

LAND MANAGEMENT PLAN  
SECTION 16, DELTONA, FLORIDA

THE SCHOOL DISTRICT  
OF VOLUSIA COUNTY, FLORIDA

SCHOOL BOARD MEMBERS

MRS.BEEBE S. WHITE, CHAIRMAN  
MR.ALFRED C. WILLIAMS, VICE-CHAIRMAN  
MRS.ANN E. McFALL, MEMBER  
MR.WILLIAM L. ROSS, JR., MEMBER  
DR.T.E. SMOTHERMAN, MEMBER

SUPERINTENDENT OF SCHOOLS DR.JIM SURRETT

PREPARED BY: THE FACILITIES PROPERTY MANAGEMENT DEPARTMENT

From the beginning, one of the goals for the Nature Center was to expand beyond the limited boundaries of the school and be able to incorporate more of the natural beauty and resources into the curriculum. Thus, in 1985, a presentation was made to the School Board of Volusia County and an agreement was reached for an additional 180 acres.

However, most of the development has remained on the school property. Some of the projects include: an outdoor classroom with a demonstration table, a picnic area, a beautiful overlook at the deep wet sink, many trails and markers noting special items of interest, a curriculum for elementary students K-5, involvement by community, clubs and other groups, video tapes, slide presentations, and the continuous training of students to act as trail guides.

In recent days the Sand Pine Nature Center became the focal point for the celebration of Earth Day, 1990, in Volusia County. State and local government, communities, families, and children all joined together to celebrate the beauty and splendor of our earth. We were proud to be a small part of that event. It also made a strong statement concerning the extreme importance of the sixteenth section and our future.

#### OUR FUTURE

Our committee speaks with one voice in recommending that the sixteenth section be set aside for educational purposes both now and in the future. Membership on the committee boasts educators K-12, administrators, parents, government and community leaders, all working toward common goals concerning curriculum and the environment. Our ideas are extensive but by no means exhaustive. It is a good beginning on which we must build to ensure the future of our children and their children who will continue to cope with the tremendous demands placed on our environment.

The pure water we drink, the clean air we breathe, are directly related to the survival of the sixteenth section and other areas like it. Only through education and involvement will we be able to preserve these and other very important elements so necessary to our survival.

The curriculum we are developing through the use of this living laboratory will help to ensure a better future for all mankind. Cost to the school board will be little since thousands of dollars are available through grants at the local, state and national levels. Many local and state agencies have offered assistance as well. Working together our goals can become a reality.

The members of the Sixteenth Section Committee and those whom we represent pledge our support to you the School Board of Volusia County in preserving and promoting this pristine property, given to us by the people of the state of Florida for the education of all those in our charge.

SECTION 16, DELTONA  
LAND MANAGEMENT PLAN

- A. The common name of the property.

Section 16, Deltona

- B. A map showing the location and boundaries of the property plus any structure or improvements to the property.

This tract is located in the northern portion of the Deltona subdivision, an early subdivision consisting of approximately 40,000 residential building lots. Section 16, Deltona, lies east of I-4, south and west of Howland Boulevard and north of Elkcam Boulevard. See map - Exhibit A.

- C. The legal description and acreage of the property.

Township 18 South, Range 31 East, Section 16, Volusia

This contains approximately 640 acres of rolling sand pine scrub punctuated by sinkholes and sandhill lakes. Legal Descriptions - See Exhibit B.

- D. The degree of title interest held by the Board, including reservations and encumbrances such as leases.

The Volusia County School Board has a fifty year lease on the entire section, Lease No. 3403, that began June 15, 1987 (attached - Exhibit C). As provided by the Northwest Ordinance Act of 1785, amended in 1787, as each territory is surveyed for acceptance as a state the sixteenth section in each township was reserved for public education purposes. Consistent with the designation for public education purposes, three schools are located here. Deltona Lakes Elementary is located on 15 acres in the southeast corner of the section and is surrounded by another 25 acres reserved as a nature study area. Two schools are under construction in the northwest corner of the section, new Middle School "A" on 30 acres and new Elementary "L" on 20 acres. These schools are scheduled for completion by late fall 1990. To serve these schools and the Deltona area, Providence Boulevard was constructed from north to south with access roads to the schools. In addition to the improvements listed above, a 10 acre transportation terminal has been approved but not constructed. Also, a Florida Power and Light transmission line transects the northwest quarter of the tract.

- E. The land acquisition program, if any, under which the property was acquired.

An Act of Congress, the Act of March 3, 1845, 5 Stat. 788, supplemental to the act admitting Florida into the Union, provided:

...That in consideration of the concessions made by the State of Florida in respect to the public lands, there be granted to the said State eight entire sections of land for the purpose of fixing their seat of Government; also, section number sixteen in every township, or other lands equivalent thereto, for the use of the inhabitants of such townships, for the support of the public schools; also, two entire townships of land, in addition to the two townships already reserved, for the use of two seminaries of learning -- one to be located east, and the other west of the Suwanee River ...

- F. The designated single use or multiple use management for the property, including other managing agencies.

It is proposed that this tract be managed for educational purposes with the assistance of the Division of Forestry, the Freshwater Fish and Game Commission and the County of Volusia. As a use collateral to environmental education it is proposed that a portion of this 640 acre tract, approximately 300-400 acres, be managed as a mitigation bank for threatened scrub species such as the scrub jay and the gopher tortoise. This concept is explained below.

- G. Proximity of property to other significant state, local, or federal land or water resources.

Section 16, Deltona is approximately four miles northeast of Lake Monroe and seven miles east of the St. Johns River.

- H. A statement as to whether the property is within an aquatic preserve or a designated area of critical state concern or an area under study for such designation.

Section 16, Deltona is not within an aquatic preserve, a designated area of critical state concern nor an area under study for such a designation.

- I. RESOURCE IDENTIFICATION

1. letter attached from Division of Historical Resources
2. report from Division of Forestry attached
3. report from Environmental Services, Inc., lists soils, biota and geo-physical conditions

- J. A description of actions the agency plans to locate and identify unknown resources such as surveys of unknown archaeological and historical resources.

Prior to any future construction, a survey will be conducted to identify historical and archaeological resources.

- K. The identification of resources on the property that are listed in the Natural Areas Inventory.

A letter from Florida Natural Areas Inventory is attached.

- L. A description of past uses, including any unauthorized uses of the property.

The earliest school board records show that this tract was leased to the DeLand Chapter of Future Farmers of America in 1958 for an Educational Agricultural Demonstration Project. The lease was renewed for another ten years in 1968. A Forest Resource Management Plan was prepared in 1979 and is attached. In addition to authorized uses, the tract has been subject to frequent trespass by all-terrain and recreational vehicles. Due to this uncontrolled traffic, the sandhill lakes area in the northeast quadrant has been seriously degraded.

- M. A detailed description of existing and planned use(s) of the property.

The existing uses of the tract include:

30.19 acres	-	new Middle School "A"
20.34 acres	-	new Elementary School "L"
15 acres	-	Deltona Lakes Elementary
25 acres	-	Nature Study Area
16.678 acres	-	Power transmission line
17.815 acres	-	Roadways
10 acres	-	Transportation Terminal (approved but not constructed)

135.026 acres - Total

In addition to existing uses it is proposed that a portion of the northeast quadrant where the terrain is relatively level be reserved for future development. The land to the south and on the east side of Providence Boulevard should serve as an agricultural/vocational area. The Future Farmers of America, the vocational/agricultural department of Volusia County Schools and the Division of Forestry could operate programs here. The acreage east of Providence Boulevard and south of the transmission line would be the primary environmental education site. Both the environmental education tract and the vocational/agricultural tracts will be part of the scrub habitat mitigation management area.

- N. A description of alternative or multiple uses of the property considered by the managing agency and an explanation of why such uses were not adopted.

Two alternative uses were considered but not adopted in the drafting of this plan. The first alternative was to fence the tract and leave it untouched except for proposed or existing schools. However, that course failed to recognize that in managing the surrounding area for fire control the natural regeneration process of sand pine scrub had been altered. This alternative also fails to take advantage of a rare opportunity for an outdoor learning experience.

The other option was to relinquish leasehold interest and recommend the uncommitted acreage for surplus. While this alternative releases the school board from the obligation of managing a large tract of land, this action would also cede an interest long held by Volusia County Schools in one of the last two remaining sixteenth sections in Volusia County and would forsake the opportunity of providing present and future school children with educational benefits intended in this far-sighted legislative Act of 1845.

- O. A detailed assessment of the impact of planned uses on the renewable and non-renewable resources of the property and a detailed description of the specific actions that will be taken to protect, enhance and conserve these resources and to mitigate damage caused by such uses.

The schools, roads, transportation center and future development have the potential to adversely impact the proposed mitigation area. The proposed mitigation, education and conservation area will be protected by surrounding the potential impacts with a continuous buffer of the existing dense sand pine scrub community. It is anticipated that the mitigation will greatly enhance the existing scrub community, returning the habitat to conditions found prior to the 1940's. Other potential impacts associated with the education aspect of the plan are expected to be minimal.

- P. A description of management needs and problems for the property.

The first step in managing this tract is to secure its boundaries by erecting a fence and ensuring that it is properly posted against trespassing. Land management practices as described in the Management Plan Objectives will serve to enhance the ecological diversity of this tract.

Once the tract is secured the sand hill lakes area in the northeast should be monitored to measure the success of their restoration. Nature trails, an outdoor classroom and a parking area will be needed at the entry point of the environmental education center, although the schools in the immediate area could meet these needs for the interim.

Q. Identification of adjacent land uses that conflict with planned use of the property, if any.

None.

R. A description of legislative or executive directives that constrain the use of such property.

Florida Statute 253.03 and F.A.C. Chapter 18-2 and 18-4.007.

S. A finding regarding whether each planned use complies with the State Lands Management Plan, particularly whether such uses represent "balanced public utilization", specific agency statutory authority, and other legislative or executive constraints.

It is our belief that this land management plan as proposed meets and exceeds the planning goals for state lands. Not only does this plan advance the original purpose for each section sixteen to serve public education, but it combines the educational goals with land management practices that enhance and protect a threatened ecosystem. The plan balances public utilization and involves several other governmental agencies in best management practices for this unique habitat.

Specifically, this plan provides for the preservation and management of today's resources to benefit the education of successive generations both in the standard academic atmosphere of three public schools and support facilities and by establishing environmental education that studies habitat and land management techniques.

T. An assessment as to whether the property, or any portion, should be declared surplus.

None of this property should be declared surplus at this time.

U. Identification of other parcels of land within or immediately adjacent to the property that should be purchased because they are essential to management of the property.

In order to better limit access at the northeast corner it would be wise to acquire the irregular lot at the north property line bounded on the west by the power transmission line and having frontage on Howland Boulevard Tract "K" Deltona Lakes Unit 53.

If the county wishes to complement the educational and conservation uses on Section 16 with a recreational facility, they may want to acquire the rural and agricultural parcels to the east. This would provide frontage on Dupont Lake. There is already a Boy Scout camp in this area. Expansion into this area is not essential for education purposes.

- V. A description of the management responsibilities of each agency and how such responsibilities will be coordinated, including a provision that requires that the managing agency consult with the Division of Historical Resources before taking actions that may adversely affect archaeological or historic resources.

The Volusia County School Board is the agency with primary responsibility for managing Section 16, Deltona. The school board will enter into an agreement with the County of Volusia governing land management in the conservation and mitigation areas. The school board will participate with the Division of Forestry and the Freshwater Fish and Game Commission to enhance the educational experience. The board will also consult with the Division of Historical Resources before taking actions that may adversely affect archaeological or historic resources.

- W. A statement concerning the extent of public involvement and local government participation in the development of the plan, if any, including a summary of comments and concerns expressed. (This question will be completed at end of process).

Presentation AAUW - Deltona	-	April 26, 1990
Board Meeting, Kurt Borglum	-	December 12, 1989
Environmental Services	-	October 24, 1989 (Board Meeting)

Public discussions  
Sand Pine Nature Center

This land management plan is consistent with goals, objectives and policies set out in the State and Local Comprehensive Plan. This tract is designated Public Use in the Future Land Use Map for Volusia County.

## RESOURCE DESCRIPTION

Section 16 can be divided into two major habitat types: mature sand pine scrub and freshwater marshes. Several small sinkholes are also present on the site, many of which retain water during most if not all of the year.

### SAND PINE SCRUB

Sand pine scrub is a xeric evergreen plant community characterized by a dominant tree, sand pine (Pinus clausa) with rosemary (Ceratiola ericoides) or scrub oaks (Quercus virginiana, Q. chapmanii, Q. myrtifolia) comprising a major component of the understory. Open, sandy areas are numerous and commonly devoid of vegetation or covered by lichens. The community typically occurs on relict sand dunes which exhibit poor water retention, high groundwater recharge and low nutrient concentrations.

The community has evolved a close and dependant relationship with fire. Crown fires occur on 30 to 60 year cycles within a mature sand pine scrub habitat as those in Section 16. These intense fires are necessary to release the seeds from the resinous cones.

Fires of a more frequent cycle cause the habitat to remain in the in a subclimax scrub stage with fewer, scattered sand pines and more open areas.

Ninety-six percent of the Section 16 conservation/mitigation area is dominated by an extremely dense sand pine scrub community. The canopy's areal coverage is complete and is comprised, with the exception of three small areas, of nearly even-aged mature sand pines 10" to 12" in diameter. The dense midcanopy and subcanopy are dominated by various scrub oaks, rusty lyonia (Lyonia ferruginea), and silk bay (Persea humilis). While not common, rosemary is also found on the site in isolated areas. Open areas typical of sand pine scrub are not found within the boundaries of the habitat on Section 16.

Aerial photographs of the site from 1943 to the present indicate that a significant change in the community structure has occurred. Prior to 1943, the characteristics of the sand pine scrub community were more typical of a community maintaining a subclimax stage. The extent and areal coverage of the sand pine within the community was much less (approximately 80%) and the amount of non-vegetated, open areas was much greater. With the advent of fire prevention and suppression, a gradual increase in the amount and density of the sand pine has occurred and has continued through the present. During the early sixties and seventies, some limited harvesting and planting occurred in three different areas of Section 16 as part of the school systems vocational program. These activities have encouraged the dense

growth of sand pine and scrub oak and allowed the site to shift to the next successional stage, deviating from the historic subclimax community.

### WETLANDS

The majority of the wetlands found along the DeLand Ridge, including the wetlands of Section 16, are subject to rapid, frequent and dramatic changes in water levels. These water level changes are dependant upon direct rainfall and the water levels of the surficial and Floridan aquifers. Historic photographs indicate the acreage of standing water within the wetlands has fluctuated from a total of approximately fifty (50) acres to less than five acres.

Until the creation and expansion of Deltona, the wetlands in Section 16 had experienced little or no adverse impacts. Along with the tremendous growth of the community, the impacts from off road vehicles have dramatically increased in recent years, particularly in the largest wetland in the northeast corner of the property. The disturbance of the wetlands by these vehicles has resulted in both upland and wetland vegetation destruction, erosion and temporary pollution problems.

The vegetation found in the transitional wetland areas include: slash pine (Pinus elliotii), broomsedge (Andropogon virginicus),

shortspike bluestem (Andropogon brachystachyus), blue maidencane (Amphicarpum muhlenbergianum), St. John's wort (Hypericum fasciculatum), and meadow beauty (Rhexia cubensis). The permanently inundated and saturated areas are dominated by red root (Lachnanthes caroliniana), meadow beauties (Rhexia spp.), beakrushes (Rhynchospora spp.), yellow-eyed grass (Xyris smalliana), spikerush (Eleocharis spp.), bladderwort (Utricularia spp.), and fragrant waterlily (Nymphaea odorata).

#### EDUCATIONAL OBJECTIVES: OVERVIEW

The goal of the environmental education curriculum committee is to produce a working document which supports the premise that the sixteenth section, located in Deltona, Florida, is a living laboratory, a classroom into the past, which will provide students of the present with knowledge, wisdom and concern needed to ensure a safe and healthy environment for all of us.

The principal educational objectives of Section 16 can be stated as follows:

1. To develop an awareness, appreciation and an affection for nature.
2. To develop an awareness that all things in nature constantly change.

3. To present conservation concepts in natural settings so that students will learn them easily.
4. To develop a desire and a will to protect and to use wisely the living and non-living natural resources of the earth important to man.
5. To increase knowledge of our natural world and man's responsibility towards nature.

Section 16 in Deltona Lakes contains an unprecedented opportunity for children, teachers, and citizens to become involved with our environment. Children will develop a caring attitude of their environment through significant life experiences with the environment.

Teachers serve as role models in environmental behavior. Teachers need to lead children in the discovery of the environment. Teachers need to actively guide children and challenge them to take effective actions. Teachers must take a scientific viewpoint and expose the children to science in nature, rather than teaching on emotions. It is important to show the children that we are taking more out of the environment than putting back into it. Most importantly, children need to learn to respect what we use on this earth.

The mission of this environmental education center, that would encompass all the surrounding schools, would be to foster an awareness and appreciation of a unique natural world, promote the understanding of ecological concepts, and instill a sense of stewardship toward the earth and its inhabitants.

### MANAGEMENT OBJECTIVES

#### NATURAL HABITATS

Much of Volusia County still has fairly large tracts of viable scrub habitat and associated wetlands. Development pressures are rapidly impacting these valuable communities and are expected to continue. Any development within habitats with resident endangered species are required by the various permitting authorities to provide for mitigation. In some instances the mitigation has been allowed to take place several miles away in Polk County, which doesn't allow for habitat protection or replacement in Volusia County.

Mitigation required for permitted projects in Volusia County will be directed to the approximately 420 acres of Section 16 managed in perpetuity as a mitigation, education and conservation area. One of the goals of this plan is to restore the existing habitats to the conditions indicated by historical information prior to the 1940's. Such mitigation and continued management will provide

within Volusia County a sand pine scrub habitat at a successional stage that is more beneficial for many species of plants and animals which are presently endangered or threatened such as scrub jays and gopher tortoises.

A detailed plan for the management of the site has yet to be developed. The mitigation plan will be reviewed by the U.S. Fish and Wildlife Service, the Florida Game and Freshwater Fish Commission and the Department of Environmental Regulation to insure compliance with existing regulations.

The 420 acres of the mitigation, education and conservation area will be divided into three different areas: 1) scrub mitigation area; 2) open sand pine scrub; and 3) sand pine scrub buffers. Each area will be subjected to a different management strategy to achieve the desired community structure.

The scrub mitigation area will be managed to achieve habitat characteristics that consist of less than 20% scattered mature trees, 10-30% bare or sparsely vegetated ground and 50-75% scrub oaks three to ten feet tall. This type of habitat is recommended for various species, such as scrub jays and gopher tortoises, known to inhabit these areas and currently threatened with extinction.

The initial concept for the scrub mitigation area calls for the establishment of five 40 acre experimental tracts within the existing sand pine scrub. Each of the experimental tracts will be subjected to different management techniques, or combinations of techniques, such as harvesting, roller-chopping and burning. Within each tract two 20 acre subplots will be managed utilizing the same techniques but applied at staggered intervals. It is anticipated that the smaller subplots and the staggered management intervals will result in a 10-15 year disturbance cycle, replicating historic cycles.

Less than 30% of the mitigation area will be converted to an open sand pine scrub community, which is less dense than existing conditions. The objective within the open sand pine scrub area is to create a transition zone between adjacent scrub mitigation areas or the buffers and still provide habitat for a maximum number of plant and animal species. It is anticipated that 50-75% of the woody understory vegetation of the dense sand pine scrub community will be cleared or thinned to provide open areas for animal species endemic to sand pine scrub habitat.

