalis*	y	X[1]	X[1]	X[1,2]	X[1,2]	X[1]	X[1]	X[1]
Indigo Bunting[1]	*Passerina cyanea*	s			X[1]				
Blue Grosbeak[1]	*Guiraca caerulea*	s	X						X[1]
Pine Siskin	*Carduelis pinus*	w			X				
American Goldfinch[2]	*Carduelis tristis*	w			X	X[2]			X
Grasshopper Sparrow	*Ammodramus savannarum*	w			X				X
Savannah Sparrow	*Passerculus sandwichensis*	w			X				X
Henslow's Sparrow	*Ammodramus henslowii*	w			X				
Rufous-sided Towhee[1,2,3]	*Pipilo erythropthalmus*	y	X[1]	X[1]	X[1,2]	X[1,2]			X[1]
Vesper Sparrow	*Pooecetes gramineus*	w			X				X

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1993).
[3]Documented during Breeding Bird Surveys (1986-1991).
[4]Source of scientific and common names: Robertson and Woolfenden (1992).

[5]Season: w = winter
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[6]Habitats: XH = Xeric Hammock
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Shading indicates species documentation.

Table C-1 (Continued).

Common Name	Scientific Name[4]	Season[5]	Habitats[6]						
			XH	SH	PF/PP	CS	HS	M	OF
Bachman's Sparrow[1,3]	*Aimophila aestivalis*	y			X[1]				
Chipping Sparrow[1]	*Spizella passerina*	w			X[1]				X
Field Sparrow	*Spizella pusilla*	w							X
White-throated Sparrow	*Zonotrichia albicollis*	w	X	X	X		X		X
Swamp Sparrow[1]	*Melospiza georgiana*	w			X[1]		X	X	X
Song Sparrow	*Melospiza melodia*	w		X	X				X

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1993).
[3]Documented during Breeding Bird Surveys (1986-1991).
[4]Source of scientific and common names: Robertson and Woolfenden (1992).

Shading indicates species documentation.

[5]Season: w = winter
s = summer
y = year round resident

[6]Habitats: XH = Xeric Hammock
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Table C-2. Potential wildlife habitat utilization at Brooker Creek Preserve: amphibians & reptiles.

Common Name	Scientific Name[3]	Habitats[4]						
		XH	SH	PF/PP	CS	HS	M	OF
Oak Toad[1,2]	*Bufo quercicus*	X[1]	X[1]	X[1,2]	X			
Southern Toad[1,2]	*Bufo terrestris*	X[1]	X	X[2]	X[2]	X[2]	X[1]	X
Florida Cricket Frog[1,2]	*Acris gryllus dorsalis*		X	X	X[1,2]	X	X[1]	
Green Treefrog[1,2]	*Hyla cinerea*	X[1]	X	X[2]	X[1,2]	X[2]	X[1]	
Pinewoods Treefrog[1,2]	*Hyla femoralis*	X[1]	X[1]	X[1,2]	X[2]	X[2]		X
Barking Treefrog	*Hyla gratiosa*	X	X	X		X		
Squirrel Treefrog[1,2]	*Hyla squirella*	X[1]	X[1]	X[1]	X[1,2]	X[1,2]	X[1]	X[1]
Little Grass Frog[1]	*Limnaoedus ocularis*	X			X[1]		X[1]	X
Florida Chorus Frog[1,2]	*Pseudacris nigrita verrucosa*	X		X	X[1,2]	X	X[1]	X
Eastern Narrowmouth Toad[1,2]	*Gastrophryne carolinensis carolinensis*	X[1]	X[1]	X[1,2]	X[2]	X[1,2]	X[1]	X
Eastern Spadefoot Toad[1,2]	*Scaphiopus holbrookii holbrookii*	X	X[1]	X[1,2]	X[2]	X[2]		X
Florida Gopher Frog	*Rana areolata aesopus*	X	X		X			
Bullfrog[2]	*Rana catesbeiana*			X[2]	X[2]	X	X	
Pig Frog[1,2]	*Rana grylio*			X[2]	X[2]	X[2]	X[1]	
Southern Leopard Frog[1,2]	*Rana utricularia*	X[1]	X[1]	X[1,2]	X[2]	X[1,2]	X[1]	X

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1992).
[3]Source of scientific and common names: Collins (1990).
[4]Habitats:
XH = Xeric Habitat
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Shading indicates species documentation.

Table C-2 (Continued).

Common Name	Scientific Name[3]	Habitats[4]						
		XH	SH	PF/PP	CS	HS	M	OF
Two-toed Amphiuma[2]	*Amphiuma means*				X[2]	X[2]	X	
Greater Siren[2]	*Siren lacertina*				X[2]	X[2]	X	
Eastern Lesser Siren[2]	*Siren intermedia intermedia*				X[2]	X	X	
Southern Dusky Salamander	*Desmognathus auriculatus*			X	X	X	X	
Slimy Salamander	*Plethodon glutinosus glutinosus*			X		X		X
Peninsula Newt[2]	*Notopthalmus viridescens piaropicola*	X			X[2]	X	X	
Greenhouse Frog[1,2]	*Eleutherodactylus planirostris planirostris*	X	X[1]		X[2]	X[2]	X	X
American Alligator[1]	*Alligator mississippiensis*				X[1]	X	X[1]	
Florida Worm Lizard[1]	*Rhineura floridana*	X[1]	X					
Eastern Slender Glass Lizard	*Ophisaurus attenuatus longicaudus*	X	X	X				X
Island Glass Lizard	*Ophisaurus compressus*	X	X	X				
Eastern Glass Lizard[1,2]	*Ophisaurus ventralis*	X	X	X[1,2]				X
Green Anole[1]	*Anolis carolinensis*	X[1]	X[1]	X[1,2]	X[2]	X[2]		X[1]
Southern Fence Lizard	*Sceloporus undulatus undulatus*	X	X	X				X
Peninsula Mole Skink	*Eumeces egregius onocrepis*	X	X					X
Southeastern Five-lined Skink[1,2]	*Eumeces inexpectatus*	X	X	X[1,2]	X[2]	X[2]		X

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1992).
[3]Source of scientific and common names: Collins (1990).
[4]Habitats:

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Table C-2 (Continued).

Common Name	Scientific Name[3]	Habitats[4]						
		XH	SH	PF/PP	CS	HS	M	OF
Ground Skink[1,2]	*Scincella lateralis*	X[1]	X[1]	X[1,2]	X[2]	X[2]		X[1]
Six-lined Racerunner[1,2]	*Cnemidophorus sexlineatus sexlineatus*	X[1]	X[1]	X[1,2]				X
Florida Chicken Turtle	*Deirochelys reticularia*						X	
Florida Box Turtle[1,2]	*Terrapene carolina bauri*		X[1]	X	X[2]			X
Gulf Coast Box Turtle	*Terrapene carolina major*	X	X	X	X			
Striped Mud Turtle[1,2]	*Kinosternon baurii*			X[2]	X[1,2]	X[2]	X	
Florida Mud Turtle[2]	*Kinosternon subrubrum steindachachneri*				X[2]	X[2]	X	
Stinkpot[2]	*Sternotherus odoratus*				X[2]	X		
Peninsula Cooter	*Pseudomys floridana peninsularis*				X	X	X	
Red-bellied Turtle[1]	*Pseudomys nelsoni*				X	X	X[1]	
Florida Snapping Turtle	*Chelydra serpentina osceola*					X	X	
Gopher Tortoise[1,2]	*Gopherus polyphemus*	X[1]	X[1]	X[1,2]				X[1]
Florida Softshell	*Apalone ferox*						X	
Brown Anole	*Anolis sagrei sagrei*			X				X[1]
Florida Scarlet Snake[1,2]	*Cemophora coccinea coccinea*	X	X[1]	X[2]	X[2]	X[2]		
Southern Black Racer[1,2]	*Coluber constrictor priapus*	X[1]	X[1]	X[1,2]	X[2]	X[1]	X[1]	X

[1]Documented between March and August, 1993.
[2]Documented during GFC Surveys (1991-1992).
[3]Source of scientific and common names: Collins (1990).
[4]Habitats:

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Table C-3. Potential wildlife habitat utilization at Brooker Creek Preserve: mammals.