Various impacts, such as predation from feral cats and dogs, increased traffic mortality and disturbance from intensive use areas (playgrounds) can be expected from the adjacent land uses surrounding the scrub and open sand pine scrub mitigation areas. In order to provide this necessary protection to the scrub mitigation sites, a minimum of a 100 ft. buffer of the existing

dense sand pine scrub community will be incorporated into the design of the scrub mitigation. The buffers will provide protection necessary from the roads, schools and surrounding residential areas.

The wetland mitigation will primarily consist of elimination of the disturbance from off-road vehicles. The areas suffering from the greatest impacts may be enhanced by vegetation planting, if natural recovery is unlikely. Soil which has eroded from the disturbed areas caused by the intense use, may be excavated to increase the volume of the wetlands and subsequently vegetated.

E X A M P L E

PROPOSED ENVIRONMENTAL STUDY STATIONS  
FOR K-2 UNIT DEVELOPMENT

NATURE TRAIL

- \*1. Sinkhole Stations
  - a. shallow sink
  - b. large wet sink
  - c. dry sink
2. Rotten Log Station
3. Soil Study Station
4. Tree Growth Study Station
5. Tracking Station
6. Fence Row Habitat Station
7. Native Plant Station
8. Fungi (moss, lichen) Growth Study Station
9. Insect Activity Station
10. Native Floridian Study Station
11. Orienteering Station
12. Land Measurement Station
13. Sundial Station
14. Weather Station

DIVERGENT AREAS

- \*1. Outdoor Classroom
- \*2. Picnic Area
3. Environmental Lab-indoor lecture hall
- \*4. Observation Platform
5. Camping Areas
6. Challenge (fitness) Course Trail
7. Tree Identification Trail
8. Wildlife Identification Trail
9. Reflection, meditation, quiet spot area for poetry, art work, reading, just thinking
10. Collecting Trail
11. Blind-fold Trail
12. Energy Experimental Station
13. Arts and Crafts Area (long tables and benches)

\*(already existing at Sand Pine Nature Trail)

## BUDGET

### A. Capital Improvements

1. Fencing boundary and along roadways
2. Entrance and parking lot for environmental study area
3. Nature trails
4. Outdoor classroom
5. Sinkhole stations
6. Restrooms

These capital improvements may be provided as funds become available. The only imperative is fencing estimated not to exceed \$100,000. Many of these improvements may be built by volunteers and students, i.e. nature trails.

### B. Staffing

No on-site staffing. Volusia County school staff will accompany students to the site. Special assistance has been offered by the Division of Forestry Services and the Freshwater Fish and Game Commission. Land management expertise for conservation and mitigation are to be provided by the county.

### C. Revenues

A formal agreement between the county the the school board will include the value of mitigation rights on the management parcel of 300-400 acres. The school board can assume that all mitigation rights will be reserved within ten years.

There will be some revenues received from timbering to create scrub areas. It is estimated that this income will not exceed \$10,000 per year.

APPENDIX



DELTONA

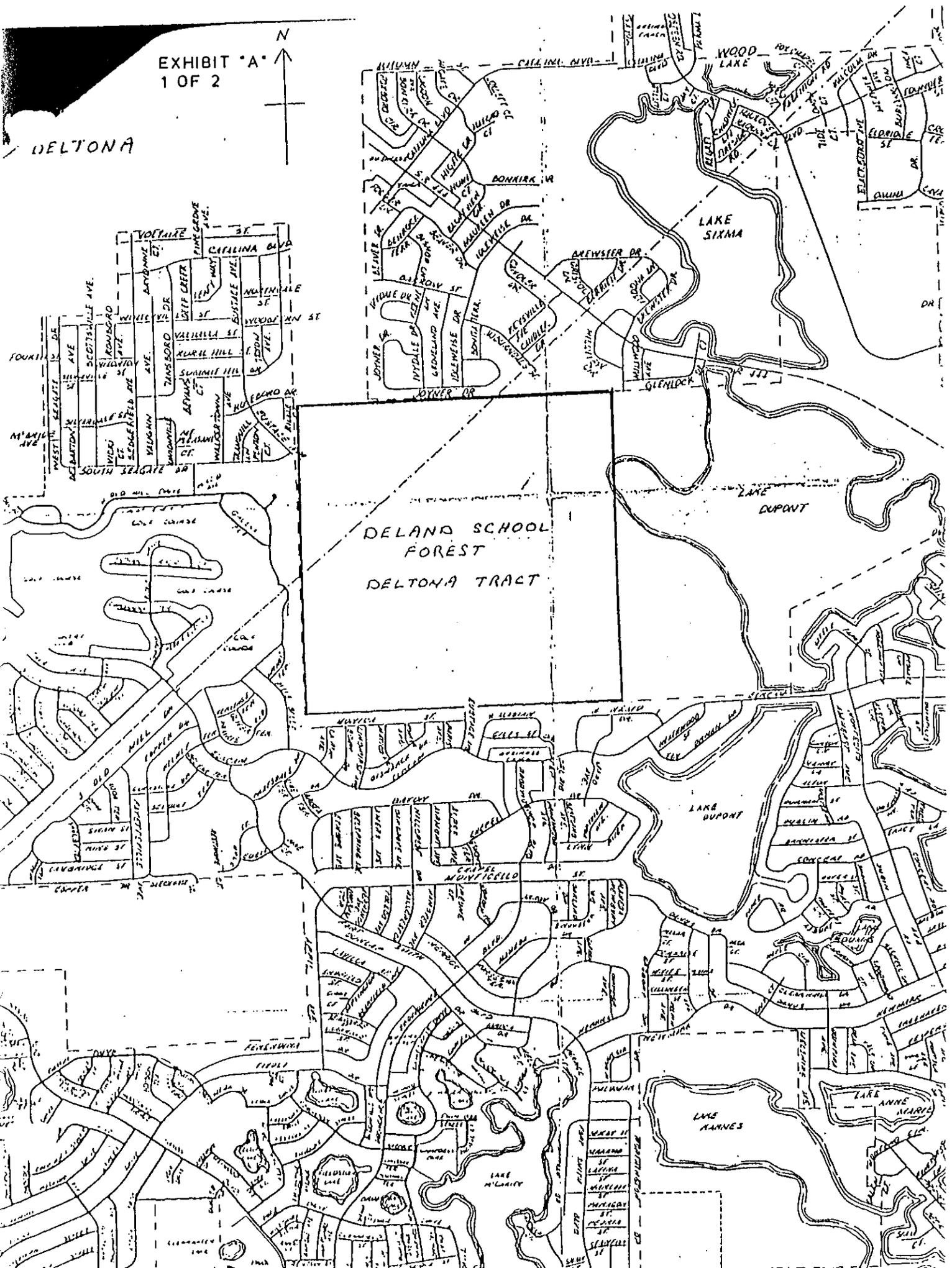
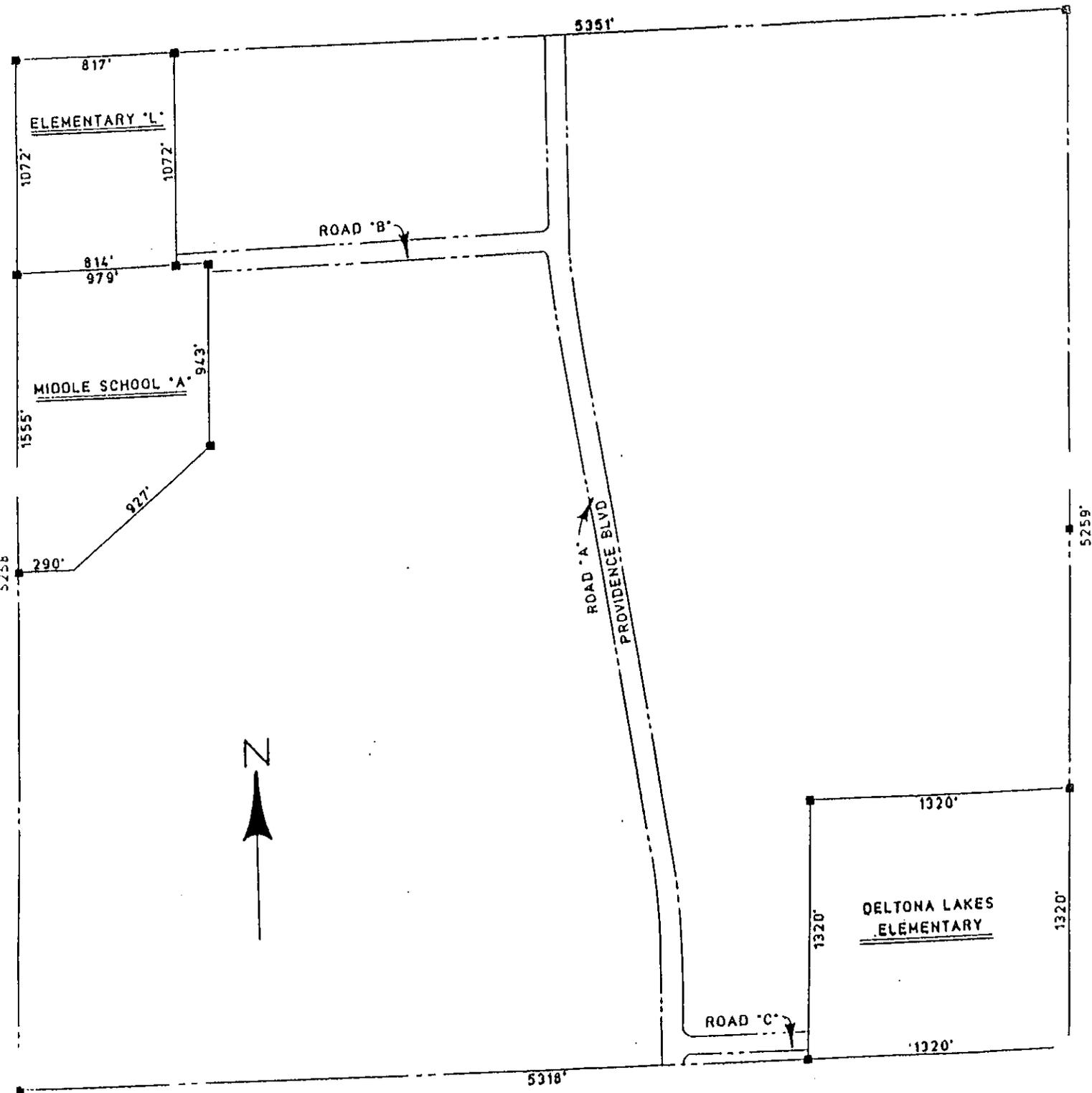


EXHIBIT "A"

2 OF 2



## VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

## DESCRIPTION OF ROAD "A":

COMMENCING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE RUN N 09° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 597.05 FT. TO THE POINT OF BEGINNING; THENCE N 00° 54' 02" W A DISTANCE OF 639.63 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 00° 24' 02" AND A RADIUS OF 2,814.79 FT. AND A CHORD BEARING OF N 05° 06' 03" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 412.70 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 09° 18' 04" W A DISTANCE OF 2,823.97 FT. TO THE P.C. OF A CURVE CONCAVE TO THE EAST HAVING A CENTRAL ANGLE OF 00° 21' 55", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF N 05° 07' 06" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 425.57 FT. TO THE P.T.; THENCE N 00° 56' 08" W A DISTANCE OF 991.65 FT. TO THE NORTH LINE OF THE NE 1/4 OF SAID SECTION 16 AT A POINT 50.00 FT. WESTERLY OF THE CENTERLINE OF IDLEWISSE DR. AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE, AS RECORDED IN MAP BOOK 20, PAGES 32 THROUGH 42, AFORESAID PUBLIC RECORDS; THENCE N 08° 58' 33" E ALONG SAID NORTH LINE 100.00 FT.; THENCE S 00° 56' 08" E A DISTANCE OF 991.00 FT. TO THE P.C. OF A CURVE CONCAVE TO THE EAST, HAVING A CENTRAL ANGLE OF 00° 21' 55", A RADIUS OF 2,814.79 FT. AND A CHORD BEARING OF S 05° 07' 06" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 410.97 FT. TO THE P.T.; THENCE S 09° 18' 04" E A DISTANCE OF 2,823.97 FT. TO THE P.C. OF A CURVE CONCAVE TO THE WEST, HAVING A CENTRAL ANGLE OF 00° 24' 02", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF S 05° 06' 03" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 427.36 FT. TO THE P.T.; THENCE S 00° 54' 02" E A DISTANCE OF 639.59 FT. TO THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16; THENCE S 09° 04' 39" W ALONG THE SAID SOUTH LINE 100.00 FT. TO THE POINT OF BEGINNING; CONTAINING 12.152 ACRES, MORE OR LESS.

SUBJECT TO A FLORIDA POWER AND LIGHT COMPANY EASEMENT AS RECORDED IN OFFICIAL RECORDS BOOK 211, PAGE 143, AND OFFICIAL RECORDS BOOK 1294, PAGE 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.

EXHIBIT "B"

1 OF 4

DESCRIPTION OF ROAD "B":

COMMENCING AT THE INTERSECTION OF THE CENTERLINE OF IDLEWEISE DRIVE AND THE NORTH LINE OF THE NE 1/4 OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, AS SHOWN ON THE PLAT OF DELTOMA LAKES, UNIT FIFTY-THREE, RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE S 88° 58' 33" W ALONG THE SAID NORTH LINE 50.00 FT.; THENCE S 00° 56' 08" E A DISTANCE OF 991.65 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 00° 06' 29", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF S 00° 59' 23" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 5.50 FT. TO THE POINT OF BEGINNING;

THENCE CONTINUE ALONG THE ARC OF SAID CURVE 148.79 FT. THROUGH A CENTRAL ANGLE OF 02° 55' 29" AND A CHORD BEARING OF S 02° 30' 21" E TO THE POINT OF REVERSE CURVE (P.R.C.) OF A CURVE CONCAVE TO THE SOUTHWEST HAVING A CENTRAL ANGLE OF 87° 03' 46", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF N 47° 30' 00" W; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE 37.99 FT. TO THE POINT OF TANGENCY (P.T.); THENCE S 88° 58' 07" W, PARALLEL WITH THE NORTH LINE OF THE NW 1/4 OF SAID SECTION 16 A DISTANCE OF 1,724.63 FT. TO THE WEST LINE OF THE EAST 365 FT. OF THE WEST 1/2 OF THE NW 1/4 OF SAID SECTION 16; THENCE N 00° 10' 47" E ALONG SAID WEST LINE 50.01 FT. TO THE SOUTH LINE OF THE NORTH 1072.34 FT. OF THE SAID NW 1/4; THENCE S 88° 58' 07" W ALONG SAID SOUTH LINE 165.00 FT. TO THE WEST LINE OF THE EAST 530 FT. OF THE SAID WEST 1/2 OF THE NW 1/4; THENCE N 00° 10' 47" E ALONG SAID WEST LINE 50.01 FT.; THENCE N 88° 58' 07" E PARALLEL WITH THE NORTH LINE OF THE SAID NW 1/4 A DISTANCE OF 1,883.65 FT. TO THE P.C. OF A CURVE CONCAVE TO THE NORTHWEST HAVING A CENTRAL ANGLE OF 90° 00' 44", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF N 43° 57' 45" E; THENCE NORTHEASTERLY ALONG THE ARC OF SAID CURVE 39.27 FT. TO THE P.T. AND THE POINT OF BEGINNING; CONTAINING 4.20 ACRES, MORE OR LESS; SUBJECT TO A FLORIDA POWER AND LIGHT COMPANY EASEMENT AS RECORDED IN O.R. BK. 211, PG. 143, AND O.R. BK. 1294, PG. 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA;

EXHIBIT "B"

VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF ROAD "C":

COMMENCING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA AS SHOWN ON THE PLAT OF DELTONA LAKES UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; RUN THENCE N 89° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 697.05 FT.; THENCE N 00° 54' 02" W A DISTANCE OF 25.00 FT. TO THE POINT OF BEGINNING; THENCE CONTINUE N 00° 54' 02" W A DISTANCE OF 150.00 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE NORTHEAST HAVING A CENTRAL ANGLE OF 96° 01' 19", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF S 45° 54' 41" E; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE 39.28 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 89° 04' 39" E PARALLEL WITH THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 611.00 FT. TO THE WEST LINE OF THE EAST 1320.00 FT. OF THE SAID SE 1/4; THENCE S 00° 42' 14" W ALONG SAID WEST LINE 100.04 FT.; THENCE S 89° 04' 39" W PARALLEL WITH THE SOUTH LINE OF THE SAID SE 1/4 A DISTANCE OF 608.222 FT. TO THE P.C. OF A CURVE CONCAVE TO THE SOUTHEAST HAVING A CENTRAL ANGLE OF 89° 58' 41", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF S 44° 05' 18" W; THENCE SOUTHWESTERLY ALONG THE ARC OF SAID CURVE 39.26 FT. TO THE P.T. AND THE POINT OF BEGINNING; CONTAINING 1.463 ACRES, MORE OR LESS.

EXHIBIT "B"

3 OF 4

DESCRIPTION OF 20 FT. UTILITY EASEMENT

THE WEST 20 FT. AND THE SOUTH 20 FT. OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, EXCEPT THE EAST 1320 FT. THEREOF; CONTAINING 4.239 ACRES, MORE OR LESS.

DESCRIPTION OF FUTURE ELEMENTARY SCHOOL:

THE NORTH 1072.34 FT. OF THE WEST 1/2 OF THE NW 1/4; EXCEPT THE EAST 530 FT. THEREOF, SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, CONTAINING 20.07 ACRES, MORE OR LESS, AND BEING SUBJECT TO A UTILITY EASEMENT OVER THE WEST 20 FT. THEREOF.

DESCRIPTION OF FUTURE MIDDLE SCHOOL

THE WEST 1/2 OF THE NW 1/4 LYING NORTH OF FLORIDA POWER & LIGHT COMPANY'S RIGHT-OF-WAY EASEMENT PER O.R. BK. 211, PAGE 143 AND O.R. BK. 1294, PAGE 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; EXCEPT THE NORTH 1072.34 FT. THEREOF AND EXCEPT THE EAST 365 FT. THEREOF; ALL IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, CONTAINING 30.04 ACRES, MORE OR LESS, AND BEING SUBJECT TO A UTILITY EASEMENT OVER THE WEST 20 FT. THEREOF.

DESCRIPTION OF DELTONA LAKES ELEMENTARY SCHOOL:

THE EAST 1320 FT. OF THE SOUTH 1320 FT. OF THE SE 1/4 OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, CONTAINING 40 ACRES, MORE OR LESS.

EXHIBIT "B"

4 OF 4

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

---

LEASE AGREEMENT

No. 3403

WHEREAS, the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida holds title to certain lands and property being utilized by the State of Florida for public purposes, and

WHEREAS, the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida is authorized in Section 253.03, Florida Statutes, to enter into leases for the use, benefit and possession of public lands by State agencies which may properly use and possess them for the benefit of the State;

NOW, THEREFORE, this agreement made between the BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND of the State of Florida, as Lessor, and the School Board of Volusia County as lessee and

WITNESSETH:

The parties, for and in consideration of mutual covenants and agreements hereinafter contained, hereby covenant and agree as follows:

1. The lessor does hereby lease to the lessee the following described premises in the County of Volusia, State of Florida, together with the improvements thereon (if applicable), viz:

(Exhibit A - attached)

TO HAVE AND TO HOLD the above described land for a period of 50 years for public school purposes.

2. The lessee shall have the right to enter upon said land for all purposes necessary to the full enjoyment by said lessee of the rights herein conveyed to it.

3. The lessee shall through its agents and employees prevent the unauthorized use of said land or any use thereof not in conformity with this lease.

EXHIBIT 'C'

4. This lease shall terminate at the sole option of the lessor, and the lessee shall surrender up the premises to the lessor, when and if said premises, including lands and improvements, shall cease to be used for school purposes. Any costs arising out of the enforcement of the terms of this lease agreement shall be the exclusive obligation of the lessee, payable upon demand of the lessor.

5. The lessee hereby covenants and agrees to investigate all claims of every nature at its own expense and to indemnify, protect, defend, hold and save harmless the lessor from any and all claims, actions, lawsuits and demands of any kind or nature arising out of this agreement to the extent allowable by law.

6. The lessor does not warrant or guarantee title, right or interest in the hereinabove described property.

7. The lessor or its duly authorized agents shall have the right at any time to inspect the said land and the works and operations thereon of the lessee in any matter pertaining to this agreement.

8. The lessee agrees to assume all responsibility for liabilities that accrue to the subject property or to the improvements thereon, including any and all drainage or special assessments or taxes of every kind and description which are now or may be hereafter lawfully assessed and levied against the subject property during the effective period of this lease.

9. The lessee is hereby authorized to grant utility and road easements which will be necessary to service authorized facilities located within the leased premises. Copies of any such easements granted shall be filed timely with the lessor.

10. This agreement is for the purposes specified herein, and subleases of any nature, excepting utility and road easements incident to authorized facilities, (Provision 9), are prohibited, unless previously authorized by the lessor.

11. A Management Plan for this tract shall be prepared by the lessee, in accordance with Section 253.034, Florida Statutes, within 12 months of the execution date of this Lease and shall be submitted to the Board for approval through State Lands, acting as agent for the Board. The approved Management Plan shall provide the basic guidance for all management activities and shall be reviewed jointly by the lessee and the Board at least every five (5) years. The lessee shall not use or alter the property except as provided for in the approved Management Plan without the advance written approval of State Lands, as agent for the Board. The land management plan prepared under this lease shall identify management strategies for exotic species, if present. The introduction of exotic species is prohibited, except when specifically authorized by the approved land management plan.

12. Upon cessation of occupation of said property, the lessee agrees to leave all fixed improvements for the use of the lessor and to put no claim upon said fixed improvements; or, at the option of the lessor, the lessee agrees to remove any or all improvements on the property at the lessee's expense.

13. Execution of this agreement in no way affects the lessee's obligations pursuant to Chapter 267, Florida Statutes.

14. The lessee hereby agrees that annual evidence of insurance will be submitted to the following: Bureau of State Lands Management, 3900 Commonwealth Boulevard, Tallahassee, Florida 32303.

15. The lessee hereby agrees that in the event no further use of this parcel or any part thereof is needed, notification will be given to the Bureau of State Lands Management, 3900 Commonwealth Boulevard, Tallahassee, Florida 32303, at least six months prior to the release of any or all of the premises. Notification will include a legal description, the

lease number, and an explanation of the release. The release will only be valid if approved by the Board of Trustees.

16. The lessee further agrees that any buildings on the premises will meet the following conditions upon release:

(a) The premises shall meet the building and safety codes in the location situated.

(b) The lessee shall properly dispose of utility fees, including having utilities turned off.

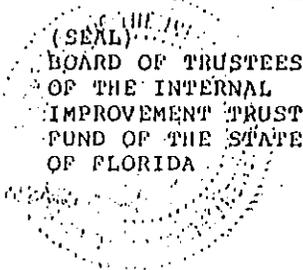
(c) The lessee shall not commit waste; fair wear and tear is acceptable.

(d) Prior to formal release a representative of the Bureau of State Lands Management shall perform an on-site inspection and the keys to any buildings on the premises shall be turned over to that Bureau.

(e) If the premises does not meet all conditions agreed upon, the lessee shall reimburse the Board for any expenses incurred in meeting the prescribed conditions.

(f) Any structures erected shall inure to the benefit of the State of Florida.

IN TESTIMONY WHEREOF, the lawfully designated agent of the Board of Trustees of the Internal Improvement Trust Fund has hereunto subscribed his name and has caused the official seal of said Board to be hereunto affixed, in the City of Tallahassee, Florida, on the 12 day of June, A.D. 1987.



BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA

By: [Signature]  
EXECUTIVE DIRECTOR, AGENT FOR THE BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA

APPROVED AS TO FORM AND LEGALITY

By: Dary L. Hester

THIS INSTRUMENT PREPARED AND REVIEWED

By: Catherine Daniels

SCHOOL BOARD OF VOLUSTA COUNTY

By: Beebe J. White

DATE November 18, 1986

VOLUSIA COUNTY SCHOOL BOARD  
PROPERTY IN SECTION 16, TOWNSHIP 10 SOUTH, RANGE 31 EAST

DESCRIPTION OF THE VOCATIONAL, AGRICULTURE AND FOREST LAB LANDS

BEGINNING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 10 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE RUN N 09° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 597.05 FT.; THENCE N 00° 54' 02" W A DISTANCE OF 639.628 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 08° 24' 02", A RADIUS OF 2,014.79 FT. AND A CHORD BEARING OF N 05° 06' 03" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 412.70 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 09° 16' 04" W A DISTANCE OF 2,023.97 FT. TO THE P.C. OF A CURVE CONCAVE TO THE EAST HAVING A CENTRAL ANGLE OF 00° 21' 55", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF N 05° 07' 06" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 425.57 FT. TO THE P.T.; THENCE N 00° 56' 00" W A DISTANCE OF 991.65 FT. TO THE NORTH LINE OF THE NE 1/4 OF SAID SECTION 16 AT A POINT 50.00 FT. WESTERLY OF THE CENTERLINE OF IOLEWEISE DR. AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE, AS RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, AFORESAID PUBLIC RECORDS; THENCE S 80° 58' 33" W ALONG SAID NORTH LINE 11.89 FT. TO THE NORTH 1/4 CORNER OF SAID SECTION 16; THENCE S 80° 58' 07" W ALONG THE NORTH LINE OF THE NW 1/4 OF SAID SECTION 16 A DISTANCE OF 1,076.76 FT. TO THE WEST LINE OF THE EAST 530 FT. OF THE WEST 1/2 OF THE SAID NW 1/4; THENCE S 00° 10' 47" W ALONG THE SAID WEST LINE 1,072.34 FT.; THENCE N 00° 58' 07" E PARALLEL WITH THE NORTH LINE OF THE SAID NW 1/4 A DISTANCE OF 165 FT. TO THE WEST LINE OF THE EAST 365 FT. OF THE WEST 1/2 OF THE SAID NW 1/4; THENCE S 00° 10' 47" W ALONG THE SAID WEST LINE 943.11 FT. TO THE NORTHERLY LINE OF FLORIDA POWER & LIGHT COMPANY'S EASEMENT AS RECORDED IN OFFICIAL RECORDS BOOK 211, PAGE 143, AND OFFICIAL RECORDS BOOK 1294, PAGE 494, AFORESAID PUBLIC RECORDS; THENCE S 47° 52' 07" W A DISTANCE OF 927.04 FT. TO THE SOUTH LINE OF THE NW 1/4 OF SAID SECTION 16; THENCE S 89° 04' 33" W ALONG SAID SOUTH LINE 290.27 FT. TO THE WEST 1/4 CORNER OF SAID SECTION 16; THENCE S 00° 01' 03" W ALONG THE WEST LINE OF THE SW 1/4 OF SAID SECTION 16 A DISTANCE OF 2,631.05 FT. TO THE SW CORNER OF SAID SECTION 16; THENCE N 09° 05' 21" E ALONG THE SOUTH LINE OF SAID SECTION 16 A DISTANCE 2,660.96 FT. TO THE POINT OF BEGINNING; EXCEPT THE FOLLOWING DESCRIBED PARCEL:

COMMENCING AT THE INTERSECTION OF THE CENTERLINE OF IOLEWEISE DRIVE AND THE NORTH LINE OF THE NE 1/4 OF SECTION 16, TOWNSHIP 10 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE, RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE S 80° 58' 33" W ALONG THE SAID NORTH LINE 50.00 FT.; THENCE S 00° 56' 00" E A DISTANCE OF 991.65 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 00° 06' 29", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF S 00° 59' 23" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 5.50 FT. TO THE POINT OF BEGINNING;

THENCE CONTINUE ALONG THE ARC OF SAID CURVE 148.79 FT. THROUGH A CENTRAL ANGLE OF 02° 55' 29" AND A CHORD BEARING OF S 02° 30' 21" E TO THE POINT OF REVERSE CURVE (P.R.C.) OF A CURVE CONCAVE TO THE SOUTHWEST HAVING A CENTRAL ANGLE OF 07° 03' 46", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF N 47° 30' 00" W; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE 37.99 FT. TO THE POINT OF TANGENCY (P.T.); THENCE S 00° 58' 07" W, PARALLEL WITH THE NORTH LINE OF THE NW 1/4 OF SAID SECTION 16 A DISTANCE OF 1,724.63 FT. TO THE WEST LINE OF THE EAST 365 FT. OF THE WEST 1/2 OF THE NW 1/4 OF SAID SECTION 16; THENCE N 00° 10' 47" E ALONG SAID WEST LINE 50.01 FT. TO THE SOUTH LINE OF THE NORTH 1072.34 FT. OF THE SAID NW 1/4; THENCE S 00° 58' 07" W ALONG SAID SOUTH LINE 165.00 FT. TO THE WEST LINE OF THE EAST 530 FT. OF THE SAID WEST 1/2 OF THE NW 1/4; THENCE N 00° 10' 47" E ALONG SAID WEST LINE 50.01 FT.; THENCE N 00° 58' 07" E PARALLEL WITH THE NORTH LINE OF THE SAID NW 1/4 A DISTANCE OF 1,803.65 FT. TO THE P.C. OF A CURVE CONCAVE TO THE NORTHWEST HAVING A CENTRAL ANGLE OF 90° 00' 44", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF N 43° 57' 45" E; THENCE NORTHEASTERLY ALONG THE ARC OF SAID CURVE 39.27 FT. TO THE P.T. AND THE POINT OF BEGINNING OF THE HEREIN DESCRIBED EXCEPTION; CONTAINING 290.49 ACRES, MORE OR LESS; SUBJECT TO A FLORIDA POWER AND LIGHT COMPANY EASEMENT AS RECORDED IN O.R. BK. 211, PG. 143, AND O.R. BK. 1294, PG. 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; AND BEING SUBJECT TO A UTILITY EASEMENT OVER THE WEST 20 FT. THEREOF AND THE SOUTH 20 FT. THEREOF.

VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF ENVIRONMENTAL STUDY AREA:

COMMENCING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA AS SHOWN ON THE PLAT OF DELTONA LAKES UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE N 09° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 697.052 FT. TO THE POINT OF BEGINNING; THENCE N 00° 54' 02" W A DISTANCE OF 639.59 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 00° 24' 02", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF N 05° 06' 03" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 427.36 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 09° 18' 04" W A DISTANCE OF 2,023.97 FT. TO THE P.C. OF A CURVE CONCAVE TO THE EAST HAVING A CENTRAL ANGLE OF 00° 21' 55", A RADIUS OF 2,014.79 FT. AND A CHORD BEARING OF N 05° 07' 06" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 410.97 FT. TO THE P.T.; THENCE N 00° 56' 08" W A DISTANCE OF 991.801 FT. TO THE NORTH LINE OF THE NE 1/4 OF SAID SECTION 16 AT A POINT 50.00 FT. EASTERLY OF THE CENTERLINE OF IDLEWISE DRIVE AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE AS RECORDED IN MAP BOOK 20, PAGES 32 THROUGH 42, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE N 00° 50' 33" E ALONG SAID NORTH LINE 2,556.79 FT. TO THE NE CORNER OF SAID NE 1/4; THENCE S 00° 19' 53" W ALONG THE EAST LINE OF THE SAID NE 1/4 A DISTANCE OF 2,634.33 FT. TO THE EAST 1/4 CORNER OF SAID SECTION 16; THENCE S 00° 42' 14" W ALONG THE EAST LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 1312.45 FT. TO THE NORTH LINE OF THE SOUTH 1320 FT. OF THE SAID SE 1/4; THENCE S 09° 04' 39" W ALONG SAID NORTH LINE 1320 FT. TO THE WEST LINE OF THE EAST 1320 FT. OF THE SAID SE 1/4; THENCE S 00° 42' 14" W ALONG SAID WEST LINE 1320 FT. TO THE SOUTH LINE OF SAID SE 1/4; THENCE S 09° 04' 36" W ALONG THE SAID SOUTH LINE 631.01 FT. TO THE POINT OF BEGINNING; EXCEPT THE FOLLOWING DESCRIBED PARCEL:

COMMENCING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA AS SHOWN ON THE PLAT OF DELTONA LAKES UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; RUN THENCE N 09° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 697.05 FT.; THENCE N 00° 54' 02" W A DISTANCE OF 25.00 FT. TO THE POINT OF BEGINNING OF THE HEREIN DESCRIBED EXCEPTION; THENCE CONTINUE N 00° 54' 02" W A DISTANCE OF 150.00 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE NORTHEAST HAVING A CENTRAL ANGLE OF 90° 01' 19", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF S 45° 54' 41" E; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE 39.20 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 09° 04' 39" E PARALLEL WITH THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 611.00 FT. TO THE WEST LINE OF THE EAST 1320.00 FT. OF THE SAID SE 1/4; THENCE S 00° 42' 14" W ALONG SAID WEST LINE 100.04 FT.; THENCE S 09° 04' 39" W PARALLEL WITH THE SOUTH LINE OF THE SAID SE 1/4 A DISTANCE OF 608.222 FT. TO THE P.C. OF A CURVE CONCAVE TO THE SOUTHEAST HAVING A CENTRAL ANGLE OF 09° 50' 41", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF S 44° 05' 18" W; THENCE SOUTHWESTERLY ALONG THE ARC OF SAID CURVE 39.26 FT. TO THE P.T. AND THE POINT OF BEGINNING OF THE HEREIN DESCRIBED EXCEPTION; SAID ENVIRONMENTAL AND STUDY AREA CONTAINING 230.31 ACRES, MORE OR LESS.

SUBJECT TO A FLORIDA POWER AND LIGHT COMPANY EASEMENT AS RECORDED IN OFFICIAL RECORDS BOOK 211, PAGE 143, AND OFFICIAL RECORDS BOOK 1294, PAGE 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; AND SUBJECT TO A UTILITY EASEMENT OVER THE SOUTH 20 FT. THEREOF.

VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF ROAD "A":

COMMENCING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE RUN N 89° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 597.05 FT. TO THE POINT OF BEGINNING; THENCE N 00° 54' 02" W A DISTANCE OF 639.63 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 08° 24' 02" AND A RADIUS OF 2,814.79 FT. AND A CHORD BEARING OF N 05° 06' 03" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 412.70 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 09° 18' 04" W A DISTANCE OF 2,823.97 FT. TO THE P.C. OF A CURVE CONCAVE TO THE EAST HAVING A CENTRAL ANGLE OF 08° 21' 55", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF N 05° 07' 06" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 425.57 FT. TO THE P.T.; THENCE N 00° 56' 08" W A DISTANCE OF 991.65 FT. TO THE NORTH LINE OF THE NE 1/4 OF SAID SECTION 16 AT A POINT 50.00 FT. WESTERLY OF THE CENTERLINE OF IDLEWEISE DR. AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE, AS RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, AFORESAID PUBLIC RECORDS; THENCE N 88° 58' 33" E ALONG SAID NORTH LINE 100.00 FT.; THENCE S 00° 56' 08" E A DISTANCE OF 991.00 FT. TO THE P.C. OF A CURVE CONCAVE TO THE EAST, HAVING A CENTRAL ANGLE OF 08° 21' 55", A RADIUS OF 2,814.79 FT. AND A CHORD BEARING OF S 05° 07' 06" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 410.97 FT. TO THE P.T.; THENCE S 09° 18' 04" E A DISTANCE OF 2,823.97 FT. TO THE P.C. OF A CURVE CONCAVE TO THE WEST, HAVING A CENTRAL ANGLE OF 08° 24' 02", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF S 05° 06' 03" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 427.36 FT. TO THE P.T.; THENCE S 00° 54' 02" E A DISTANCE OF 639.59 FT. TO THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16; THENCE S 89° 04' 39" W ALONG THE SAID SOUTH LINE 100.00 FT. TO THE POINT OF BEGINNING; CONTAINING 12.152 ACRES, MORE OR LESS.

SUBJECT TO A FLORIDA POWER AND LIGHT COMPANY EASEMENT AS RECORDED IN OFFICIAL RECORDS BOOK 211, PAGE 143, AND OFFICIAL RECORDS BOOK 1294, PAGE 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.