Common Name	Scientific Name[3]	Habitats[4]						
		XH	SH	PF/PP	CS	HS	M	OF
Virginia Opossum[1]	*Didelphis virginiana*	X	X	X[1]	X[1]	X[1]		
Southeastern Shrew	*Sorex longirostris*	X	X		X	X		
Least Shrew[1,2]	*Cryptotis parva*	X	X[1]	X[2]	[2]			X
Southern Short-tailed Shrew[2]	*Blarina carolinensis*			X[2]	X[2]	X[2]	X	X
Eastern Mole	*Scalopus aquaticus*	X	X	X				X
Southeastern Myotis	*Myotis austroriparius*							
Eastern Red Bat	*Lasiurus borealis*							
Seminole Bat	*Lasiurus seminolus*							
Eastern Pipistrel	*Pipistrellus subflavus*							
Big Brown Bat	*Eptesicus fuscus*							
Evening Bat	*Nycticeius humeralis*							
Northern Yellow Bat	*Lasiurus intermedius*							
Rafinesque's Big-eared Bat	*Plecotus rafinesquii*							
Brazilian Free-tailed Bat	*Tadarida brasiliensis*							
Black Bear	*Ursus americanus floridana*	X	X	X	X	X	X	X

POTENTIALLY USE ALL HABITATS FOR FORAGING

[1] Documented between March and August, 1993.
[2] Documented during GFC Surveys (1991-1992).
[3] Source of scientific and common names: Jones et al. (1992).
[4] Habitats:

XH = Xeric Habitat
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Table C-3 (Continued).

Common Name	Scientific Name[3]	Habitats[4]						
		XH	SH	PF/PP	CS	HS	M	OF
Raccoon[1]	*Procyon lotor*	X[1]	X[1]	X	X[1]	X[1]	X[1]	X[1]
Longtail Weasel	*Mustela frenata*	X	X	X	X	X	X	X
River Otter[1]	*Lutra canadensis*				X	X[1]	X[1]	
Spotted Skunk	*Spilogale putorius*	X	X	X				X
Striped Skunk	*Mephitis mephitis*	X	X	X				X
Coyote	*Canis latrans*			X				X
Red Fox	*Vulpes vulpes*	X	X	X				X
Gray Fox[1]	*Urocyon cinereoargenteus*	X	X	X	X	X[1]	X	X
Bobcat[1]	*Lynx rufus*	X	X[1]	X	X	X	X[1]	X[1]
Sherman's Fox Squirrel[1]	*Sciurus niger shermanii*		X	X[1]				
Gray Squirrel[1]	*Sciurus carolinensis*	X[1]				X[1]		
Southern Flying Squirrel[1]	*Glaucomys volans*	X[1]	X[1]	X				
Southeastern Pocket Gopher[1]	*Geomys pinetis*	X	X[1]	X				X[1]
Eastern Harvest Mouse	*Reithrodontomys humulis*			X				X
Oldfield Mouse	*Peromyscus polionotus*	X	X					X

[1] Documented between March and August, 1993.
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[3] Source of scientific and common names: Jones et al. (1992).
[4] Habitats:
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Table C-3 (Continued).

Common Name	Scientific Name[3]	Habitats[4]						
		XH	SH	PF/PP	CS	HS	M	OF
Cotton Mouse[1,2]	*Peromyscus gossypinus*	X[1]	X[1]	X[2]	X[2]	X		
Golden Mouse	*Ochrotomys nuttalli*			X		X		
Florida Mouse[1,2]	*Podomys floridanus*	X	X[1]	X[2]				X
Eastern Woodrat	*Neotoma floridana*	X		X	X	X		
Marsh Rice Rat	*Oryzomys palustris*						X	
Hispid Cotton Rat[1,2]	*Sigmodon hispidus*	X[1]		X[1,2]				X[1]
Round-tailed Muskrat	*Neofiber alleni*						X	
Eastern Cottontail[1]	*Sylvilagus floridanus*	X[1]	X[1]	X				X[1]
Marsh Rabbit[1]	*Sylvilagus palustris*						X[1]	
White-tailed Deer[1]	*Odocoilus virginianus*	X[1]	X[1]	X	X[1]	X[1]	X[1]	X[1]
Nine-banded Armadillo[1]	*Dasypus novemcinctus*	X	X[1]	X[1]	X[1]	X[1]		X[1]

[1] Documented between March and August, 1993.
[2] Documented during GFC Surveys (1991-1992).
[3] Source of scientific and common names: Jones et al. (1992).
[4] Habitats:

XH = Xeric Habitat
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Shading indicates species documentation.

Table C-4. Management guidelines for target species that potentially utilize Brooker Creek Preserve.

PS	SPECIES AND REFERENCE	PREFERRED HABITAT REPRESENTED ON SITE	UTILIZED HABITAT REPRESENTED ON SITE	SPECIES MANAGEMENT GUIDELINES
SSC	Gopher Frog (*Rana capito*)	sandhills with vernal pool/isolated grassy wetlands (devoid of fish) nearby for breeding	xeric hammock, pine flatwoods	Management scheme should consider: (1) access to suitable breeding habitat, and (2) land management as specified for gopher tortoise. Gopher frogs are known only from sites that support gopher tortoise.
SSC	Gopher Tortoise (*Gopherus polyphemus*)	sandhills	xeric hammocks, pine flatwoods, palmetto prairies, old field	Viable population is 25-30; (translates to 75-90 active and inactive burrows); 25 or more acres depending on the suitability of habitat; must consider habitat size, shape, type and adjacent environs. Maintain area with a canopy cover <25%, sparse shrub cover, and abundant herbaceous ground cover.
FT, T	Eastern Indigo Snake (*Drymarchon corais couperi*)	gopher tortoise habitat	all mesic and xeric habitats; wetlands	Maintain populations by preservation and/or restoration of suitable habitat adjacent to, or part of, large contiguous tracts of land (>500 acres). Dense canopy of oak or pine eliminates suitability. Manage as specified for gopher tortoise.

Key

PS:	Protected Status
FT:	Federally Threatened (Endangered Species Act of 1973)
FE:	Federally Endangered (Endangered Species Act of 1973)
FT S/A:	Federally Threatened due to Similarity of Appearance
E:	Endangered in the State of Florida (Chapter 39.27002)
T:	Threatened in the State of Florida (Chapter 39.27002)
SSC:	Species of Special Concern in the State of Florida (Chapter 39.27002)
C2:	Federally under review, but substantial evidence of biological vulnerability of threat is lacking (Endangered Species Act of 1973)

Table C-4 (continued).

PS	SPECIES AND REFERENCE	PREFERRED HABITAT REPRESENTED ON SITE	UTILIZED HABITAT REPRESENTED ON SITE	SPECIES MANAGEMENT GUIDELINES
T	Short-tailed Snake (*Stilosoma extenuatum*)	Gopher tortoise habitat	----------	Controlled management of xeric habitat; maintain as per guidelines for gopher tortoise; can coexist with man if critical habitat is maintained.
SSC	Florida Pine Snake (*Pituophis m. mugitus*)	sandhills	----------	Often utilize pocket gopher or gopher tortoise burrows. Maintain populations by preservation and/or restoration of suitable habitat adjacent to, or part of, large contiguous tracts of land (>500 acres). Manage habitat as specified for gopher tortoise.
FT S/A	American Alligator (*Alligator mississipiensis*)	All wetland habitats		Listed due to similarity of appearance to crocodile; locally common if wetlands are sustained.
FT	Florida Sandhill Crane (*Grus canadensis pratensis*)	Breed in emergent palustrine wetlands; forage in pastures, old field.	scrub-shrub wetlands; mesic forest; swamps; marsh habitat along transmission line	Large pop. uses golf courses east of property for foraging; future nesting potential on site. Breeding habitat always has adjacent foraging habitat; if cranes nest on site consider maintenance of foraging habitat and development of visual buffer between human related activities and foraging/nesting habitat.