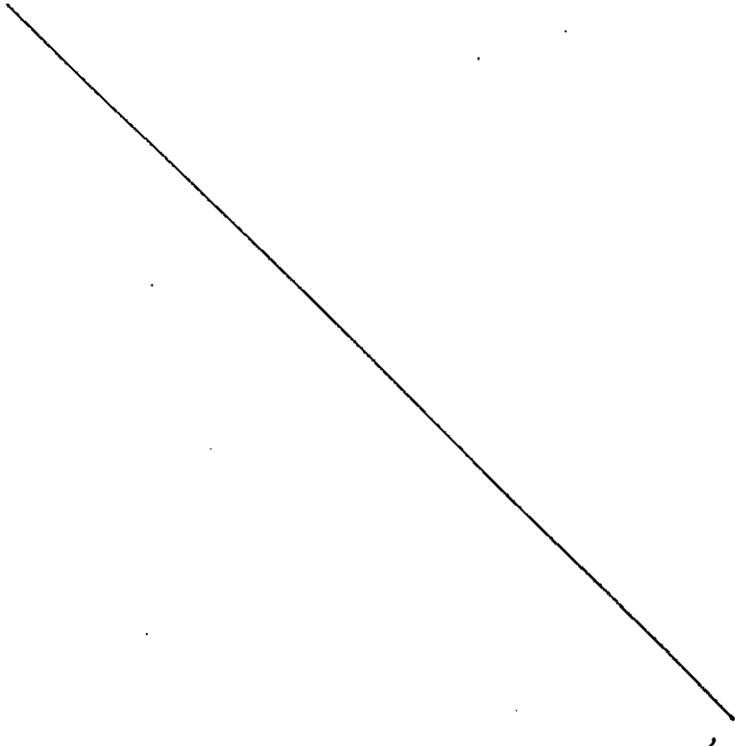
VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF ROAD "B":

COMMENCING AT THE INTERSECTION OF THE CENTERLINE OF IULEWEISE DRIVE AND THE NORTH LINE OF THE NE 1/4 OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE, RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE S 88° 58' 33" W ALONG THE SAID NORTH LINE 50.00 FT.; THENCE S 00° 56' 08" E A DISTANCE OF 991.65 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 00° 06' 29", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF S 00° 59' 23" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 5.50 FT. TO THE POINT OF BEGINNING;

THENCE CONTINUE ALONG THE ARC OF SAID CURVE 148.79 FT. THROUGH A CENTRAL ANGLE OF 02° 55' 29" AND A CHORD BEARING OF S 02° 30' 21" E TO THE POINT OF REVERSE CURVE (P.R.C.) OF A CURVE CONCAVE TO THE SOUTHWEST HAVING A CENTRAL ANGLE OF 07° 03' 46", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF N 47° 30' 00" W; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE 37.99 FT. TO THE POINT OF TANGENCY (P.T.); THENCE S 88° 58' 07" W, PARALLEL WITH THE NORTH LINE OF THE NW 1/4 OF SAID SECTION 16 A DISTANCE OF 1,724.63 FT. TO THE WEST LINE OF THE EAST 365 FT. OF THE WEST 1/2 OF THE NW 1/4 OF SAID SECTION 16; THENCE N 00° 10' 47" E ALONG SAID WEST LINE 50.01 FT. TO THE SOUTH LINE OF THE NORTH 1072.34 FT. OF THE SAID NW 1/4; THENCE S 88° 58' 07" W ALONG SAID SOUTH LINE 365.00 FT. TO THE WEST LINE OF THE EAST 530 FT. OF THE SAID WEST 1/2 OF THE NW 1/4; THENCE N 00° 10' 47" E ALONG SAID WEST LINE 50.01 FT.; THENCE N 88° 58' 07" E PARALLEL WITH THE NORTH LINE OF THE SAID NW 1/4 A DISTANCE OF 1,803.65 FT. TO THE P.C. OF A CURVE CONCAVE TO THE NORTHWEST HAVING A CENTRAL ANGLE OF 90° 00' 44", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF N 43° 57' 45" E; THENCE NORTHEASTERLY ALONG THE ARC OF SAID CURVE 39.27 FT. TO THE P.T. AND THE POINT OF BEGINNING; CONTAINING 4.20 ACRES, MORE OR LESS; SUBJECT TO A FLORIDA POWER AND LIGHT COMPANY EASEMENT AS RECORDED IN O.R. BK. 211, PG. 143, AND O.R. BK. 1294, PG. 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA;



Prepared By: ARTHUR W. STEINMAN & ASSOCIATES, INC., DeLand, Florida

EXHIBIT "C"

8 OF 12

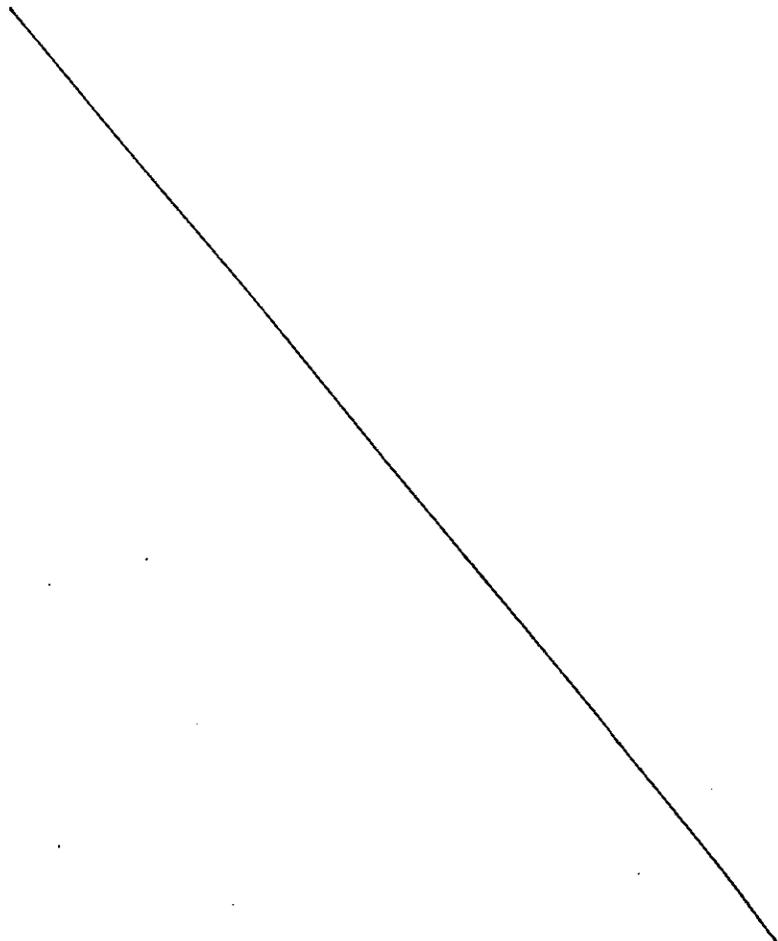
NO. 3903  
EXHIBIT "A"

VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF ROAD "C":

COMMENCING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA AS SHOWN ON THE PLAT OF DELTONA LAKES UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; RUN THENCE N 09° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 697.05 FT.; THENCE N 00° 54' 02" W A DISTANCE OF 25.00 FT. TO THE POINT OF BEGINNING; THENCE CONTINUE N 00° 54' 02" W A DISTANCE OF 150.00 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE NORTHEAST HAVING A CENTRAL ANGLE OF 90° 01' 19", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF S 45° 54' 41" E; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE 39.26 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 09° 04' 39" E PARALLEL WITH THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 611.00 FT. TO THE WEST LINE OF THE EAST 1320.00 FT. OF THE SAID SE 1/4; THENCE S 00° 42' 14" W ALONG SAID WEST LINE 100.04 FT.; THENCE S 09° 04' 39" W PARALLEL WITH THE SOUTH LINE OF THE SAID SE 1/4 A DISTANCE OF 608.222 FT. TO THE P.C. OF A CURVE CONCAVE TO THE SOUTHEAST HAVING A CENTRAL ANGLE OF 09° 50' 41", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF S 44° 05' 10" W; THENCE SOUTHWESTERLY ALONG THE ARC OF SAID CURVE 39.26 FT. TO THE P.T. AND THE POINT OF BEGINNING; CONTAINING 1.463 ACRES, MORE OR LESS.



VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF 20 FT. UTILITY EASEMENT

THE WEST 20 FT. AND THE SOUTH 20 FT. OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, EXCEPT THE EAST 1320 FT. THEREOF; CONTAINING 4.239 ACRES, MORE OR LESS.

DESCRIPTION OF FUTURE ELEMENTARY SCHOOL:

THE NORTH 1072.34 FT. OF THE WEST 1/2 OF THE NW 1/4; EXCEPT THE EAST 530 FT. THEREOF, SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, CONTAINING 20.07 ACRES, MORE OR LESS, AND BEING SUBJECT TO A UTILITY EASEMENT OVER THE WEST 20 FT. THEREOF.

DESCRIPTION OF FUTURE MIDDLE SCHOOL

THE WEST 1/2 OF THE NW 1/4 LYING NORTH OF FLORIDA POWER & LIGHT COMPANY'S RIGHT-OF-WAY EASEMENT PER O.R. BK. 211, PAGE 143 AND O.R. BK. 1294, PAGE 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; EXCEPT THE NORTH 1072.34 FT. THEREOF AND EXCEPT THE EAST 365 FT. THEREOF; ALL IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, CONTAINING 30.04 ACRES, MORE OR LESS, AND BEING SUBJECT TO A UTILITY EASEMENT OVER THE WEST 20 FT. THEREOF.

Prepared By: ARTHUR W. STEINMAN & ASSOCIATES, INC., DeLand, Florida

EXHIBIT 'C'

10 OF 12

NO. 3403

EXHIBIT "A"

JOHN H. MCKENZIE, III  
GENERAL COUNSEL  
BARBARA STARON HARRON  
DEPUTY GENERAL COUNSEL  
CAROLYN S. HOLIFIELD  
COUNSEL  
CHARLES S. ROBERG  
COUNSEL  
CARL J. FAHREN  
COUNSEL



JIM MARTINEZ  
GOVERNOR  
CHAIRMAN OF THE BOARD  
BETTY CASTON  
COMMISSIONER OF HEALTH  
SECRETARY AND EXECUTIVE DIRECTOR  
DOYLE CORNER  
COMMISSIONER OF AGRICULTURE  
GERALD LEWIS  
COMMISSIONER  
BILL GUNTER  
TREASURER  
BOB BUTTERWORTH  
ATTORNEY GENERAL  
JIM SMITH  
SECRETARY OF STATE

FLORIDA BOARD OF EDUCATION  
OFFICE OF THE GENERAL COUNSEL

KNOTT BUILDING  
TALLAHASSEE, FLORIDA 32309-0400  
TELEPHONE (904) 488-7707

May 3, 1989

MEMORANDUM

TO: Thomas E. Gardner, Executive Director  
Department of Natural Resources

FROM: Sydney H. McKenzie *SHM*  
General Counsel

RE: Volusia County School Board  
Request to Utilize Section 16 Lands

The Volusia County School Board, presently leasing Section 16 land from the State, has proposed to use a portion of that property for a school bus facility.

According to the provisions of the lease agreement and the applicable federal act, the subject property must be used for "public school purposes". The proposed use of Section 16 land for a school bus transportation facility appears to be legally permissible.

SHM/ts

cc: Pete Mallison, Director  
Division of State Lands, Department of Natural Resources  
Deborah Hart, Chief  
Bureau of Uplands Management  
Division of State Lands, Department of Natural Resources  
Mary Lou Rajchel, Chief Cabinet Aide  
Department of Education

RECEIVED

JUN 20 1989

FACILITIES PLANNING  
& RESEARCH

EXHIBIT 'C'

11 OF 12

STATE OF FLORIDA  
DEPARTMENT OF NATURAL RESOURCES

Marjory Stoneman Douglas Building • 3900 Commonwealth Boulevard • Tallahassee, Florida 32399  
Tom Gardner, Executive Director

June 9, 1989

Ms. McGlade L. Holloway  
Director  
Facilities Property Management  
Post Office Box 2118  
DeLand, Florida 32721-2118

RE: Lease No. 3403

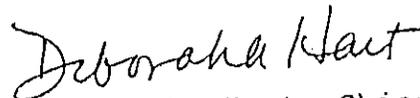
Dear Ms. Holloway:

You have requested whether lease 3403 would allow for a school bus transportation facility to be constructed on a portion of the site.

I have reviewed the lease language which is for "public school purposes" and believe that the requested use is an allowable use. Enclosed is a copy of a letter from the Florida Board of Education concurring with the proposed use. Since the facility will involve diesel fuel and gasoline storage, you will need to contact the Department of Environmental Regulation and determine which rules and laws this new facility must comply with.

Please contact me at (904) 488-2291 if you have any further questions.

Sincerely,



Deborah A. Hart, Chief  
Bureau of Uplands Management  
Division of State Lands

DAH/ss  
Enclosure

EXHIBIT "C"

12 OF 12

RECEIVED

JUN 20 1989

FACILITIES PLANNING  
& RESEARCH



# FOREST RESOURCE

DELAND SCHOOL FOREST

DELTONA TRACT

Prepared by:

James E. Grubbs

Volusia County Forester

Reg. Forester No. 595

*Date 7/20/79*

# MANAGEMENT PLAN

## DELAND SCHOOL FOREST

### DELTONA TRACT

#### Introduction and History

This 640 acre tract of land comprises all of section 16, township 18 south, range 31 east, Volusia County, Florida. The property lies northeast of the intersection of Elkcam Boulevard and Dixie-Belle Drive in Deltona.

The land has been part of the DeLand High School FFA forest for years. It was previously known as the Lake Helen forest; however, since the development of the Deltona community it has become known as the Deltona Tract.

At one time, the FFA Chapter was fairly active in management of the tract. However, in recent years management activity has decreased. The forest has been a definite source of income for the school, but its effectiveness as an educational tool seems to have decreased as of late.

A three acre portion of the property is currently being used as a sand pine progeny study area by the University of Florida.

The property is bordered on the northern, western and southern sides by the Deltona housing development. The property along the eastern boundary is also privately owned but is not part of the Deltona development. Roads are established but the area is only partially developed. Garbage dumping occurs to a small extent along the northern boundary; this problem will most likely increase as the surrounding area develops.

This site is the only portion of the sand pine scrub ecosystem in the area that is not privately owned. In the future, this may well be the only undeveloped portion of this ecosystem in the area.

### Current Resources

The soil conditions and plant life are typical of the sand pine scrub ecosystem. Soils are primarily paola and orsino sands. Paola is an excessively drained deep sandy soil and orsino is a deep, moderately well drained soil. Both of these soil types are very poor, infertile soils with very little organic matter.

Lesser vegetation includes rosemary (Ceratiola ericoides), rusty lyonia (Lyonia ferruginea), and a variety of native blueberries (Vaccinium spp).

Major vegetation includes saw palmetto (Serenoa repens), scrub hickory (Carya floridana), sand-live oak (Quercus geminata), myrtle oak, (Quercus myrtifolia), chapman oak (Quercus chapmanii), silk bay (Persea humilis) and sand pine (Pinus clausa). Slash pine (Pinus elliotii) can be found near the ponds.

It should also be noted that a specimen of the Florida Scrub Jay was noticed during the field inspection of this site. The scrub jay is found exclusively in the sand pine scrub ecosystem and prefers open stands. This species is non-migratory and is fairly localized in its activities. The best method of securing the continued existence of this threatened bird is to protect its environment and manage appropriate forest lands with its habit requirements in mind.

### Current Timber Resources

The primary timber species found on this tract is sand pine. Overall, it is in fair condition with negligible insect and/or disease problems. The merchantable timber is growing at approximately 3 1/2 per cent a year. A stand by stand description of the timber, based upon stocking follows.

Stand 1 {144 acres} -- Stocking open, basal area less than 19 square feet per acre. Contains approximately 3 cords of pulpwood per acre. Regeneration is negligible.

Stand 2 {203 acres} -- Medium stocking with 47 square feet of basal area per acre. This is the most heavily stocked natural stand on the tract, containing approximately nine cords per acre.

Stand 3 {39 acres} -- Heavily stocked stand of ten year old planted sand pine.

Stand 4 {3 acres} -- Sand pine progeny test area.

Stand 5 {70 acres} -- Stocking poor, basal area 20 to 39 square feet per acre.

Stand 6 {79 acres} -- Stocking poor to medium with approximately 35 to 45 square feet of basal area per acre.

Stand 7 {11 acres} -- Slash pine islands in an area of receding lakes. Medium stocking.

#### Management Needs

A portion of this property should be maintained in its natural state for aesthetic and environmental purposes. The northeast corner of the property, starting at the fireline in stand number one and running to the north and east property lines, would be ideal. This would include the two timber types {sand pine and slash pine} and the lakes providing an excellent situation for environmental education. The open sand pine scrub in this area also provides the ideal habitat for the scrub jay.

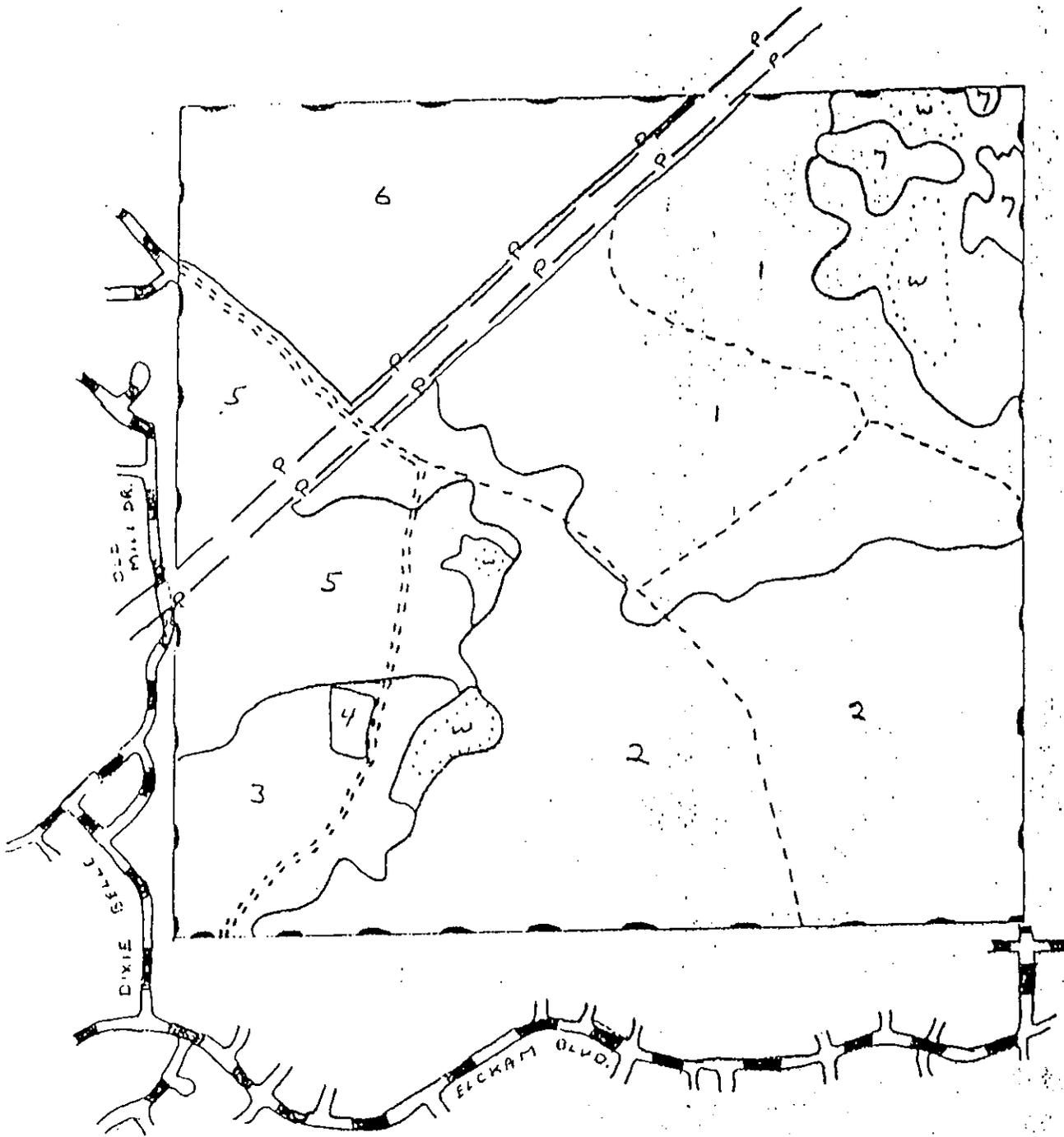
The sand pine progeny area should also be maintained in an undisturbed and protected state for the continuation of the study.

The remainder of the tract should be managed as a demonstration forest. Stands should be converted to full stocking by areas, starting with the poorest stocked areas first and progressing to the heavier stocked stands. After the stands are converted to full stocking they should be placed on a 30 year rotation and harvested in irregular shaped blocks ranging from 50 - 80 acres.

It is of utmost importance that the area be protected from wildfire.