Key

PS:	Protected Status
FT:	Federally Threatened (Endangered Species Act of 1973)
FE:	Federally Endangered (Endangered Species Act of 1973)
FT S/A:	Federally Threatened due to Similarity of Appearance
E:	Endangered in the State of Florida (Chapter 39.27002)
T:	Threatened in the State of Florida (Chapter 39.27002)
SSC:	Species of Special Concern in the State of Florida (Chapter 39.27002)
C2:	Federally under review, but substantial evidence of biological vulnerability of threat is lacking (Endangered Species Act of 1973)

Table C-4 (continued).

PS	SPECIES AND REFERENCE	PREFERRED HABITAT REPRESENTED ON SITE	UTILIZED HABITAT REPRESENTED ON SITE	SPECIES MANAGEMENT GUIDELINES
	King Rail (*Rallus elegans*)	marshes in borrow pits, wet prairies	----------	Requires dense emergent vegetation for nesting and cover.
SSC	Burrowing Owl (*Athene cunicularia*)	sandhills, ruderal communities, dry (palmetto) prairies	----------	Maintain a minimum buffer zone of 50' around the burrow and stake off the area.
FE, E	Bald Eagle (*Haliaeetus leucocephalus*)	nests in tall trees along coasts, rivers, and lakes	----------	Opportunistic feeders that feed on carrion in open habitats such as open water, marshes, and fields. Management should adhere to *Habitat Management Guidelines for the Bald Eagle* (USFWS).
T	Southeastern American Kestrel (*Falco sparverius paulus*)	sandhill, nest in natural cavities of dead trees and abandoned woodpecker nests.	Forage in open habitats including powerline easements.	Require tree cavity, natural or created, for nesting in open canopy (<60%) forest; suitable foraging habitat; perches adjacent to foraging habitat. Maintain a 500 foot buffer from nest site and any human related activities. (Stys, 1993.)

Key

PS:	Protected Status
FT:	Federally Threatened (Endangered Species Act of 1973)
FE:	Federally Endangered (Endangered Species Act of 1973)
FT S/A:	Federally Threatened due to Similarity of Appearance
E:	Endangered in the State of Florida (Chapter 39.27002)
T:	Threatened in the State of Florida (Chapter 39.27002)
SSC:	Species of Special Concern in the State of Florida (Chapter 39.27002)
C2:	Federally under review, but substantial evidence of biological vulnerability of threat is lacking (Endangered Species Act of 1973)

Table C-6. Comparison of wildlife species predicted to occur to those actually documented at Brooker Creek Preserve (1991 - 1993).

Class	Species Predicted (a)	Documented Species (b)	% of Predicted (b x 100)/a
Amphibians	22	19	86.4
Reptiles	52	29	55.8
*Birds	94	74	78.8
Mammals	41	18	43.4

Source of survey information:

(1) Surveys conducted for the Brooker Creek Management Plan (March through August, 1993)

(2) *Final Report: Aquatic and Terrestrial Wildlife Survey in the Lake Tarpon Watershed*. 1992. FGFWFC.

(3) Breeding Bird Atlas Surveys - 1986 through 1991.

* Numbers represent birds that utilize the Preserve during the summer.

Table C–7. Birds observed during standard surveys at Brooker Creek Preserve (March – August, 1993).

American Crow
American Kestrel
American Redstart
Anhinga
Bachman's Sparrow
Barn Swallow
Barred Owl
Black Vulture
Black–and–white Warbler
Black–throated Blue Warbler
Blue Grosbeak
Blue Jay
Blue–gray Gnatcatcher
Boat–tailed Grackle
Brown Thrasher
Brown–headed Nuthatch
Carolina Chickadee
Carolina Wren
Cattle Egret
Chimney Swift
Chipping Sparrow
Chuck–will's–widow
Common Crow
Common Grackle
Common Ground–Dove
Common Nighthawk
Common Yellowthroat
Cooper's Hawk
Double–crested Cormorant
Downy Woodpecker
Eastern Bluebird
Eastern Kingbird
Fish Crow
Forster's Tern
Gray Catbird
Great Blue Heron
Great Crested Flycatcher
Great Egret
Great Horned Owl
Green–backed Heron
Hairy Woodpecker
House Wren
Indigo Bunting
Killdeer
King Rail
Little Blue Heron
Loggerhead Shrike
Marsh Wren
Merlin
Mourning Dove
Northern Bobwhite
Northern Cardinal
Northern Flicker
Northern Mockingbird
Northern Parula
Osprey
Palm Warbler
Pileated Woodpecker
Pine Warbler
Purple Martin
Red–bellied Woodpecker
Red–eyed Vireo
Red–shouldered Hawk
Red–tailed Hawk
Red–winged Blackbird
Ruby–crowned Kinglet
Ruby–throated Hummingbird
Rufous–sided Towhee
Sandhill Crane
Screech Owl
Short–tailed Hawk
Snowy Egret
Solitary Sandpiper
Solitary Vireo
Southeastern American Kestrel
Solitary Sandpiper
Solitary Vireo
Southeastern American Kestrel
Summer Tanager
Swamp Sparrow
Tree Swallow
Tri–colored Heron
Tufted Titmouse
Turkey Vulture
White Ibis
White–eyed Vireo
Wild Turkey
Wood Duck
Wood Stork
Yellow–bellied Sapsucker
Yellow–billed Cuckoo
Yellow–rumped Warbler
Yellow–throated Warbler

Total: 93 species

Table C–8. Bird sightings at Brooker Creek Preserve (Spring: March – May, 1993).

American Crow	Forster's Tern	Red–bellied Woodpecker
American Kestrel	Gray Catbird	Red–eyed Vireo
Anhinga	Great Blue Heron	Red–shouldered Hawk
Barn Swallow	Great Crested Flycatcher	Red–tailed Hawk
Barred Owl	Great Egret	Red–winged Blackbird
Black Vulture	Great Horned Owl	Ruby–crowned Kinglet
Black–and–white Warbler	Green–backed Heron	Rufous–sided Towhee
Black–throated Blue Warbler	Hairy Woodpecker	Sandhill Crane
Blue Grosbeak	House Wren	Snowy Egret
Blue Jay	Killdeer	Solitary Sandpiper
Blue–gray Gnatcatcher	Little Blue Heron	Solitary Vireo
Boat–tailed Grackle	Loggerhead Shrike	Southeastern American Kestrel
Brown Thrasher	Marsh Wren	Summer Tanager
Carolina Chickadee	Merlin	Swamp Sparrow
Carolina Wren	Mourning Dove	Tree Swallow
Cattle Egret	Northern Bobwhite	Tri–colored Heron
Chimney Swift	Northern Cardinal	Tufted Titmouse
Chipping Sparrow	Northern Flicker	Turkey Vulture
Chuck–will's–widow	Northern Mockingbird	White Ibis
Common Grackle	Northern Parula	White–eyed Vireo
Common Ground–Dove	Osprey	Wild Turkey
Common Nighthawk	Palm Warbler	Wood Duck
Common Yellowthroat	Pileated Woodpecker	Yellow–bellied Sapsucker
Double–crested Cormorant	Pine Warbler	Yellow–billed Cuckoo
Downy Woodpecker	Purple Martin	Yellow–rumped Warbler
Eastern Kingbird		Yellow–throated Warbler
Fish Crow		

Table C–9. Bird sightings at Brooker Creek Preserve (Summer: June – August, 1993).