CR. No. \_\_\_\_\_

PHOTO No. \_\_\_\_\_



### WOODLAND TRACING

#### LEGEND

##### ROADS:

PAVED

GRADED

WOODS

RILROAD

##### BOUNDARY

FENCE

PROPERTY

STAND

##### R/W

GAS

POWER

TELEPHONE

FIRELINE

PROPOSED (Red)

STREAM

INTERMITTENT

BUILDINGS

RES. ■ BUS ■

NAME: DELANO SCHOOL FORE  
DELTONA TRACT

ADDRESS: DEPARTMENT OF  
NATURAL RESOURCES

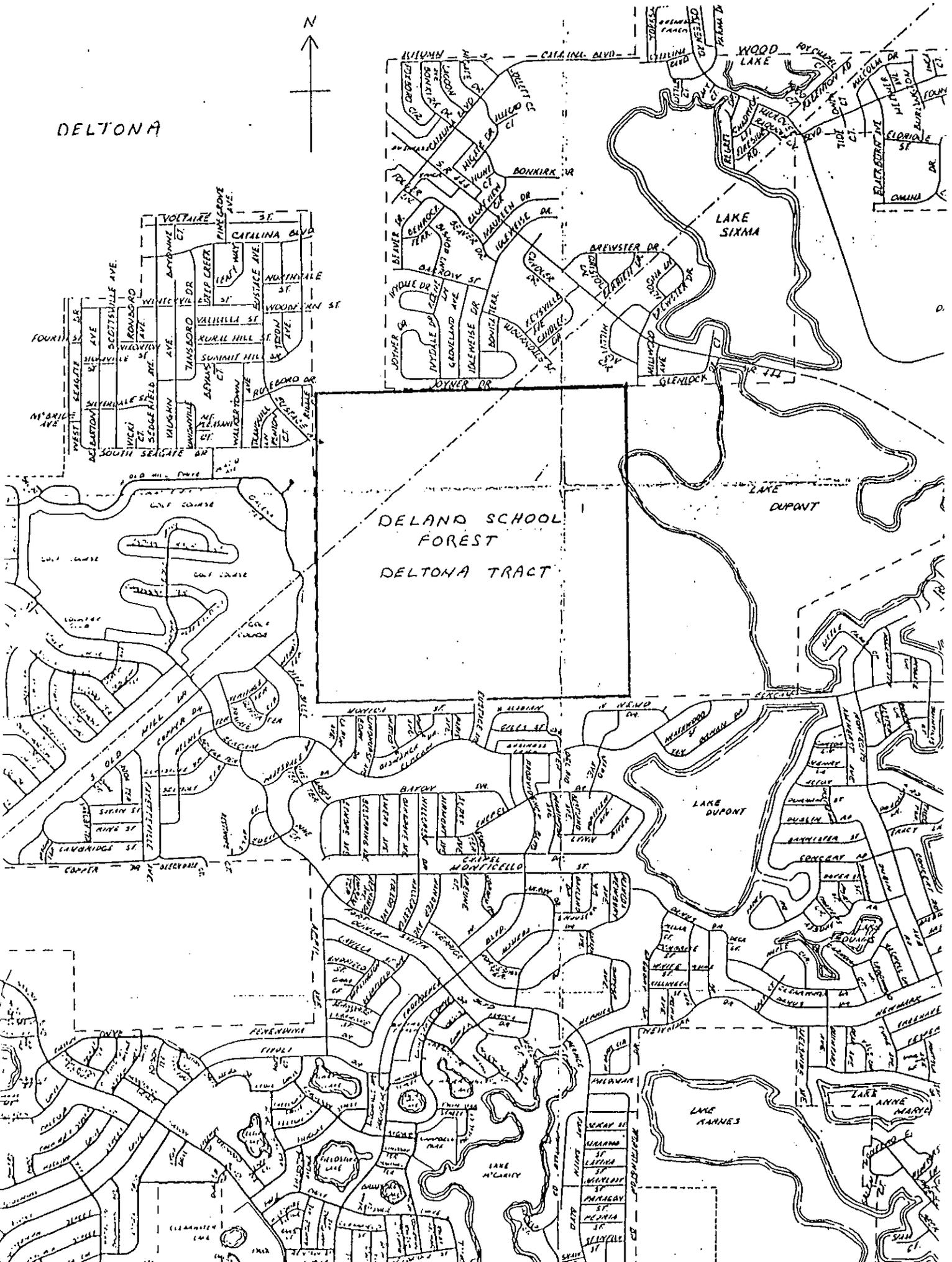
COUNTY: VOLUSIA

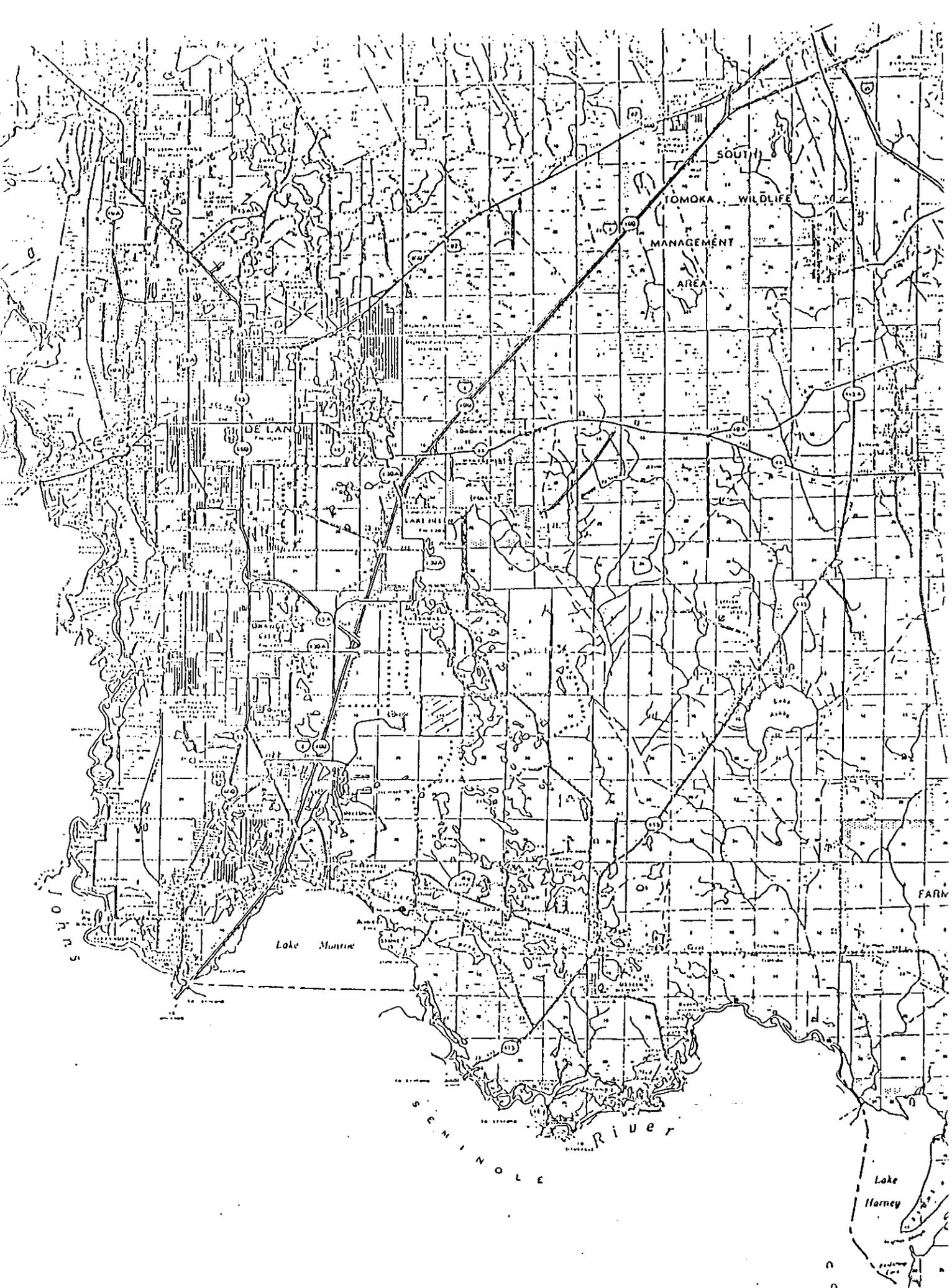
SCALE: 1" = 1000' DATE: 7/18/7

J.E. CRUBBS

FARM FORESTER

DELTONA





FM-10 (9/75)

1.5M(9/75)

D. W. R

NAME DAKOTA TRACT

POINT SAMPLE TALLY SHEET - SAWTIMBER OR PULPWOOD  
RECORD BY DBH CLASS IN EACH PLOT BLOCK  
UNDER PROPER LOG LENGTH

DATE 8/11/78

SHEET 1 OF 1

CUMULATIVE DIAMETER INCHES	PLOT NUMBER	NUMBER 18' LOGS OF 8.1/4" CUTS								BASAL AREA
		2	3	4	5	6	7	8		
43	1	13			11	9,10				40
26	2					3,3				30
41	3		6	7,7	11		10			50
29	4	6	8	8,7						40
49	5					8,8,11				50
61	6				7,10	10,10	11			60
52	7			7	2,9	8,10				60
	8							1		
	9									
	10									
AVERAGE DBH	TOTALS	2	2	5	6	16	2			330
(1) CUT	FACTORS	1	11	14	16	20	22			
(2) LEAVE	PRODUCTS	14	22	70	96	320	44			
	TOTALS									
	PRODUCTS									

Cut & Leave  
Av. Dia./Tree  
=  $\frac{\Sigma \text{Cum. Dia.}}{\# \text{ Trees}}$   
=  $\frac{301}{33}$   
= 9.12  
BA/Tree  
=  $\frac{\Sigma \text{DBH}(.00545)}{\# \text{ Trees/Ac}}$   
=  $\frac{153}{104}$   
#Trees/Ac  
=  $\frac{\text{Total BA}}{\# \text{ Plots BA/Tree}}$   
= 104

Total (cut, leave) = 566  
Total (cut) =

N 2.5  
6.15  
16.50

N = No. of Plots = 7  
M =  $\frac{\Sigma \text{Basal Area}}{\text{No. of Plots}} = \frac{330}{7} = 47.14$   
R = Range of Basal Area = 30  
F = Given 3

Pulpwood: Conv. factor, Hayes Table of Cu. Ft. Tree Vol. \*  
(Cut, Leave): Cds/Ac =  $\frac{\Sigma \text{Products (BAF)}}{\# \text{ Plots (90)}} = \frac{566(10)}{7(90)} = 8.98$  Cds/Ac  
(Cut) = \_\_\_\_\_ Cds/Ac  
Sawtimber: Form Class conv. factors, Scribner Log Rule \*  
(Cut, Leave): BF/Ac =  $\frac{\Sigma \text{Products (100)}}{\# \text{ Plots}}$  = \_\_\_\_\_ BF/Ac  
(Cut) = \_\_\_\_\_ BF/Ac

SD =  $\frac{R}{F} = \frac{30}{3} = 10$   
SE =  $\frac{SD}{\sqrt{N}} = \frac{10}{2.65} = 3.77$   
CV =  $\frac{SD}{M} \times 100 = \frac{10}{47.14} \times 100 = 21.2\%$   
LE =  $\frac{SE}{M} \times 100 = \frac{3.77}{47.14} \times 100 = 8\%$   
Y =  $\frac{(CV)^2}{(A)^2} = \frac{.0449}{.01} = 4.49$   
A = Desired Accuracy \_\_\_\_\_

Tree No.	Dob	DBH	dib	dib	(dib) <sup>2</sup>	Total Hgt.	Age
1	9.9	9.0	8.4	.93	.86	40	34
2	11.4	9.9	8.8	.89	.79	39	37
3	8.1	7.6	7.0	.92	.85	37	45
					2.5		
Growth Projection						Site Index	45
Gross Growth % = $1 - \frac{\Sigma \text{dib}^2}{\text{No. Trees}}$							

=  $1 - \frac{2.5}{3} = 1 - .83 = .17$

\* Use appropriate tables found on reverse side

RM-10 (9/75)  
1.5M(9/75)

D.N.R. W.  
NAME DELTA TRACT  
DATE 8/16/75

POINT SAMPLE TALLY SHEET - SAWTIMBER OR PULPWOOD  
RECORD BY DBH CLASS IN EACH PLOT BLOCK  
UNDER PROPER LOG LENGTH

SHEET 1 OF 2

CUMULATIVE DIAMETER INCHES	PLOT NUMBER	NUMBER 10' LOGS OR 3-1/4' CUTS								BASAL AREA	Cut & Leave	Cut	
		2	3	4	5	6	7	8	9				
0	CUT	1									0		
	LEAVE												
7	CUT	2	7								10		
	LEAVE												
15	CUT	3		7	8						20		
	LEAVE												
46	CUT	4				8, 8, 6, 9					60		
	LEAVE					7, 8							
17	CUT	5	5	5		7					30		
	LEAVE												
25	CUT	6	6	8	11						30		
	LEAVE												
16	CUT	7	7		9						20		
	LEAVE												
21	CUT	8		10	11						20		
	LEAVE												
11	CUT	9					11				10		
	LEAVE												
13	CUT	10				13					10		
	LEAVE												
AVERAGE DBH	CUT	TOTALS	4	4	4	6	3						
	LEAVE												
(11) CUT	XXX	FACTOR											
(12) LEAVE	CUT	PRODUCTS											
	LEAVE												
F*	CUT	TOTALS											
N	F												
2.5	2												
6.15	3												
16.50	4												

Cum. Dia. / # Trees	BA/Tree	#Trees/Ac	Total BA / # Plots BA/Tree
	= DBH(.00545)		

Total (cut, leave) \_\_\_\_\_  
Total (cut) \_\_\_\_\_

N = No. of Plots \_\_\_\_\_  
M =  $\frac{\sum \text{Basal Area}}{\text{No. of Plots}}$  \_\_\_\_\_  
R = Range of Basal Area = \_\_\_\_\_  
F = Given ✓  
SD =  $\frac{R}{F}$  = \_\_\_\_\_  
SE =  $\frac{SD}{\sqrt{N}}$  = \_\_\_\_\_  
CV =  $\frac{SD}{M} \times 100 =$  \_\_\_\_\_ %  
LE =  $\frac{SE}{M} \times 100 =$  \_\_\_\_\_ %  
Y =  $\frac{(CV)^2}{(A)^2} =$  \_\_\_\_\_  
A = Desired Accuracy \_\_\_\_\_

Pulpwood: Conv. factor, Hayes Table of Cu. Ft. Tree Vol. \*  
(Cut, Leave): Cds/Ac =  $\frac{\sum \text{Products (BAF)}}{\# \text{Plots (90)}} =$  \_\_\_\_\_ Cds/Ac  
(Cut) = \_\_\_\_\_ Cds/Ac  
Sawtimber: Form Class conv. factors, Scribner Log Rule \*  
(Cut, Leave): BF/Ac =  $\frac{\sum \text{Products (100)}}{\# \text{Plots}} =$  \_\_\_\_\_ BF/Ac  
(Cut) = \_\_\_\_\_ BF/Ac

Tree No.	Dob	D1B	d1b	$\frac{d1b}{D1B}$	$\frac{(d1b)^2}{(D1B)^2}$	Total Hgt.	Age
1	6.8	6.15	4.55			28	20
2	7.8	6.8	6.0			41	40
3	8.1	7.3	6.3			30	29
4	11.0	10.0	8.0			32	31
5	14.1	13.2	12.0			28	41

Growth Projection \_\_\_\_\_ Site Index \_\_\_\_\_  
Cross Growth % =  $1 - \frac{\sum (\frac{d1b}{D1B})^2}{\text{No. Trees}}$

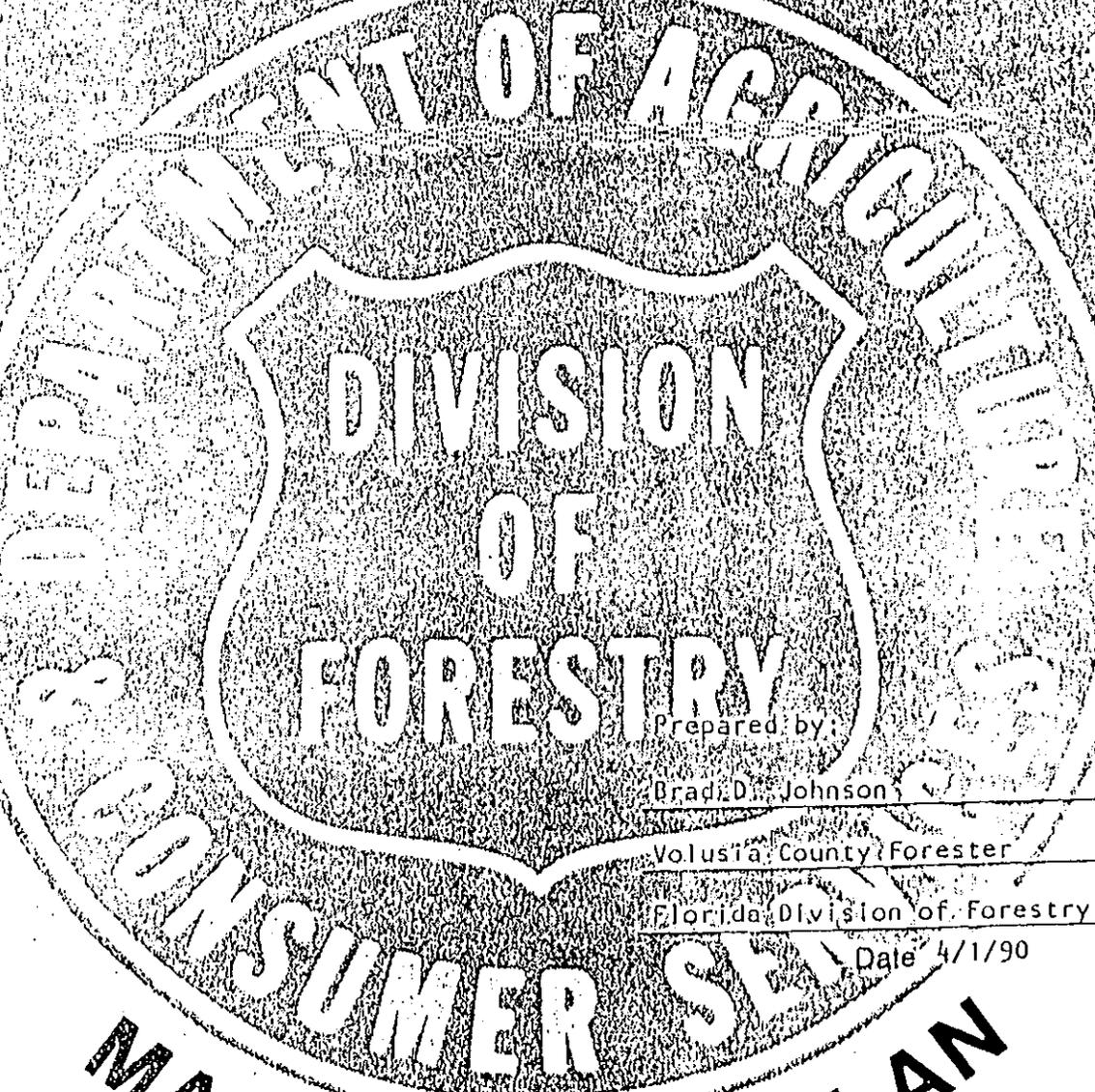
\* Use appropriate tables found on reverse side



# FOREST RESOURCE FLORIDA

Forest Management Recommendations

Deltona Tract Section 16



Prepared by:

Brad D. Johnson

Volusia County Forester

Florida Division of Forestry

Date 4/1/90

# MANAGEMENT PLAN

## FOREST MANAGEMENT RECOMMENDATIONS

### DELTONA TRACT SECTION 16

#### General Comments

Most of the following recommendations will be in addition to, and refer to the attached 1979 Deltona Tract Forest Management Plan prepared by Jim Grubbs, Volusia County Forester, Florida Division of Forestry. Section 16 of Township 18 South, Range 31 East in Deltona, Florida is a very unique piece of property with great potential for public benefit. For the most part, I support the management plan written by Jim Grubbs. He has adequately addressed the uniqueness of this area.

I would like to emphasize that this area has unparalleled potential for environmental education and preservation. The Section 16 Tract is one of the few remaining undeveloped areas remaining in Deltona. The deep sands of this area are valuable for aquifer recharge and a unique sand hill ecological community. The area is readily accessible to area school children and the surrounding urban area. Development within this area should be restricted to educational and environmental uses.

#### Environmental Education

Being a School Board property, environmental education is a valuable and obvious use. No other rural undeveloped property in the county is as accessible to as many school children as this Section 16 Tract. Within the year 2 additional elementary schools and a middle school will be in operation on the property. School children can access this tract with little or no transportation

required. This sand hill community is a valuable learning tool when combined with the low flatwood community of the School Board's Bicentennial Youth Park. School children and the general public now have a unique opportunity to learn about two sharply contrasting ecological communities.

As Mr. Grubbs suggests, I recommend setting aside the northeast corner of the tract from the fireline north for environmental education. (See the management plan stand map). This is approximately the north half of Stand 1, encompassing 70-80 acres. This area exhibits the contrast between the lake or slash pine community and the surrounding sand hill or sand pine community. This area is already, in part, good scrub jay habitat. Students could learn about this unique bird. Parts of this area should be prescribed burned to maintain the scrub jay habitat. A facility much like the Bicentennial Youth Park could be developed here.

Stands 3 and 4 as well as the area immediately surrounding the small dry lakes in the southwest corner of the section, should also be preserved for environmental education opportunities. The planted sand pine in stands 3 and 4 offer a unique study area for sand pine forest management.

The east half of Stand 2 and all of Stand 6 should also be primarily managed for environmental education, with primary consideration given to aesthetics and a natural sand pine community. Small patch cuts could be implemented in these areas to show students natural regeneration of sand pine and wildlife habitat enhancement. The cutting of trails and creation of some outdoor classrooms would be useful in these areas. Students attending the

schools in this area could walk into these unique outdoor classrooms. The schools in these areas should encourage minimum impact management.

#### Scrub Jay Habitat

I am recommending the south half of Stand 1 and <sup>all of</sup> Stand 5 be reserved for scrub jay habitat and mitigation. This area includes approximately 150 acres. The northernmost 50 acres of stand 2 could also be included in this area to make an approximately 200 acre scrub jay management area. Stands 1 and 5 are the most sparsely stocked stands of sand pine on the property. Therefore, these areas would be best for removal of the sand pine overstory to help create scrub jay habitat. Prescribed burning or mechanical tree harvesting would accomplish this purpose. The Division of Forestry can help with these management activities. A prescribed burn would leave dead sand pine creating nesting sites for cavity nesting birds and perch areas for other species. A tree harvest would not leave standing dead trees for wildlife, but would create some monetary income. Both alternatives will help to create scrub jay habitat. Prescribed burning will have to be implemented in either case to maintain scrub jay habitat. Because of the obvious aesthetical drawbacks of creating scrub jay habitat, I am recommending developing no more than 200-250 acres of this type of management on the whole tract. This scrub jay area can be a valuable teaching tool as well. Some buffering should be implemented along Providence Blvd. and area subdivisions. It is important that this Section 16 property be managed for a multiple of uses to maximize its educational and public benefits.

### Recreation

Of course, section 16 has ample opportunities for outdoor recreation. Maintained trails and environmental education facilities are useful to the school children and the general public as well. Hiking and nature study should be encouraged on this tract.

However, the present all terrain vehicle use of the site is incompatible with the tracts purpose. The tract should be fenced and signed to keep unwanted vehicles and illegal dumping out.

### Final Comments

The School Board now has a unique opportunity to plan and develop a valuable area in the most rapidly growing section of Volusia County. With the extension of Providence Blvd. through the tract, commercial development pressures are bound to increase. I encourage the School Board to continue to utilize this property for its intended use, public education, not monetary gain.

*for file*

ENVIRONMENTAL ASSESSMENT

OF

SECTION 16

DELTONA, FLORIDA

A

SAND PINE SCRUB ECOSYSTEM

FOR

MS. PAT DRAGO  
VOLUSIA COUNTY SCHOOLS  
P.O. BOX 2118  
200 NORTH CLARA AVENUE  
DELAND, FLORIDA 32721-2118

BY

ENVIRONMENTAL SERVICES, INC.  
9124 CYPRESS GREEN DRIVE  
JACKSONVILLE, FLORIDA 32256

*Maisha Peacock*

FIELD INVESTIGATOR

*Donald Palmer*

SUPERVISOR

# ENVIRONMENTAL ASSESSMENT

## OUTLINE

### I. INTRODUCTION

### II. BIOPHYSICAL RESOURCES: BIOTIC

- A. Sand Pine Scrub
  - 1. Definition
  - 2. Vegetation
    - a. Trees
    - b. Upper shrub layer
    - c. Lower shrub layer
    - d. Vines
    - e. Ground cover
    - f. Herbaceous
  - 3. Wildlife
    - a. Endangered or threatened species
      - (1) Florida scrub jay
      - (2) Gopher tortoise
    - b. Amphibians
    - c. Reptiles
    - d. Birds
    - e. Mammals
    - f. Other species
- B. Sinkhole/Sandhill Lakes
  - 1. Definition
  - 2. Vegetation
    - a. Outer zone
    - b. Middle zone
    - c. Inner zone
  - 3. Wildlife
    - a. Endangered or threatened species
    - b. Amphibians
    - c. Reptiles
    - d. Birds
    - e. Mammals
    - f. Other species

### III. BIOPHYSICAL RESOURCES: ABIOTIC

- A. Geology
  - 1. Physiography
  - 2. Ground water recharge
- B. Soils
  - 1. Sand pine scrubs
  - 2. Sinkhole/sandhill lakes
- C. Climate
  - 1. Rainfall
  - 2. Temperature
  - 3. Winds
  - 4. Humidity
- D. Fire Ecology

#### IV. EXISTING USE

- A. Deltona Lakes Elementary School
- B. Sand Pine Nature Center
- C. New elementary and middle schools
- D. Providence Road extension
- E. Horse and vehicle trails
- F. Toxic and hazardous materials

#### V. MANAGEMENT RECOMMENDATIONS AND LAND USE ALTERNATIVES

- A. Conservation
  - 1. Preservation
  - 2. Fire ecology management
    - a. Harvest/roller-chop/burn
    - b. Cut/roller-chop/burn
    - c. Cut/roller-chop
    - d. Benefits
- B. Education
- C. Recreation
- D. Development

#### VI. SUMMARY

89-270a.01  
(OCT89)

ENVIRONMENTAL SERVICES, INC.  
9124 CYPRESS GREEN DRIVE  
JACKSONVILLE, FLORIDA 32256

(904) 636-8552

SECTION 16  
DELTONA, FLORIDA  
A SAND PINE SCRUB ECOSYSTEM

## I. INTRODUCTION

In September 1989, Environmental Services, Inc. conducted an environmental assessment for the Volusia County School Board of a sand pine scrub ecosystem in Deltona, Florida. The site is located at Section 16, Township 18 South, Range 31 East, in southern Volusia County (Figure 1) and covers approximately 640 acres. The purpose of the study was to assess the resources of the site to assist in developing options for a management plan for the site.

In late September and October 1989, Environmental Services, Inc. conducted various studies of the property. Emphasis was placed on the biotic components of the ecosystem such as vegetation, wildlife, and endangered and threatened species. Additional data were collected on the abiotic aspects of the site such as soils, climate, geology, fire and on potential hazardous and toxic materials. This report outlines the biophysical resources which were examined, existing land use, and options for management of the property.

## II. BIOPHYSICAL RESOURCES: BIOTIC

The site is primarily comprised of sand pine scrub with several sinkhole/sandhill lakes. Each ecosystem is described below with regards to vegetation and wildlife including threatened and endangered species.

### A. Sand Pine Scrub

1. Definition. Sand pine scrub is a xeric terrestrial community found on ancient dunes with a deep, fine white sand substrate. The ecosystem is dependent upon fire on 30 to 60 year cycles. The sandy soils exhibit frequent water deficits owing to poor water retention and nutrient limitations resulting from low mineral absorption capacity (Barbour and Billings, 1988).

Sand pine scrub community has been differentiated into two phases (Abrahamson, et al. 1984). These two phases are the oak understory phase and the rosemary phase. The sand pine scrub community studied on this site was dominated by the oak understory phase. This is a three layer community with a lower shrub level of palmetto, upper shrub layer of scrub oaks and an overstory of sand pine. Herbs are scarce in this phase except in disturbed areas such as powerline crossings and trails. The rosemary phase is not represented, though some small areas of rosemary with

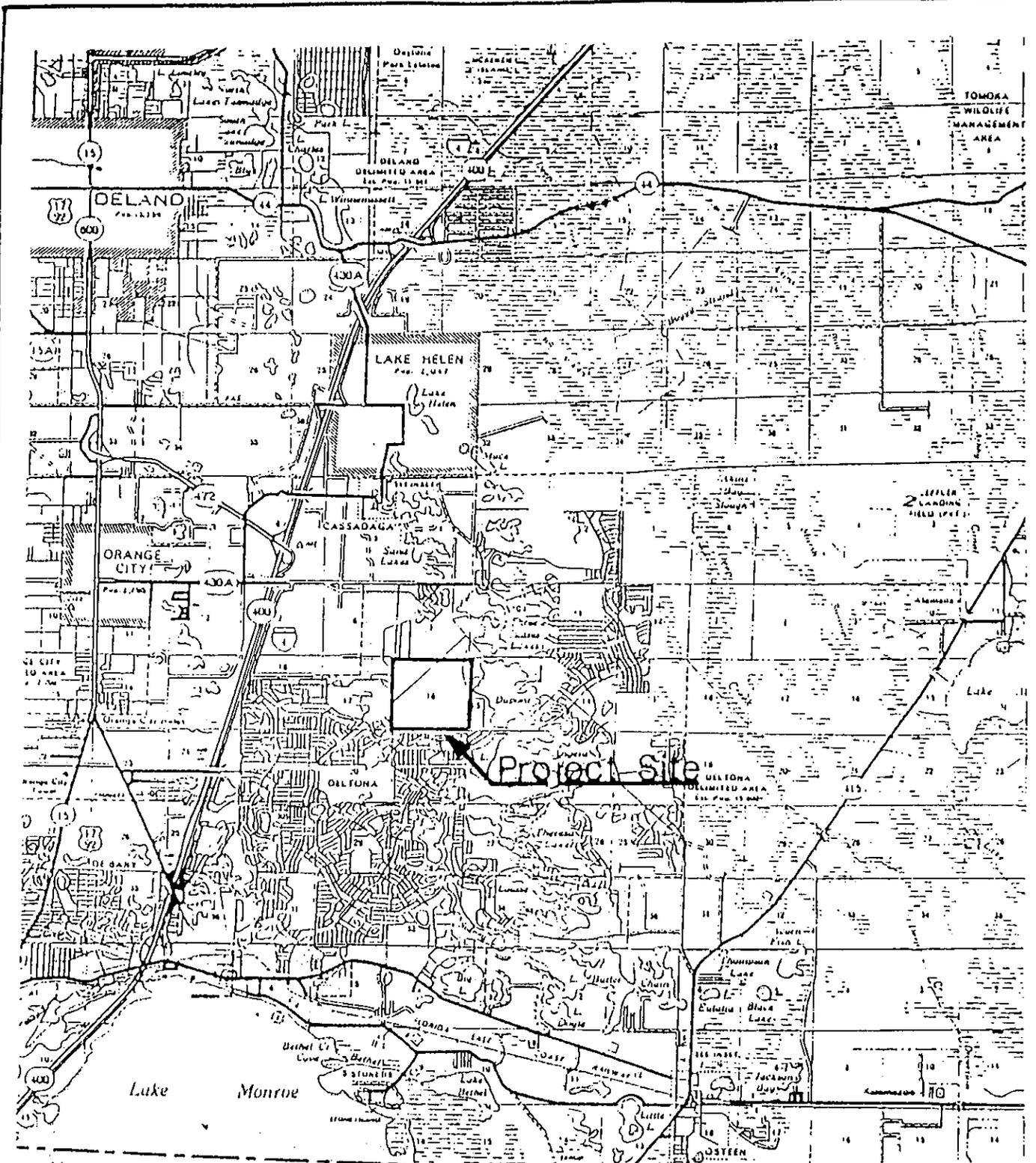


Figure 1  
Location Map



Project:	89-270
Date:	10/23/89
Sheet:	1 of 3

ENVIRONMENTAL SERVICES, INC.

reindeer moss could be found. Sand pines on this site formed nearly even-aged mature stands of trees averaging 10" to 12" in diameter at breast height and were approximately 60 feet tall.

Because it comprises some of the best soils for development and groves in Florida, this habitat is much reduced from its original coverage and is becoming more and more scarce, as recognized in the state comprehensive plan.

2. Plants. A variety of plants characterize the sand pine scrub community on this site. The various vegetative layers are described below.

a. Trees. Sand pine scrub is dominated by one tree, the Ocala sand pine (Pinus clausa var. clausa), with occasional pockets of live oak (Quercus virginiana).

b. Upper shrub layer. Below the pine is a thick understory layer. Dominant plants include sand live oak (Quercus geminata), myrtle oak (Quercus chapmanii), rusty lyonia (Lyonia ferruginea), silkbay (Persea humilis), sand holly (Ilex ambigua), scrub hickory (Carya floridana) and wild olive (Osmanthus americanus).

c. Lower shrub layer. Below the upper shrub layer is a less dense stratum of vegetation. Typical species include rosemary (Ceratiola ericoides), staggerbush (Lyonia mariana), fetterbush (Lyonia lucida), saw palmetto (Serenoa repens), scrub palmetto (Sabal etonia), dwarf pawpaw (Asimina pygmaea), huckleberry (Caylussacia tomentosa), deerberry (Vaccinium stamineum), gallberry (Ilex glabra) and blueberry (Vaccinium myrsinites).

d. Vines. Scattered throughout all of the vegetation layers are various vines such as milkpea (Galactica elliottii), grapevine (Vitis rotundifolia), sarsaparilla vine (Smilax pumila) and greenbriar (Smilax auriculata).

e. Ground cover. Below the shrub layers and in open, sandy layers are scattered ground cover species such as gopher apple (Licania michauxii), prickly-pear cactus (Opuntia humifusa), St. John's wort (Hypericum reductum) and reindeer moss (Cladonia sp.)

f. Herbaceous. A variety of herbaceous plants were found along the large powerline crossing and along the various trailroads which allowed for open, sunny conditions. Typical species included grass-leaved golden aster (Chrysopsis graminifolia), nutgrass (Scleria sp.), dicantherium (Dicantherium dichotomum), wireweed (Polygonella gracilis), blazing star (Liatris tenuifolia), cottonweed (Froelichia floridana), goldenrod (Solidago chapmanii), umbrella sedge (Cyperus sp.), horseweed (Erigeron canadensis), coastal foxtail (Setaria corrugata), stinging nettle

ENVIRONMENTAL SERVICES, INC.

(Cnidoscopus stimulosus), jointweed (Polygonella polygama), broomsedge (Andropogon virginicus), dog fennel (Eupatorium sp.), thoroughwort (Eupatorium leptophyllum), sphortspike bluestem (Andropogon brachystachyus), warty panic grass (Panicum vericosum) and bahai grass (Paspalum notatum).

3. Wildlife

a. Endangered or threatened species. Sand pine scrub community is a valuable wildlife area for a variety of animals. With the rapid growth of the Deltona area, this large parcel of land provides important habitat for common animals and could potentially be the home for those considered to be threatened or endangered. Two important species are the Florida scrub jay and the gopher tortoise, each described below.

1) Florida scrub jay. The Florida scrub jay (Aphelocoma coeruluscens coerulescens) lives exclusively in scrub communities. They are considered to be a disjunct, relic race of a jay species that is widespread in the western United States and Mexico (Cox, 1987). The Florida scrub jays numbers have dwindled drastically over the years because much of its' habitat has been destroyed by rapid housing growth and development of citrus groves (Cox, 1987). The Florida scrub jay is considered to be threatened by the Florida Game and Fresh Water Fish Commission (FGFWFC) and by the U.S. Department of the Interior, Fish and Wildlife Service (FWS).

Though no scrub jays have been recorded on the site they have been recorded extremely close by, just off-site to the north. According to Cox (1987), scrub jays were located in Section 9, Township 18 south, Range 31 east, which is the section adjacent to and immediately north of this parcel. The scrub jays were found in mature sand pine scrub with an oak understory, the same conditions that occur on this site. This area had an extensive road network with some houses during Cox's survey in 1981. Since that time, houses have continued to be built, but the area is not overdeveloped. Florida scrub jays were also found in south eastern Deltona and in the nearby towns of DeBary, Deland, Orange City and Lake Helen.

With proper management of the sand pine scrub habitat, it is quite possible to encourage Florida scrub jays to become established on the site. If they already exist on-site, the habitat could be managed to improve conditions for nesting and foraging.

2) Gopher tortoise. In addition to the Florida scrub jay, sand pine scrub is also used by gopher tortoises (Gopherus polyphemus). Gopher tortoises are considered to be a species of special concern by FGFWFC and is under review for listing by FWS. Because of habitat destruction, habitat degradation (fire exclusion) and human predation, an estimated 80 percent of the original number of gopher tortoises have been

ENVIRONMENTAL SERVICES, INC.

reduced over the last 100 years (Diemer, 1985). With the loss of gopher tortoises has also come the loss of many commensal species which share the gopher tortoise burrow. These include the threatened eastern indigo snake (Drymarchon corais couperi) and two species of special concern, the Florida mouse (Peromyscus floridanus) and the gopher frog (Rana areolata) as listed by the FGFWFC. Additionally, the Florida Committee on Rare and Endangered Plants and Animals (FCREPA) has identified three uncommon scarab beetles which live in gopher tortoise burrows. These are the scarab beetle (Onthophagus polyphemus), aphodius tortoise commensal scarab beetle (Aphodius troglodytes) and the copris tortoise commensal scarab beetle (Copris gopheri) (Franz, 1982). The latter two beetles are under review for listing by FWS.

FGFWFC has developed a methodology for determining local population size, population viability and calculating habitat suitability indices for gopher tortoises (Cox, et al. 1987). Methods have also been developed for determining minimum area requirements, and guidelines for delineating preservation areas and developing management plans. However, under current policy the guidelines frequently are not required to be followed unless a project is a Development of Regional Impact (DRI). As a result, most housing and commercial developments, like those found throughout the Deltona area, are exempt from preserving gopher tortoises or their habitats. Such losses could occur on this site unless a management plan is developed to determine the population size and methods of preservation.

3) Other species. Sand pine scrub community can also potentially be the host of many other species which can be considered rare, threatened or endangered. The Florida pine snake (Pituophis melanoleucus mugitus) prefers dry, sandy areas and is considered a species of special concern by FGFWFC and is under review for listing by FWS. Additionally, sand pine scrub has been reported to be habitat for several mammals, but data has not been adequate to evaluate its relative importance to the species. These mammals are the Shermann's fox squirrel (Sciurus niger shermani), hoary bat (Lasiurus cinereus cinereus), southeastern big-eared bat (Plecotus rafinesquii) and the Florida weasel (Mustela frenata peninsulæ) (Layne, 1979). Sand pine scrub can also be used for nesting by bald eagles (Haliaeetus leucocephalus) especially where food sources such as lakes are found nearby. The bald eagle is considered to be threatened by FGFWFC and endangered by USFWS. Similarly, Bachman's sparrow, under review by FWS, also utilizes sand pine scrub (Kale, 1979; Soil Conservation Service, 1989).

In addition to animals, a number of plants are endemic to sand pine scrub, at least one of which is considered to be endangered or threatened. The plant is known to occur within Volusia County and could potentially occur on this site although it was not observed during field studies. This plant is called Florida bonamia (Bonamia grandiflora) and is considered to be endangered by the Florida Department of Agriculture and Consumer Services

ENVIRONMENTAL SERVICES, INC.