American Crow	Common Yellowthroat	Pine Warbler
American Redstart	Cooper's Hawk	Red–bellied Woodpecker
Anhinga	Downy Woodpecker	Red–shouldered Hawk
Bachman's Sparrow	Eastern Bluebird	Red–tailed Hawk
Barred Owl	Great Blue Heron	Red–winged Blackbird
Black Vulture	Great Crested Flycatcher	Ruby–throated Hummingbird
Black–and–white Warbler	Great Egret	Rufous–sided Towhee
Blue Jay	Green–backed Heron	Screech Owl
Blue–gray Gnatcatcher	Indigo Bunting	Short–tailed Hawk
Boat–tailed Grackle	King Rail	Snowy Egret
Brown Thrasher	Little Blue Heron	Summer Tanager
Brown–headed Nuthatch	Loggerhead Shrike	Tufted Titmouse
Carolina Chickadee	Mourning Dove	Turkey Vulture
Carolina Wren	Northern Bobwhite	White–eyed Vireo
Cattle Egret	Northern Cardinal	Wild Turkey
Chimney Swift	Northern Flicker	Wood Duck
Chuck–will's–widow	Northern Mockingbird	Wood Stork
Common Crow	Northern Parula	Yellow–billed Cuckoo
Common Nighthawk	Pileated Woodpecker	Yellow–throated Warbler

Table C–10: Brooker Creek Preserve bird observations: xeric hammock.

(Spring: March through May 1993)	(Summer: June through August 1993)
Barred Owl	Blue Jay
Black–and–white Warbler	Brown Thrasher
Black–throated Blue Warbler	Carolina Chickadee
Blue Jay	Carolina Wren
Blue–gray Gnatcatcher	Chimney Swift
Brown Thrasher	Chuck–will's–widow
Carolina Wren	Common Yellowthroat
Chuck–will's–widow	Downy Woodpecker
Common Grackle	Great Crested Flycatcher
Downy Woodpecker	Loggerhead Shrike
Fish Crow	Mourning Dove
Great Crested Flycatcher	Northern Bobwhite
House Wren	Northern Cardinal
Mourning Dove	Northern Parula
Northern Cardinal	Pine Warbler
Northern Parula	Red–bellied Woodpecker
Pine Warbler	Rufous–sided Towhee
Red–bellied Woodpecker	Tufted Titmouse
Red–tailed Hawk	White–eyed Vireo
Ruby–crowned Kinglet	Yellow–billed Cuckoo
Rufous–sided Towhee	Yellow–throated Warbler
Southeastern American Kestrel	
Tufted Titmouse	
White–eyed Vireo	
Wild Turkey	
Yellow–billed Cuckoo	

Table C–11. Brooker Creek Preserve bird observations: sandhill.

(Spring: March through May 1993)	(Summer: June through August 1993)
Barred Owl	Barred Owl
Blue Jay	Blue Jay
Brown Thrasher	Carolina Wren
Carolina Wren	Common Nighthawk
Great Crested Flycatcher	Downy Woodpecker
Mourning Dove	Northern Cardinal
Northern Bobwhite	Northern Parula
Northern Cardinal	Red–bellied Woodpecker
Northern Parula	Red–shouldered Hawk
Pileated Woodpecker	Red–tailed Hawk
Pine Warbler	Rufous–sided Towhee
Red–bellied Woodpecker	Summer Tanager
Red–shouldered Hawk	Tufted Titmouse
Red–tailed Hawk	Yellow–billed Cuckoo
Rufous–sided Towhee	
Tufted Titmouse	

Table C–12. Brooker Creek Preserve bird observations: pine flatwoods/palmetto prairie.

(Spring: March through May 1993)	(Summer: June through August 1993)
American Crow	American Crow
Barred Owl	Bachman's Sparrow
Black–and–white Warbler	Barred Owl
Blue Jay	Blue Jay
Blue–gray Gnatcatcher	Blue–gray Gnatcatcher
Boat–tailed Grackle	Brown Thrasher
Brown Thrasher	Brown–headed Nuthatch
Carolina Chickadee	Carolina Chickadee
Carolina Wren	Carolina Wren
Chimney Swift	Chimney Swift
Chipping Sparrow	Chuck–will's–widow
Common Grackle	Common Nighthawk
Common Ground–Dove	Common Yellowthroat
Common Nighthawk	Downy Woodpecker
Common Yellowthroat	Eastern Bluebird
Downy Woodpecker	Great Crested Flycatcher
Forster's Tern	Great Egret
Gray Catbird	Mourning Dove
Great Crested Flycatcher	Northern Bobwhite
Great Egret	Northern Cardinal
Great Horned Owl	Northern Flicker
Hairy Woodpecker	Northern Mockingbird
House Wren	Northern Parula
Little Blue Heron	Pileated Woodpecker
Marsh Wren	Pine Warbler
Merlin	Red–bellied Woodpecker
Mourning Dove	Red–shouldered Hawk
Northern Bobwhite	Red–tailed Hawk
Northern Cardinal	Red–winged Blackbird
Northern Flicker	Ruby–throated Hummingbird
Northern Mockingbird	Rufous–sided Towhee
Northern Parula	Screech Owl
Pileated Woodpecker	Short–tailed Hawk
Pine Warbler	Summer Tanager
Purple Martin	Tufted Titmouse
Red–bellied Woodpecker	White–eyed Vireo
Red–eyed Vireo	Wild Turkey
Red–shouldered Hawk	Yellow–billed Cuckoo
Red–tailed Hawk	Yellow–throated Warbler
Red–winged Blackbird	
Ruby–crowned Kinglet	
Rufous–sided Towhee	
Solitary Vireo	
Summer Tanager	
Swamp Sparrow	
Tufted Titmouse	

Table C–12 (continued).

(Spring: March through May 1993)	(Summer: June through August 1993)
Turkey Vulture	
White Ibis	
White–eyed Vireo	
Wild Turkey	
Yellow–billed Cuckoo	
Yellow–rumped Warbler	
Yellow–throated Warbler	

Table C–13. Brooker Creek Preserve bird observations: old field.

(Spring: March through May 1993)	(Summer: June through August 1993)
Barn Swallow	Black–and–white Warbler
Blue Grosbeak	Blue Jay
Blue Jay	Blue–gray Gnatcatcher
Brown Thrasher	Brown Thrasher
Chuck–will's–widow	Carolina Wren
Eastern Kingbird	Cattle Egret
Gray Catbird	Chimney Swift
Northern Bobwhite	Cooper's Hawk
Northern Cardinal	Downy Woodpecker
Palm Warbler	Great Crested Flycatcher
Red–bellied Woodpecker	Northern Bobwhite
Red–shouldered Hawk	Northern Mockingbird
Red–tailed Hawk	Northern Parula
Red–winged Blackbird	Red–shouldered Hawk
Rufous–sided Towhee	Rufous–sided Towhee
Sandhill Crane	Short–tailed Hawk
Tree Swallow	Tufted Titmouse
Tufted Titmouse	White–eyed Vireo
White–eyed Vireo	Yellow–billed Cuckoo
Yellow–rumped Warbler	

Table C–14. Brooker Creek Preserve bird observations: misc. ruderal communities (orange groves, improved pasture).

(Spring: March through May 1993)	(Summer: June through August 1993)
None	Carolina Wren Mourning Dove Northern Bobwhite Red–bellied Woodpecker

Table C–15. Brooker Creek Preserve bird observations: ruderal communities/powerline easement.