(FDA) and threatened by FWS. The FDA also considers garberia (Garbaria heterophylla) to be threatened. We found garberia throughout the site.

b. Amphibians. A variety of amphibians utilize sand pine scrub for most of their life cycle. This is especially true where sinkholes and lakes, such as those found on this site, are used for breeding. The two common species found in the sand pine scrub community are the oak toad (Bufo quercicus) and the southern toad (Bufo terrestris) (Conant, 1975).

c. Reptiles. As mentioned under endangered or threatened species, the site could contain gopher tortoises, indigo snakes and the Florida pine snake. Additionally, sand pine scrub is also a habitat for a variety of other reptiles such as the green anole (Anolis carolinensis), black racer (Coluber constrictor), diamondback rattlesnake (Crotalus adamanteus), corn snake (Elaphe guttata), southeastern five-lined skink (Eumeces inexpectatus), eastern hognose snake (Heterodon platyrhinos), scarlet king snake (Lampropeltis dolia), coral snake (Micrurus fulvius), rough green snake (Opheodrys aestivus), island glass lizard (Ophisaurus compressus), peninsula crowned snake (Tantilla relicta relicta) and the box turtle (Terrapene carolina) (Conant, 1975).

d. Birds. During the field study, a variety of birds were seen on-site. A list of these species, plus others which may occur in sand pine scrub are the cedar waxwing, great horned owl, red-tailed hawk, red-shouldered hawk, chuck-will's widow, cardinal, boat-tailed grackle, yellow-shafted flicker, bobwhite quail, ground dove, mourning dove, turkey vulture, black vulture, common crow, fish crow, blue jay, yellow-rumped warbler, prairie warbler, palm warbler, downy woodpecker, pileated woodpecker, red-bellied woodpecker, red-headed woodpecker, kestrel, loggerhead shrike, wild turkey, eastern mockingbird, great crested flycatcher, screech owl, English sparrow, painted bunting, rufous-sided towhee, eastern phoebe, white-breasted nuthatch, brown-headed nuthatch, Carolina wren, brown thrasher, house wren, American robin, eastern king bird, barn owl, gray cat bird, American redstart, tufted titmouse, eastern meadowlark, pine warbler and yellow-throated warbler (Peterson, 1980; Soil Conservation Service, 1981).

e. Mammals. Any large tract of land will provide a variety of niches for mammals of all sizes to occur. On this parcel common mammals expected to occur include armadillo, opossum, southeastern pocket gopher, bobcat, striped skunk, spotted skunk, white-tailed deer, raccoon, gray squirrel, eastern cottontail rabbit and gray fox (Soil Conservation Service, 1981).

f. Other species. In addition to amphibians, reptiles, birds and mammals, sand pine scrub also contains an extraordinary assortment of invertebrates such as snails, moths, butterflies, beetles, spiders, scorpions, crickets, and flies. Such a list would be too large of scope to include in this report.

ENVIRONMENTAL SERVICES, INC.

B. Sinkhole/Sandhill Lakes

1. Definition. Sinkhole/sandhill lakes are lacustrine communities within natural topographic depressions. Most are generally rounded solution depressions in deep sandy uplands or sandy uplands shallowly underlain by limestone. Some of the smaller lakes on-site show classic karst topography with relatively steep walls. Karst topography is the relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins (Soil Conservation Service, 1980).

This site contains four major solution depressions and several minor ones, with those near the Deltona Lakes Elementary School exhibiting the steepest slopes. All of them are dominated by emergent vegetation of various species depending upon the depth. The four largest lakes show signs of decreasing water levels, especially when compared to historic photographs and communications with local residents. The two lakes in the northeast corner appear to have been connected and part of a much larger surface water system. Further evidence that this area was once under water is the young age of the encroaching slash pines, and the scattered wetland species found underneath them. Additionally, nearby lakes exhibiting the same vegetation growth, have docks leading from peoples' homes which stop significantly short of any open water. The cause of the water subsidence is unknown, but cyclical drought and/or increased use of the local aquifer are suspected to be causes.

2. Vegetation. The vegetation around the sinkhole/sandhill lakes can be divided into three major zones - outer, middle and inner. Each is described in detail below.

a. Outer zone. The outer zone is an area outside of any open water, but is not sand pine scrub. It may be considered a transitional zone between the two communities. Dominant species in this outer zone is slash pine (Pinus elliottii) most of which appears to be less than 15 years old. The young age of the slash pine supports the concept that the lakes may have been larger at one time, but have subsided, allowing the slash pines to become established. Other species include broomsedge (Andropogon virginicus), shortspike bluestem (Andropogon brachystachyus), blue maidencane (Amphicarpum muhlenbergianum), meadow beauty (Rhexia cubensis), St. John's wort (Hypericum fasciculatum) and bladder pod (Sesbania vesicaria).

b. Middle zone. The middle zone comprises the majority of the lake, much of which is subject to seasonal flooding. This area remains dry enough to support upland to marginally wetland species. Soils were dry to partially saturated, but not inundated, during our study. Dominant species included St. John's wort (Hypericum fasciculatum), thoroughwort (Eupatorium leptophyllum), warty panic grass (Panicum vericosum), blue

## ENVIRONMENTAL SERVICES, INC.

maidencaine (Amphicarpum muhlenbergianum), red root (Lachnanthes caroliniana) and short spike bluestem (Andropogon brachystachyus). Other species included meadow beauty (Rhexia cubensis), pale meadow beauty (Rhexia mariana), beakrush (Rhynchospora microcephala), primrose (Ludwigia suffruticosa), marsh pink (Sabatia grandiflora), dicantherium (Dicantherium sp.), dahoon holly (Ilex cassine) and yellow-eyed grass (Xyris smalliana).

c. Inner zone. Toward the center of each large lake is an area of permanent water with well saturated soils along the edges. The portions with very saturated soils are dominated by fimbriatylis (Fimbristylis sp.), bogbutton (Lachnocaulon spp.), sundew (Drosera brevifolia), marsh pink (Sabatia grandiflora), beakrush (Rhynchospora microcephala), yellow-eyed grass (Xyris smalliana) and Asian coinwort (Centella asiatica). The open water areas were dominated by spikerush (Eleocharis sp.), and water lily (Nymphaea odorata) with some beakrush (Rhynchospora corniculata) and duck potato (Sagittaria graminea).

### 3. Wildlife

a. Endangered or threatened species. Several species of aquatic and water dependent species are known to use lakes such as those occurring on this site. Many wading birds are dependent upon these permanent pools of water, especially in relatively undisturbed conditions, as found on this site. FGFWFC has listed the limpkin, little blue heron, reddish egret, snowy egret and tricolored heron as species of special concern. All of these birds could likely occur on this site with a confirmed sighting of a little blue heron. Of course the gopher frog, mentioned under sand pine scrub, is dependent upon lakes and wet areas for breeding.

b. Amphibians. Because amphibians are dependent upon water to complete their life cycle, a variety of amphibians found in the sand pine scrub can also be found in the sinkhole/sandhill lakes. This includes the gopher frog, referred to earlier, and more common species such as the green tree frog (Hyla cinerea), southern spring peeper (Hyla crucifer), little grass frog (Hyla ocularis), southern leopard frog (Rana utricularia), pig frog (Rana grylio) and the bullfrog (Rana catesbiana) (Conant, 1975).

c. Reptiles. Due to the permanent water in the large lakes, several reptiles would be expected to be able to utilize them. These include the cottonmouth moccasin (Agkistrodon piscivorus), striped mud turtle (Kinosternon bauri), eastern mud turtle (Kinosternon subrubrum subrubrum), banded water snake (Natrix fasciata fasciata), and Florida brown snake (Storeria dekayi victa) (Conant, 1975).

d. Birds. In addition to the limpkin, little blue heron, reddish egret, snowy egret and tricolored heron mentioned

## ENVIRONMENTAL SERVICES, INC.

above, a number of other birds were observed on-site, or are common residents of lakes such as those found on this site. These birds include the great blue heron, American egret, great egret, cattle egret and various other wading birds and ducks. Lakes such as these are known to be important brooding, feeding and nesting areas for ducks (Smith, 1980).

e. Mammals. All of the mammals listed earlier are dependent upon freshwater and can be expected to utilize the sinkhole/sandhill lakes. Additionally, some small rodents and other species may live most of their life cycle in the vicinity of the lakes.

f. Fish. During the study some minnows were seen in the largest lake on-site. Since three of the lakes on-site have permanent pools of water, a variety of fish such as minnows, darters, killifish and mosquito fish can be expected.

g. Other species. In addition to amphibians, reptiles, birds, mammals and fish, a wide variety of invertebrates would also be expected to be dependent upon the sinkhole/sandhill lakes. During our field visit, several species of dragonflies were seen at the lakes, and a great diversity of other invertebrates can be expected.

### III. BIOPHYSICAL RESOURCES: ABIOTIC

In addition to the unique flora and fauna, the site also contains unique abiotic resources such as geology, soils, etc. We have included information on these resources, as well as an analysis of the fire ecology and a report on hazardous and toxic materials.

#### A. Geology

1. Physiography. According to Marcus and Fernald (1975), more than 300 million years ago, during the Paleozoic era, an area of volcanic islands occupied part of present-day Florida. About 150 million years ago these islands were slowly worn down and submerged beneath the shallow waters of the sea. While submerged, these islands were covered with sediments, principally limestones. During that time an arching occurred forming the axis of peninsular Florida. Later, approximately 50 million years ago, there was a gentle doming which resulted in the formation of a broad, oval arch running roughly in a north-northeast direction. The bulk of the arch is made up of almost pure limestone, called Ocala limestone. The Ocala limestone lies on or near the surface in north central Florida but becomes buried beneath 1,200 feet of younger sediments in the Everglades.

As the Ocala limestone has eroded over time, many separate ridges and terraces have formed. This site is located on the DeLand Ridge, between the Talbot Terrace and the St. Johns River Valley

## ENVIRONMENTAL SERVICES, INC.

(Soil Conservation Service, 1980). The DeLand Ridge is an isolated ridge with depth to limestone rock about 65 feet. It is separated from the various other Ocala limestone ridges by the St. Johns River Valley. Another ridge, the Crescent City Ridge, lies to the north and crosses into Putnam County. The surface of the DeLand and Crescent City Ridges have been altered by erosion, and the collapse of solution caverns in the underlying limestone. Of the approximately 120 lakes which are greater than 5 acres in size found in Volusia County, 90 percent are within these two ridges (Soil Conservation Service, 1980). This site contains several of these lakes, and smaller ponds. However, the majority of the site represents the top of the DeLand Ridge, the sand pine scrub community.

2. Ground water recharge. The ridges have little or no runoff because rain rapidly percolates down through the sandy soil and reaches the water table where it recharges the aquifer, accumulates in lakes or depressions, or seeps outward from the base of the ridges (Soil Conservation Service, 1980). The Florida Aquifer underlies all of Volusia County. This limestone aquifer supplies about 95 percent of the water used in the county (Soil Conservation Service, 1980). Recharge to the Florida Aquifer occurs throughout the county, but the areas of greatest recharge are the deep sandy soils of the ridges in the western part of the county, such as the DeLand Ridge which this site is located on. Groundwater recharge which occurs on this site is vital to the maintenance of the quality and quantity of water resources county-wide. Urbanization in the surrounding areas is threatening groundwater resources by increasing surface runoff, developing over recharge areas, over-consumption and pollution.

### B. Soils

The site is located on the DeLand Ridge and is considered to be part of the Paola-Orsino soil map unit. These soils are excessively drained and moderately well-drained, grayish sandy soils that have a yellowish sandy subsoil. The sand pine scrub on this site has been identified as having Paola fine sand, Orsino fine sand, Daytona fine sand and Apopka fine sand.

Interspersed within the Paola-Orsino map unit are sinks, lakes and wet depression. This site includes several sinkhole/sandhill lakes which have been identified as having Myakka fine sand, and Myakka fine sand depressional. These soils are found in depressional areas which have high water tables or are inundated throughout most of the year.

### C. Climate

1. Rainfall. Volusia County has a subtropical maritime climate. Average annual rainfall is approximately 55 inches. Nearly 60 percent of the annual rainfall occurs between the first

## ENVIRONMENTAL SERVICES, INC.

of June and the middle of October as a result of convective thundershowers in the afternoon and evenings. July has the highest average rainfall at 8.4 inches, while December has the lowest at 1.8 inches (Soil Conservation Service, 1980).

2. Temperature. The average temperature in Volusia County is approximately 70 degrees F. During the summer the average daily temperature is about 81 degrees F with an average daily maximum of 91 degrees F, and an average daily minimum of 71 degrees F. In winter the average daily temperature is approximately 62 degrees F with an average daily maximum of 74 degrees F, and an average daily minimum of 50 degrees F (Soil Conservation Service, 1980).

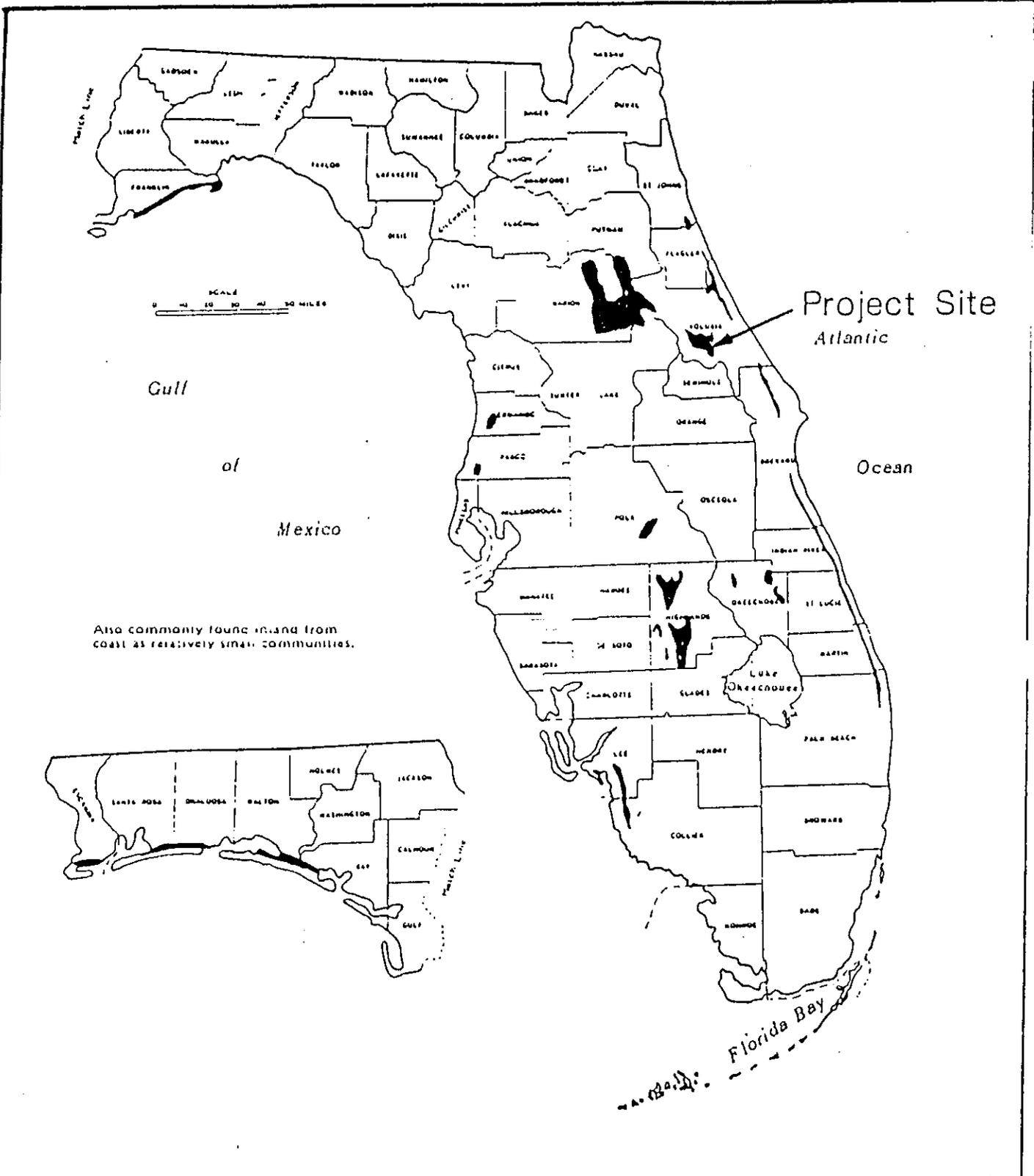
3. Winds. Prevailing winds in Volusia County are from the east - northeast. Northwest and southwest winds are not uncommon, however, especially during the winter months. Average wind speed is slightly greater than 10 mph in February, March and April and slightly less than 10 mph throughout the rest of the year (Soil Conservation Service, 1980).

4. Humidity. The relative humidity is in Volusia County normally greater than 50 percent by mid-day and increases to 80 to 100 percent at night resulting in heavy dews (Soil Conservation Service, 1980).

### D. Fire Ecology

The sand pine scrub ecosystem is dependent upon infrequent high-intensity fires. These fires typically occur every 30 to 60 years (Barbour and Billings, 1988). The dense scrubby oak understory creates a pathway for the fire to reach the crowns of the trees, thus killing them (Soil Conservation Service, 1981). Once burned, the serotinous cones release seed which regenerate the ecosystem into even aged stands of sand pine. Without fire, the pines eventually die and the ecosystem succeeds into xeric hardwoods dominated by oaks. If fire occurs repeatedly, the ecosystem changes into sandhill (Figure 2, Barbour and Billings, 1988).

Based on the size of the trees, 10" to 12" dbh (diameter at breast height), the trees are approximately 50 years of age (United States Department of Agriculture, 1983). The trees are estimated to live another  $\pm 40$  years before being replaced by oaks, if fire does not occur before then (Myers, 1989). Under natural conditions, fires would not generally start in the sand pine scrub areas on a regular basis due to the lack of herbaceous cover needed for fuel. Instead, fires would occur in nearby ecosystems, such as flatwoods or sandhill, and spread into the scrub on rare occasions (Myers, 1989). Because the site is now surrounded by residential development the likelihood of fire is even further diminished (Myers, 1989).



Also commonly found inland from coast as relatively small communities.

Map prepared by U. S. Department of Commerce, Bureau of The Census, 1960, Corrected as of April 1965.  
 U. S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE

FEBRUARY 1981 4-R-36720-3  
 FEBRUARY 1968 BASE 4-L-25770

Figure 2  
 Distribution of Sand Pine Scrub

Volusia County School Board

Project:	89-270
Date:	10/23/89
Sheet 2	of 3

## ENVIRONMENTAL SERVICES, INC.

### IV. EXISTING USE

The majority of the site has been left undisturbed. This is a result of foresight by early planners in Florida who set aside Section 16's in many townships throughout the state. The Section 16's are managed by the Department of Natural Resources (DNR) and are offered for lease by the DNR to the local county school boards. Those sections not used by the school board are offered to other local county agencies, and on occasion, are traded or sold (Daniels, 1989). Currently, the Volusia County School Board has a 50 year lease on a Section 16 parcel in Deltona. Existing uses of the land are described below.

A. Deltona Lakes Elementary School. The Deltona Lakes Elementary School opened in 1982, in the southeastern corner of Section 16. It was the second elementary school built in the Deltona area and opened with 760 students. Enrollment has increased dramatically and the school now operates at over-capacity with many portable classrooms used in teaching the students. The opening of a third local elementary school has relieved some of the over crowding, and plans are underway to build a fourth elementary school.