(Spring: March through May 1993)	(Summer: June through August 1993)
American Kestrel	American Redstart
Anhinga	Black Vulture
Black Vulture	Blue Jay
Carolina Wren	Eastern Bluebird
Cattle Egret	Indigo Bunting
Chipping Sparrow	Mourning Dove
Common Ground–Dove	Northern Bobwhite
Common Yellowthroat	Red–bellied Woodpecker
Fish Crow	Red–shouldered Hawk
Gray Catbird	Red–tailed Hawk
Great Blue Heron	Short–tailed Hawk
Killdeer	Turkey Vulture
Loggerhead Shrike	Yellow–billed Cuckoo
Northern Bobwhite	
Northern Cardinal	
Northern Mockingbird	
Northern Parula	
Osprey	
Palm Warbler	
Pileated Woodpecker	
Red–bellied Woodpecker	
Red–shouldered Hawk	
Red–tailed Hawk	
Red–winged Blackbird	
Rufous–sided Towhee	
Summer Tanager	
Swamp Sparrow	
Tufted Titmouse	
Turkey Vulture	
White Ibis	
White–eyed Vireo	
Yellow–rumped Warbler	

Table C-16. Brooker Creek Preserve bird observations: marsh/pond habitat.

(Spring: March through May 1993)	(Summer: June through August 1993)
Anhinga	Anhinga
Blue Jay	Blue Jay
Boat-tailed Grackle	Boat-tailed Grackle
Carolina Wren	Brown Thrasher
Common Yellowthroat	Carolina Wren
Double-crested Cormorant	Cattle Egret
Gray Catbird	Common Yellowthroat
Great Blue Heron	Downy Woodpecker
Great Egret	Great Blue Heron
Green-backed Heron	Great Egret
Little Blue Heron	Green-backed Heron
Marsh Wren	King Rail
Northern Cardinal	Little Blue Heron
Northern Parula	Northern Bobwhite
Red-bellied Woodpecker	Northern Cardinal
Red-tailed Hawk	Northern Mockingbird
Red-winged Blackbird	Northern Parula
Snowy Egret	Red-shouldered Hawk
Solitary Sandpiper	Red-tailed Hawk
Tri-colored Heron	Red-winged Blackbird
Tufted Titmouse	Snowy Egret
White Ibis	Tufted Titmouse
White-eyed Vireo	Turkey Vulture
Wood Duck	Wood Duck
	Wood Stork

Table C–17. Brooker Creek Preserve bird observations: hardwood swamp.

(Spring: March through May 1993)	(Summer: June through August 1993)
Barred Owl	Blue Jay
Black–and–white Warbler	Blue–gray Gnatcatcher
Blue Jay	Carolina Wren
Carolina Wren	Downy Woodpecker
Common Yellowthroat	Great Crested Flycatcher
Great Crested Flycatcher	Northern Cardinal
Northern Parula	Northern Parula
Pileated Woodpecker	Pileated Woodpecker
Red–bellied Woodpecker	Red–bellied Woodpecker
Red–eyed Vireo	Red–shouldered Hawk
Tufted Titmouse	Tufted Titmouse
White–eyed Vireo	White–eyed Vireo
Yellow–bellied Sapsucker	Yellow–billed Cuckoo

Table C–18. Brooker Creek Preserve bird observations: cypress swamp.

(Spring: March through May 1993)	(Summer: June through August 1993)
Carolina Chickadee	American Crow
Common Grackle	Blue Jay
Common Yellowthroat	Carolina Wren
Downy Woodpecker	Chimney Swift
Northern Bobwhite	Common Crow
Northern Cardinal	Common Yellowthroat
Northern Parula	Downy Woodpecker
Pine Warbler	Great Crested Flycatcher
Rufous–sided Towhee	Green–backed Heron
Tufted Titmouse	Mourning Dove
White–eyed Vireo	Northern Bobwhite
	Northern Cardinal
	Northern Mockingbird
	Northern Parula
	Pileated Woodpecker
	Pine Warbler
	Red–bellied Woodpecker
	Screech Owl
	Tufted Titmouse
	White–eyed Vireo

Table C-19. Comparison of birds predicted to birds observed in the major habitats types at Brooker Creek Preserve (June through August 1993).

Habitat	Species Predicted (a)	[1]Documented Species (b)	% of Predicted (b x 100)/a
Xeric Hammock	46	25 [2](3)	54.3
Sandhill	43	19 (1)	44.2
Pine Flatwoods	50	42 (8)	84.0
Cypress Swamp	49	24 (3)	49.0
Hardwood Swamp	41	16 (0)	39.0
Marsh	52	26 (5)	50.0
Old Field	49	23 (6)	46.9

Source of survey information:

(1) Surveys conducted for the Brooker Creek Management Plan (March through August, 1993)

(2) *Final Report: Aquatic and Terrestrial Wildlife Survey in the Lake Tarpon Watershed*. 1992. FGFWFC.

(3) Breeding Bird Atlas Surveys (1986 - 1991).

[1]Documented Species is a compilation of year-residents sighted throughout the study and species sighted during the summer.

[2]Numbers in parenthesis represent # of species observed which were not predicted in habitat.

Table C-20. Comparison of amphibians predicted to amphibians observed in major habitat types at Brooker Creek Preserve (1991 through 1993).

Habitat	Species Predicted (a)	Documented Species (b)	% of Predicted (b x100)/a
Xeric Hammock	14	7	50.0
Sandhill	12	7	58.3
Pine Flatwoods	15	10	66.7
Cypress Swamp	19	16	84.2
Hardwood Swamp	18	10	55.6
Marsh	15	9	60.0
Old Field	10	1	10.0

Source of survey information:

(1) Surveys conducted for the Brooker Creek Management Plan (March through August, 1993)

(2) *Final Report: Aquatic and Terrestrial Wildlife Survey in the Lake Tarpon Watershed*. 1992. FGFWFC.

Table C-21. Comparison of reptiles predicted to reptiles observed in the major habitat types at Brooker Creek Preserve (1991 through 1993).

abitat	Species Predicted (a)	Documented Species (b)	% of Predicted (b x 100)/a
Xeric Hammock	30	8	26.7
Sandhill	31	8	25.8
Pine Flatwoods	36	16	44.4
Cypress Swamp	31	21	67.7
Hardwood Swamp	26	13	50.0
Marsh	21	6	28.6
Old Field	28	9	32.1

Source of survey information:

(1) Surveys conducted for the Brooker Creek Management Plan (March through August, 1993)

(2) *Final Report: Aquatic and Terrestrial Wildlife Survey in the Lake Tarpon Watershed*. 1992. FGFWFC.

Table C–22. Brooker Creek Preserve herpetofaunal observations (1991–1993).

Amphibians
Eastern Narrowmouth Toad
Eastern Spadefoot Toad
Southern Chorus Frog
Southern Cricket Frog
Green Treefrog
Greenhouse Frog
Little Grass Frog
Oak Toad
Pig Frog
Pinewoods Treefrog
Southern Leopard Frog
Southern Toad
Squirrel Treefrog
*Bullfrog
*Eastern Newt
*Two–toed Amphiuma
*Greater Siren
*Eastern Lesser Siren

Reptiles
American Alligator
Florida Worm Lizard
Eastern Glass Lizard
Green Anole
Southeastern Five–lined Skink
Ground Skink
Six–lined Racerunner
Box Turtle
Striped Mud Turtle
Gopher Tortoise
Brown Anole
Florida Scarlet Snake
Southern Black Racer
Corn Snake
Yellow Rat Snake
Eastern Mud Snake
Eastern Garter Snake
Eastern Cottonmouth
Eastern Diamondback Rattlesnake
Dusky Pigmy Rattlesnake
*Mud Turtle
*Ribbon Snake
*Banded Water Snake
*Striped Crayfish Snake
*Pine Woods Snake
*Scarlet Kingsnake

*Observed exclusively during:
The Aquatic and Terrestrial Wildlife Survey in the Lake Tarpon Watershed. 1992. FGFWFC.
– All other observations occurred between March and August, 1993.

Table C–23. Amphibians observed at the Brooker Creek Preserve: sorted by habitat (1991 – 1993)

Xeric Hammock
Eastern Narrowmouth Toad
Green Treefrog
Oak Toad
Pinewoods Treefrog
Southern Leopard Frog
Southern Toad
Squirrel Treefrog

Sandhill
Eastern Narrowmouth Toad
Eastern Spadefoot Toad
Greenhouse Frog
Oak Toad
Pinewoods Treefrog
Southern Leopard Frog
Squirrel Treefrog

Pine Flatwoods
Eastern Narrowmouth Toad
Eastern Spadefoot Toad
Oak Toad
Pinewoods Treefrog
Southern Leopard Frog
Squirrel Treefrog
*Bullfrog
*Greenhouse Frog
*Pig Frog
*Southern Toad

Marsh
Florida Cricket Frog
Little Grass Frog
Eastern Narrowmouth Toad
Southern Toad
Green Treefrog
Squirrel Treefrog
Florida Chorus Frog
Pig Frog
Southern Leopard Frog

Cypress Swamp
Southern Chorus Frog
Southern Cricket Frog
Green Treefrog
Little Grass Frog
Squirrel Treefrog
*Bullfrog
*Eastern Lesser Siren
*Eastern Narrowmouth Toad
*Eastern Newt
*Eastern Spadefoot Toad
*Greater Siren
*Greenhouse Frog
*Pig Frog
*Pinewoods Treefrog
*Southern Toad
*Two–toed Amphiuma

Hardwood Swamp
Eastern Narrowmouth Toad
Southern Leopard Frog
Squirrel Treefrog
*Eastern Spadefoot Toad
*Greater Siren
*Green Treefrog
*Greenhouse Frog
*Pig Frog
*Pinewoods Treefrog
*Southern Toad
*Two–toed Amphiuma
*Southern Leopard Frog

Old Field
Squirrel Treefrog

*Observed exclusively during:
The Aquatic and Terrestrial Wildlife Survey in the Lake Tarpon Watershed. 1992. FGFWFC.
– All other observations occurred between March and August, 1993.

Table C–24. Reptiles observed at the Brooker Creek Preserve: sorted by habitat (1991–1993).

Upland Habitats

Xeric Hammock
Florida Worm Lizard
Green Anole
Ground Skink
Six–lined Racerunner
Gopher Tortoise
Southern Black Racer
Eastern Garter Snake
Dusky Pigmy Rattlesnake

Sandhill
Green Anole
Ground Skink
Six–lined Racerunner
Box Turtle
Gopher Tortoise
Florida Scarlet Snake
Southern Black Racer
Dusky Pigmy Rattlesnake

Pine Flatwoods
Eastern Glass Lizard
Green Anole
Southeastern Five–lined Skink
Six–lined Racerunner
Ground Skink
Gopher Tortoise
*Striped Mud Turtle
Southern Black Racer
Dusky Pigmy Rattlesnake
*Florida Scarlet Snake
*Eastern Diamondback Rattlesnake
*Ringneck Snake
*Rat Snake
*Scarlet Kingsnake
*Ribbon Snake
*Garter Snake

Old Field
Green Anole
Ground Skink
Gopher Tortoise
Brown Anole
Corn Snake
Yellow Rat Snake
Eastern Garter Snake
Eastern Diamondback Rattlesnake
Dusky Pigmy Rattlesnake
Florida Red–bellied Turtle

*Observed exclusively during:
The Aquatic and Terrestrial Wildlife Survey in the Lake Tarpon Watershed. 1992. FGFWFC.
– All other observations occurred between March and August, 1993.

Table C–24: (continued).

Wetland Habitats

Cypress Swamp
American Alligator
*Southern Black Racer
*Ringneck Snake
*Southeastern Five–lined Skink
*Striped Mud Turtle
*Mud Turtle
*Ground Skink
*Eastern Garter Snake
*Eastern Cottonmouth
*Green Anole
*Florida Scarlet Snake
*Eastern Diamondback Rattlesnake
*Corn Snake
*Rat Snake
*Eastern Mud Snake
*Banded Water Snake
*Striped Crayfish Snake
*Dusky Pygmy Rattlesnake
*Stinkpot
*Box Turtle
*Ribbon Snake

Hardwood Swamp
Striped Mud Turtle
Southern Black Racer
*Eastern Cottonmouth
*Green Anole
*Florida Scarlet Snake
*Ringneck Snake
*Rat Snake
*Southeastern Five–lined Skink
*Striped Mud Turtle
*Mud Turtle
*Banded Water Snake
*Pine Woods Snake
*Ground Skink
*Ribbon Snake

Marsh
American Alligator
Southern Black Racer
Eastern Mud Snake
Florida Cottonmouth

*Observed exclusively during:
The Aquatic and Terrestrial Wildlife Survey in the Lake Tarpon Watershed. 1992. FGFWFC.
– All other observations occurred between March and August, 1993.

Table C–25. Herpetofaunal trapping – Site 1: xeric hammock.

Two Drift Fences (H1.1 and H1.2)
– Each fence includes 4 funnel traps and 2 5–gallon buckets at either end (see text).
H1.1 – set for 16 days between 4/15 and 6/25/93.
H1.2 – set for 24 days between 4/15 and 7/29/93
Tortoise burrow funnel traps – 47 trap nights between 4/15 and 7/29/93.

Species		Trap*	Caught	Recap.	n/100 TN
Southern Toad	*Bufo terrestris*	FT	1	0	2.5
Oak Toad	*Bufo quercicus*	B	3	0	7.5
Southern Leopard Frog	*Rana utricularia*	FT	8	0	20.0
Green Treefrog	*Hyla cinerea*	FT	1	0	2.5
Narrowmouth Toad	*Gastrophryne carolinensis*	B	3	0	7.5
Ground Skink	*Scincella lateralis*	B	7	0	20.0
Gopher Tortoise	*Gopherus polyphemus*	FT	1	0	2.5
Six–lined Racerunner	*Cnemidophorus sexlineatus*	FT,B	9	1	20.0
Garter Snake	*Thanmophis sirtalis similis*	FT	1	0	2.5
Pygmy Rattlesnake	*Sistrurus miliarius barbouri*	FT	3	0	**
Incedental Observations at site					
Squirrel Treefrog	*Hyla squirella*				
Pinewoods Tree frog	*Hyla femoralis*				
Greenhouse Frog	*Eleutherodactylus planirostris*				
Worm Lizard	*Rhineura floridana*				
Green Anole	*Anolis carolinensis*				
Black Racer	*Coluber constrictor*				

*FT: Caught in funnel trap
B: Caught in bucket
GFT: Caught in funnel trap set at entrance to gopher tortoise burrow
AS: Found under one of aluminum sheets placed at site

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

**Pygmy Rattlesnake excluded from calculation because they were not individually marked.

Table C–26. Herpetofaunal trapping – Site 2: sandhill.

Two Drift Fences (H2.1 and H2.2)
– Each fence includes 4 funnel traps and 2 5–gallon buckets at either end (see text).
H2.1 – set for 16 days between 4/15 and 6/25/93.
H2.2 – set for 16 days between 4/15 and 6/25/93.
H2.3 – set for 11 days between 4/15 and 7/29/93
Tortoise burrow funnel traps – 45 trap nights between 4/15 and 7/29/93.

Species		Trap*	Caught	Recap.	n/100 TN
Southern Toad	*Bufo terrestris*	B,AS	3	1	15.7
Southern Leopard Frog	*Rana utricularia*	GFT	1	0	1.6
Narrowmouth Toad	*Gastrophryne carolinensis*	B	3	0	6.25
Ground Skink	*Scincella lateralis*	B	1	0	1.6
Six–lined Racerunner	*Cnemidophorus sexlineatus*	FT,B	20	1	35.9
Pygmy Rattlesnake	*Sistrurus miliarius barbouri*	FT	1	0	1.6
Black Racer	*Coluber constrictor*	FT,GFT	5	1	7.8
Greenhouse Frog	*Eleutherodactylus planirostris*	FT	1	0	1.6
Eastern Spadefoot	*Scaphiopus holbrooki*	FT	1	0	6.3
Incedental Observations at site					
Oak Toad	*Bufo quercicus*				
Squirrel Treefrog	*Hyla squirella*				
Gopher Tortoise	*Gopherus polyphemus*				
Green Anole	*Anolis carolinensis*				

*FT: Caught in funnel trap
B: Caught in bucket
GFT: Caught in funnel trap set at entrance to gopher tortoise burrow
AS: Found under one of aluminum sheets placed at site

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

–Sites 2 and 3 combined.

Table C–27. Herpetofaunal trapping – Site 3: sandhill.

One Drift Fence (H3.1)
– Fence includes 4 funnel traps and 2 5–gallon buckets at either end (see text).
H2.1 – set for 21 days between 4/15 and 7/29/93.
Tortoise burrow funnel traps – 55 trap nights between 4/15 and 7/29/93.

Species		Trap*	Caught	Recap.	n/100 TN
Southern Toad	*Bufo terrestris*	SLT,FT,B,GFT	10	2	15.7
Oak Toad	*Bufo quercicus*	GFT	2	0	3.1
Eastern Spadefoot	*Scaphiopus holbrooki*	FT	3	0	6.3
Narrowmouth Toad	*Gastrophryne carolinensis*	B	1	0	6.3
Florida Cricket Frog	*Acris gryllus dorsalis*	FT	1	0	1.6
Green Treefrog	*Hyla cinerea*	B	1	0	1.6
Six–lined Racerunner	*Cnemidophorus sexlineatus*	FT	4	1	35.9
Florida Scarlet Snake	*Cemophora coccinea*	AS	1	0	*
Black Racer	*Coluber constrictor*	AS	1	0	7.8
Incedental Observations at site					
Squirrel Treefrog	*Hyla squirella*				
Gopher Tortoise	*Gopherus polyphemus*				

*FT: Caught in funnel trap
B: Caught in bucket
GFT: Caught in funnel trap set at entrance to gopher tortoise burrow
AS: Found under one of aluminum sheets placed at site

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

–Sites 2 and 3 combined.

Table C–28. Herpetofaunal trapping – Site 4: pine flatwoods.

One Drift Fence (H4.1)
– Fence includes 4 funnel traps and 2 5–gallon buckets at either end (see text).
H4.1 – set for 11 days between 7/14 and 8/6/93.

Species		Trap*	Caught	Recap.	n/100 TN
Southern Toad	*Bufo terrestris*	B	1	0	9.1
Southern Leopard Frog	*Rana utricularia*	GFT	1	0	9.1
Narrowmouth Toad	*Gastrophryne carolinensis*	B	1	0	9.1
Eastern Spadefoot	*Scaphiopus holbrooki*	B	2	0	18.2
Six–lined Racerunner	*Cnemidophorus sexlineatus*	FT,B	2	1	9.1
Incedental Observations at site					
Eastern Glass Lizard	*Ophisaurus ventralis*				
Squirrel Treefrog	*Hyla squirella*				

*FT: Caught in funnel trap
B: Caught in bucket
GFT: Caught in funnel trap set at entrance to gopher tortoise burrow
AS: Found under one of aluminum sheets placed at site

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

Table C–29. Herpetofaunal trapping – Site 5: pine flatwoods.

One Drift Fence (H5.1)
– Fence includes 4 funnel traps along fence and 2 at each end (see text).
H5.1 – set for 10 days between 7/15 and 8/6/93.

Species		Trap*	Caught	Recap.	n/100 TN
Southern Leopard Frog	*Rana utricularia*	FT	2	0	20.0
Ground Skink	*Scincella lateralis*	FT	1	0	10.0
Black Racer	*Coluber constrictor*	FT	3	0	30.0
Incedental Observations at site					
Squirrel Treefrog	*Hyla squirella*				
Pinewoods Treefrog	*Hyla femoralis*				
Little Grass Frog	*Limnaoedus ocularis*				

*FT: Caught in funnel trap
B: Caught in bucket
GFT: Caught in funnel trap set at entrance to gopher tortoise burrow
AS: Found under one of aluminum sheets placed at site

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

Table C–30. Herpetofaunal trapping – Site 6: old field.

One Drift Fence (H6.1)
– Fence includes 4 funnel traps and 2 5–gallon buckets at either end (see text).
H6.1 – set for 4 days between 8/3 and 8/6/93.
Tortoise burrow funnel traps – 18 trap nights between 8/4 and 8/6/93.

Species		Trap*	Caught	Recap.	n/100 TN
Pygmy Rattlesnake	*Sistrurus miliarius barbouri*	FT	2	0	50
Six–lined Racerunner	*Cnemidophorus sexlineatus*	FT	1	0	25
Incedental Observations at site					
Diamondback Rattlesnake	*Crotalus adamanteus*				
Corn Snake	*Elaphe guttatta guttatta*				

*FT: Caught in funnel trap
B: Caught in bucket
GFT: Caught in funnel trap set at entrance to gopher tortoise burrow
AS: Found under one of aluminum sheets placed at site

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

Table C–31. Herpetofaunal trapping – Site 7: hardwood swamp.

One Drift Fence (H7.1)
– Fence includes 4 funnel traps along fence and 2 at each end (see text).
H7.1 – set for 4 days between 8/3 and 8/6/93.

Species		Trap*	Caught	Recap.	n/100 TN
Black Racer	*Coluber constrictor*	FT	1	0	25.0
Incedental Observations at site					
None					

*FT: Caught in funnel trap
B: Caught in bucket
GFT: Caught in funnel trap set at entrance to gopher tortoise burrow
AS: Found under one of aluminum sheets placed at site

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

Table C-32. Gopher tortoise population estimates.

Areas Surveyed	Tot. Inact. and Active Burrows	*Pop. Estimate	Gopher tortoises/ acre	Pop. Est. for tot. area
Site 1: Xeric Hammock (21.3 total acres: 80% surveyed)	43	26.4	1.2	33
Site 2: Sandhill (26.4 acres: 100% surveyed)	57	35.0	1.3	35
Site 3: Sandhill (23.8 acres: 80% surveyed)	34	20.9	1.1	26
Site 6: Old Field (71.5 acres: 15% surveyed))	22	13.5	1.3	90

*Population Estimate of Gopher Tortoise = (Active + Inactive Burrows) x 0.614
Ref: Cox (1987).

Table C-33. Comparison of mammals predicted to mammals observed in the major habitats types at Brooker Creek Preserve (1991 through 1993).

Habitat	Species Predicted (a)	Documented Species (b)	% of Predicted (b x 100)/a
Xeric Hammock	23	7	30.4
Sandhill	21	10	47.6
Pine Flatwoods	25	8	32.0
Cypress Swamp	13	7	53.8
Hardwood Swamp	15	8	53.3
Marsh	11	5	45.4
Old Field	20	7	35.0

Source of survey information:

(1) Surveys conducted for the Brooker Creek Management Plan (March through August, 1993)

(2) *Final Report: Aquatic and Terrestrial Wildlife Survey in the Lake Tarpon Watershed*. 1992. FGFWFC.

Table C–34. Mammals observed at Brooker Creek Preserve (1991 – 1993).

Bobcat	Nine–banded Armadillo
Cotton Mouse	Raccoon
Cotton Rat	River Otter
Eastern Cottontail	Sherman's Fox Squirrel
Florida Mouse	Southeastern Pocket Gopher
Gray Fox	Southern Flying Squirrel
Gray Squirrel	Southern Short–tailed Shrew
Least Shrew	Virginia Opossum
Marsh Rabbit	White–tailed Deer

–Sorted by Habitat

Upland Habitats

Xeric Hammock	Sandhill	Pine Flatwoods
Raccoon	Southeastern Pocket Gopher	Cotton Rat
Cotton Rat	Cotton Mouse	Virginia Opossum
Cotton Mouse	Florida Mouse	*Southern Short–tailed Shrew
Southern Flying Squirrel	Eastern Cottontail	Sherman's Fox Squirrel
Gray Squirrel	Bobcat	*Least Shrew
White–tailed Deer	White–tailed Deer	*Nine–banded Armadillo
Eastern Cottontail	Least Shrew	*Cotton Mouse
	Southern Short–tailed Shrew	*Florida Mouse
Old Field	Southern Flying Squirrel	
Cotton Rat	Raccoon	
Eastern Cottontail	Nine–banded Armadillo	
Bobcat		
Nine–banded Armadillo		
Raccoon		
White–tailed Deer		
Southeastern Pocket Gopher		

Wetland Habitats

Cypress Swamp	Hardwood Swamp	Marsh
Virginia Opossum	River Otter	River Otter
Raccoon	Raccoon	Marsh Rabbit
Nine–banded Armadillo	Nine–banded Armadillo	Raccoon
White–tailed Deer	Virginia Opossum	Nine–banded Armadillo
*Southern Short–tailed Shrew	White–tailed Deer	White–tailed Deer
*Least Shrew	Gray Fox	Bobcat
*Cotton Mouse	*Southern Short–tailed Shrew	
	*Gray Squirrel	

*Observed exclusively during:
The Aquatic and Terrestrial Wildlife Survey in the Lake Tarpon Watershed. 1992. FGFWFC.
– All other observations occurred between March and August, 1993.

Table C-35. Small mammal trapping - Site 1: xeric hammock.

Two transects (M1.1 and M1.2)
– Each transect consists of 10 stations 50 feet apart; two traps at each station.
M1.1 – set for 14 days between 4/15 and 6/25/93.
M1.2 – set for 21 days between 4/15 and 7/29/93.

591 total trap nights;
Trap nights – ((number of traps) – (tripped traps/2)) X (number of nights)

Species		Trap*	Caught	Recap.	x/100 tr.nts.
Cotton Mouse	*Peromyscus gossypinus*	SLT	11	7	0.7
Southern Flying Squirrel	*Glaucomys volans*	SLT	7	1	1.0
Hispid Cotton Rat	*Sigmodon hispidus*	SLT	1	0	0.17
		Trap success: 18/591 = 3%			
Incedental Observations at site					
Gray Squirrel	*Sciurus carolinensis*				
White–tailed Deer	*Odocoileus virginianus*				
Armadillo	*Dasypus novemcinctus*				
Eastern Cottontail	*Sylvilagus floridanus*				

*SLT: Sherman Live Trap (3X3X10)
WRT: Wood Rat Trap (6X6X18)
FT: Funnel Trap

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

Table C-36. Small mammal trapping - Site 2: sandhill.

Two transects (M2.1 and M2.2)
– Each transect consists of 10 stations 50 feet apart; two traps at each station.
M2.1 – set for 14 days between 4/15 and 6/25/93.
M2.2 – set for 25 days between 4/15 and 8/6/93.

687 total trap nights
Trap nights – ((number of traps) – (tripped traps/2)) X (number of nights)

Species		Trap*	Caught	Recap.	n/100 TN
Cotton Mouse	*Peromyscus gossypinus*	SLT	3	0	0.65
Florida Mouse	*Podomys floridanus*	SLT	2	0	0.18
Southern Flying Squirrel	*Glaucomys volans*	SLT	5	2	0.28
		Trap success: 10/687 = 1.5%			
Incedental Observations at site					
White–tailed Deer	*Odocoileus virginianus*				
Armadillo	*Dasypus novemcinctus*				

*SLT: Sherman Live Trap (3X3X10)
WRT: Wood Rat Trap (6X6X18)
FT: Funnel Trap

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

– Trap nights for Sites 2 and 3 combined.

Table C-37. Small mammal trapping - Site 3: sandhill.

One transect (M3.1)

– Transect consists of 10 stations 50 feet apart; two traps at each station.

M3.1 – set for 21 days between 4/15 and 6/25/93.

398 total trap nights

Trap nights – ((number of traps) – (tripped traps/2)) X (number of nights)

Species		Trap*	Caught	Recap.	n/100 TN
Cotton Mouse	*Peromyscus gossypinus*	SLT	5	1	0.65
Southeastern Pocket Gopher	*Geomys pinetis*	FT	1	0	1.6*
Southern Short–tailed Shrew	*Blarina carolinensis*	FT	1	0	1.6*
		Trap success: 7/398 = 1.8%			

Incedental Observations at site	
White–tailed Deer	*Odocoileus virginianus*
Armadillo	*Dasypus novemcinctus*
Eastern Cottontail	*Sylvilagus floridanus*
Bobcat	*Felis rufus*

*SLT: Sherman Live Trap (3X3X10)
WRT: Wood Rat Trap (6X6X18)
FT: Funnel Trap

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

– Trap nights for Sites 2 and 3 combined.

Table C-38. Small mammal trapping - Site 4: pine flatwoods.

One transect (M4.1)
– Transect consists of 10 stations 50 feet apart; two traps at each station.
M4.1 – set for 9 days between 7/15 and 8/6/93.
Wood Rat traps: 14 trap nights

154 total trap nights
Trap nights – ((number of traps) – (tripped traps/2)) X (number of nights)

Species		Trap*	Caught	Recap.	n/100 TN
Hispid Cotton Rat	*Sigmodon hispidus*	SLT	12	4	5.2
Oppossum	*Didelphis virginiana*	WR	1	0	7.1*
		Trap success: 13/168 = 7.7%			
Incedental Observations at site					
White–tailed Deer	*Odocoileus virginianus*				
Armadillo	*Dasypus novemcinctus*				
Eastern Cottontail	*Sylvilagus floridanus*				

*SLT: Sherman Live Trap (3X3X10)
WRT: Wood Rat Trap (6X6X18)
FT: Funnel Trap

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

Table C-39. Small mammal trapping - Site 5: pine flatwoods.

One transect (M5.1)					
– Transect consists of 10 stations 50 feet apart; two traps at each station.					
M5.1 – set for 9 days between 7/15 and 8/6/93.					
Wood Rat Traps: 7 trap nights					
162.5 total trap nights					
Trap nights – ((number of traps) – (tripped traps/2)) X (number of nights)					
Species		**Trap***	**Caught**	**Recap.**	**n /100 TN**
Hispid Cotton Rat	*Sigmodon hispidus*	SLT	3	0	1.9
		Trap success: 3/163 = 1.8%			
Incedental Observations at sit					
White–tailed Deer	*Odocoileus virginianus*				
Armadillo	*Dasypus novemcinctus*				
Eastern Cottontail	*Sylvilagus floridanus*				

*SLT: Sherman Live Trap (3X3X10)
WRT: Wood Rat Trap (6X6X18)
FT: Funnel Trap

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

Table C-40. Small mammal trapping - Site 6: old field.

One transect (M6.1) – Transect consists of 10 stations 50 feet apart; two traps at each station. M6.1 – set for 4 days between 8/3 and 8/6/93.				
79 total trap nights Trap nights – ((number of traps) – (tripped traps/2)) X (number of nights)				
Species	**Trap***	**Caught**	**Recap.**	**n/100 TN**
No individuals caught	N/A	0	0	0

*SLT: Sherman Live Trap (3X3X10)
WRT: Wood Rat Trap (6X6X18)
FT: Funnel Trap

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

Table C-41. Small mammal trapping - Site 7: hardwood swamp.

One transect (M7.1) – Transect consists of 10 stations 50 feet apart; two traps at each station. M7.1 – set for 4 days between 8/3 and 8/6/93.
58 total trap nights Trap nights – ((number of traps) – (tripped traps/2)) X (number of nights)

Species	Trap	Caught	Recap.	x/100 tr.nts.
No individuals caught	N/A	0	0	0

*SLT: Sherman Live Trap (3X3X10)
WRT: Wood Rat Trap (6X6X18)
FT: Funnel Trap

n/100 TN: number of individuals captured per 100 trap nights.
n = # original captures

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