B. Sand Pine Nature Center. When the Deltona Lakes Elementary School was founded, the Sand Pine Nature Center on the school grounds was also formed. The Sand Pine Nature Center is an environmental education center for students in grades K-6, staffed with volunteers and an administrative staff. The purpose of the center is to educate the students on environmental studies beyond the classroom walls in a natural setting. Trails and interpretive stations have been established and are used by the students to study such things as flora, fauna, sinkhole geology, soils, erosion, food chains, astronomy and orienteering (Moreau, 1989). To date, the Sand Pine Nature Center has been utilized by greater than 5,000 students and is one of the most popular curriculums offered to the students.

C. New elementary and middle schools. With the rapid growth of the Deltona area has come the need for additional elementary and middle schools. Two such schools are currently being built on the northwest corner of the site, tentatively called elementary school "L" and middle school "A". The development of these schools is consistent with the planned use of Section 16 as set aside by DNR.

D. Providence Road extension. With the development of the two new schools, and the development of a new high school off-site in the northwest portion of Deltona, an extension of Providence Road has been undertaken to facilitate access to all of the schools. Without the Providence Road extension, the newest schools are disjunct from easy access to Deltona Lakes Elementary School, the Sand Pine Nature Center, and to the students and residents of central Deltona. The Providence Road extension is a north/south

ENVIRONMENTAL SERVICES, INC.

access road and essentially bisects Section 16 in half. Access roads from the existing school and the new schools to Providence Road extension, have also been built. Despite the potential negative effects of the road, it does serve an important role in facilitating the education process and the overall acreage impact is a small percentage of the Section 16 parcel.

E. Horse and vehicle trails. In addition to planned educational uses of the site, the project area is also heavily used by local residents. There are few trails through the sand pine scrub, but many around the existing sinkhole/sandhill lakes. One local resident described the parcel as the last refuge for horseback riding, with over 3,000 people owning horses in the area but no place to ride, since many other natural areas have been converted to residential use. These same trails are also used extensively by trucks, cars and dirt bikes. The traffic on the site is causing damage to the delicate ecosystem of the lakes and creating pollution problems.

F. Toxic and hazardous materials. A preliminary visual inspection of the property was conducted to assess the potential for presence of toxic and hazardous materials. The subject property has been used for unauthorized dumping. The dumping has occurred primarily around the sinkhole/sandhill lakes, especially those in the northeast corner of the site. Although most of the material that has been dumped is domestic garbage (i.e.- beverage containers, paper products, yard trimmings, tires), there is one rusted, bullet-riddled drum present in one of the small, northeastern lakes.

In addition to the visual site inspection, appropriate records have been reviewed to determine if the subject property and/or adjacent properties have any known history of hazardous materials on site. The following records were reviewed:

- . SUPER Act Site Cleanup Ranking Report. The SUPER Act Ranking Report is an inventory (computer printout dated March 13, 1989) of stationary tank Superfund cleanup sites for the State of Florida prepared by the Florida Department of Environmental Regulation (DER). No sites were listed pertinent to the subject property.
- . DER Stationary Tank Inventory System - Contamination Detail Report. The Contamination Detail Report is a computer printout (dated March 13, 1989) that provides the contamination details of the SUPER Act sites that are identified in the above-referenced report and of other contaminated tank sites in Florida. No sites were listed pertinent to the subject property.

ENVIRONMENTAL SERVICES, INC.

- . Hazardous Waste Quick Look (GMS 10). The Hazardous Waste Quick Look directory is a computer printout (dated March 13, 1989) from DER of known hazardous material generators, handlers, transporters, and disposers. No sites were listed pertinent to the subject property.
- . Solid Waste Facilities Directory (GMS 80). The Solid Waste Facilities Directory is a computer printout (dated March 13, 1989) from DER of known active and inactive landfill sites. No sites were listed pertinent to the subject property.
- . U.S. EPA National Priorities List (NPL). The NPL is a computer printout listing (dated July 26, 1989) from the U.S. Environmental Protection Agency (EPA) of Superfund sites. No sites were listed pertinent to the subject property.
- . U.S. EPA Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) List. The CERCLIS is a computer printout listing (July 27, 1989) from the U.S. EPA of suspected contamination sites. No sites were listed pertinent to the subject property.
- . U.S. EPA Hazardous Waste Data Management System (HWDMS) List. The HWDMS list is a computer printout listing (July 24, 1989) from the U.S. EPA of facilities which have received or applied for permits to generate, transport, treat, store, or dispose of hazardous waste materials. No sites were listed pertinent to the subject property.
- . U.S. EPA Facility Index System (FINDS) Report. The FINDS report is a computer printout listing (July 18, 1989) of sites or facilities subject to EPA regulations and programs, such as for air, water, hazardous waste, and pesticides. No sites were listed pertinent to the subject property.

V. MANAGEMENT RECOMMENDATIONS AND LAND USE ALTERNATIVES

In determining the ultimate use of the site, the Volusia County School Board needs to review all options available. The site could be managed for a single use or for multiple uses. Four major management directions are conservation education, recreation and development. All four of these options need to be explored by the school board, as each has positive and negative aspects. A discussion of each of these management options is described below.

## ENVIRONMENTAL SERVICES, INC.

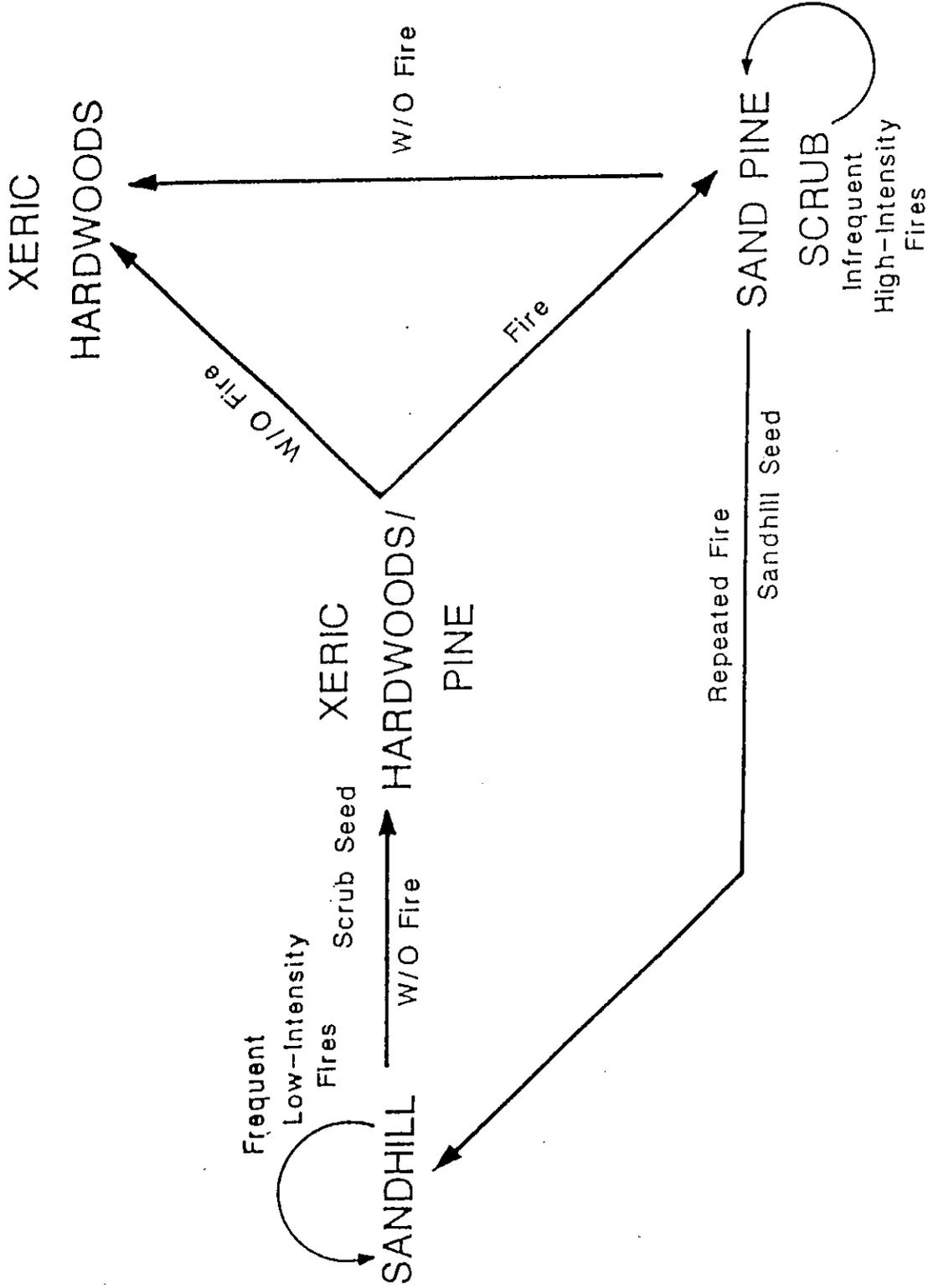
### A. Conservation

1. Preservation. Sand pine scrub is a fire-based community found in only small areas of the state (Figure 3). Much of the original sand pine scrub in the state has been destroyed or altered due to rapid housing, commercial, and agricultural development. The coarse textured, excessively well-drained soils make the community extremely important in aquifer recharge, with an estimated 95 percent of the water used in the county being derived from the aquifer (Soil Conservation Service, 1981). It is a unique ecosystem which gives it an important scientific value. Heat and drought stress response by plants and animals are often studied in these sites (Soil Conservation Services, 1981). Sand pine scrub is the home to many rare, endangered, threatened or endemic species, some of which are found no where else on the globe.

To preserve the sand pine scrub on this site, certain management techniques should be considered. One is management through controlled burning. Uncontrolled fires could create serious liability problems. Without fire, the ecosystem will eventually change in the next  $\pm 50$  years to xeric hardwoods. We recommend utilizing different controlled burn techniques in different areas and at different times to provide for diversity. Such methods could also be part of an environmental education program. Development of a controlled burn plan should be done with the assistance of an expert in sand pine scrub management, such as the Archbold Biological Station, a research facility devoted to studying scrub communities, or state expert Ronald L. Myers, now with Tall Timbers Research Station.

Part of the preservation of sand pine scrub should require limited use by man. Damage to vegetation by excessive foot or vehicle travel has adverse effects on the community (Soil Conservation Service, 1981). The adverse effects are clearly seen around the sinkhole/sandhill lakes. The lakes in the northeastern portion of the site show significant damage caused by man which have destroyed vegetation, increased erosion problems and polluted the lakes. These areas need to be cleaned up and given time to restore themselves naturally.

An additional advantage to preservation of the unique sand pine scrub ecosystem is in "mitigation banking". Mitigation is a technique of offsetting losses to valuable ecosystems, usually wetlands, through creation, enhancement or preservation. Mitigation is often required when developing large parcels of lands, such as schools, and is likely to be required during the development of many new schools in Volusia County. Because the regulatory agencies recognize the uniqueness of sand pine scrub, they may allow for the preservation of portions of this property to count as mitigation credit for impacts which will occur in other parts of the county. Such off-site areas are known as "mitigation



Source: Bourbour and Billings, 1988

Figure 3  
Fire Ecology of Xeric Communities

Project: 89-270
Date: 10/23/89
Sheet 3 of 3

ENVIRONMENTAL SERVICES, INC.

banks" and this site has the potential of serving as an important mitigation bank for the Volusia County School System.

2. Fire ecology management. To maintain the sand pine scrub we recommend developing a fire management plan. Depending upon wild fires to maintain the scrub is not preferred due to liability problems. A lack of planning is also not preferred since the sand pine would eventually die and be replaced by a xeric hardwood community. Instead, several options are available involving site preparation and controlled burn which will maintain sand pine scrub as a viable ecosystem. Examples of just some of the options (Myers, 1989) are described below:

a. Harvest/roller-chop/burn. The most economical method of maintaining sand pine is to harvest the trees (which can then be sold), leaving the branches, cones and slash on the site during tree removal after tree harvest. The shrubby live oaks are then roller-chopped, with minimal disturbance to the soil, and the entire area burned. The burning allows for nutrients to be released into the soil, the release of the seeds from the pine cones and the opening of the ground cover layer for pine seeds and herbs to establish. The controlled burn is easier to contain and the trees are not lost as with a crown fire. This method will encourage scrub jays.

b. Cut/roller-chop/burn. This method is similar to the one above, with the exception that the trees are cut and left on-site. This allows for more nutrients to be returned to the soil. This method produces a cooler fire than would occur with a natural crown fire. The end result is the same, but by cutting and roller-chopping, the fire can be managed and liability greatly reduced. This method has the added benefit of being the most beneficial to wildlife, including scrub jays.

c. Cut/roller-chop. Through not preferred as a method of maintaining sand pine scrub, thinning of the trees and roller-chopping the understory will increase wildlife use and encourage scrub jays.

d. Benefits. Developing a fire management plan to maintain sand pine scrub has many benefits. The key benefit will be that the sand pine scrub on-site can be maintained indefinitely, without reverting into another ecosystem. Additionally, fire management of the site can produce areas of young scrub, which is extremely favorable to scrub jays and other threatened and endangered species. To encourage the most diversity on-site, different fire management methods can be used on different areas. This information could have the added benefit of being studied and incorporated into the environmental education program of the local schools.

## ENVIRONMENTAL SERVICES, INC.

B. Education. The reason this parcel, Section 16, has remained undeveloped is so it could be used for educational purposes. The land is owned by DNR and leased by the Volusia County School Board. Currently, the site contains an operating elementary school with new elementary and middle schools being built. The development of the schools is obviously consistent with the planned use of the land. However, the educational value of the remainder of the land needs to be considered.

Because of the uniqueness of the ecosystem, many educational opportunities exist on the site. This can already be seen in the very successful Sand Pine Nature Center located at the Deltona Lakes Elementary School in the south-eastern corner of the site. This environmental education center has the potential to expand so it can be used by all of the students of Deltona, not just those students at Deltona Lakes Elementary School. The educational opportunities are extensive on the site and can be incorporated into a conservation plan. For example, students could assist in developing and monitoring a controlled burn program. Additional research and study could be done on rare species such as the scrub jay and gopher tortoise, as well as monitoring the restoration of the lakes on-site. All of the biotic and abiotic aspects of the ecosystem can be studied.

C. Recreation. Along with an educational commitment, the school board should also consider utilizing some portion of the site for recreation. Recreation facilities are needed by the local residents and students and there appears to be a lack of enough facilities in the Deltona area. A large area designated for sports facilities should be chosen in a less environmentally sensitive area and near the schools. One such ideal area would be adjacent to the east boundary of the new elementary and middle schools being constructed in the northwestern portion of the site. Between the schools, the power line and the Providence Road extension is an area that may be difficult to manage that has already been disturbed by the power line crossing. Such an area could be used for playing fields, ball courts and other sports activities.

In addition to a sports complex, the overall site could also be further developed for jogging trails and nature trails with interpretive signs, observation platforms over the lakes and outdoor classroom facilities. The existing trails at the Sand Pine Nature Center are very popular with the students and present many educational opportunities.

Because most of the site is undeveloped with easy access, people are already using the site for riding dirt bikes, all terrain vehicles, cars, trucks and horses. Unfortunately, most of these activities occur around the delicate sinkhole/sandhill lakes and they are being damaged. A decision will need to be made to either stop these activities or control it to restricted areas designated for that purpose. Without control, the lakes will continue to

ENVIRONMENTAL SERVICES, INC.

suffer and the school board could be liable for personal damages or injuries which may occur on the site.

D. Development. In determining a management plan for the site, the school board must consider the option of trading the site so development can occur. Deltona does not have a central commercial district and if the community wishes to have one; this may be a logical choice. Under certain circumstances, DNR will allow the trading or selling of Section 16 parcels (253.034 (5) FS). If desired, it may be possible for the school board to retain usage of portions of the property (for future school growth and some nature trails) and trade the remainder of land for land needed elsewhere for schools. Such a plan would give the school board the opportunity to acquire lands in other parts of the county, such as rapidly growing areas. However, because the land is owned by DNR and only leased by the school board, the school board will likely have little control on what happens to the site if it is decided to not manage it. Most likely, the site will be offered to other county agencies, including the prison, and if rejected by all other county authorities, then offered for sale (Daniels, 1989). Additionally, such a plan would also ensure the loss of the sand pine scrub community on-site and its resources such as ground water recharge, flora and fauna. Having the ecosystem divided and separated into various parcels will eliminate many of the unique characteristics which it now contains because it is one large, virtually undistributed tract of land. If this were a widely distributed ecosystem, such as pine flatwoods, such losses may be considered negligible. However, sand pine scrub is very limited in the state and much of this limited area is already lost due to residential, commercial and agricultural development. The site is unique, and worthy of consideration to preserve it.

## VI. SUMMARY

The Volusia County School Board needs to develop a plan for managing Section 16 in Deltona as required by the lease with DNR (253.034 (a) FS). Such a plan should recognize the biophysical resources of the site and its potential for development. Many options are available to the school board for management including conservation education, and recreation, all of which can occur on the site with a multiple-use plan. Management of the site must include security considerations regarding liability of unauthorized recreational uses of the property. Additionally, the site should be secured to minimize unauthorized dumping on the property. Another option available to the school board may be the partial or complete trading of the land for lands elsewhere in the county so this parcel can be given to another county agency or be developed. This can be a complicated legal step since DNR owns the land. Such a trade should only occur if it is clearly in the best interest of the Volusia County school system.

89270b.rpt(OCT89)

ENVIRONMENTAL SERVICES, INC.

REFERENCES

- Abrahamson, W.G., A.F. Johnson, J.N. Layne, and P.A. Peroni, "Vegetation of the Archbold Biological Station, Florida: An Example of the Southern Lake Wales Ridge", Florida Scientist, 1984, 47:209-250.
- Barbour, M.G. and W.D. Billings, "Xeric Sand Communities", North American Terrestrial Vegetation, Cambridge University Press, New York, 1988, pp.326-331.
- Conant, R., "A Field Guide to Reptiles and Amphibians", The Peterson Field Guide Series, Houghton Mifflin Company, Boston, 1975.
- Cox, J.A., "Status and Distribution of the Florida Scrub Jay", Florida Ornithological Society, 1987, Special publication No. 3.
- Cox, J.A., D. Inkley and R. Kautz, "Ecology and Habitat Protection Needs of Gopher Tortoise (Gopherus polyphemus) Populations Found on Lands Slated for Large-Scale Development in Florida", Nongame Wildlife Program, Florida Game and Fresh Water Fish Commission, Tallahassee, 1987, Technical Report No. 4.
- Daniels, Katherine, Personal Communication, Department of Natural Resources, Tallahassee, 1989.
- Diemer, J.E., "The Ecology and Management of the Gopher Tortoise in the Southeastern United States", Florida Game and Fresh Water Fish Commission, Gainesville, 1985.
- Franz, R., Rare and Endangered Biota of Florida, Vol. 6, Invertebrates, University Presses of Florida, Gainesville, 1982.
- Gilbert, C.R., Rare and Endangered Biota of Florida, Vol. 4, Fishes, University Presses of Florida, Gainesville, 1979.
- Kale, H.W., Rare and Endangered Biota of Florida, Vol. 2, Birds, University Presses of Florida, Gainesville, 1979.
- Layne, J.N., Rare and Endangered Biota of Florida, Vol. 1, Mammals, University Presses of Florida, Gainesville, 1979.
- Marcus, R.B. and E.A. Fernald, Florida. A Geographical Approach, Kendall/Hunt Publishing Company, Dubuque, Iowa, 1975.
- McDiarmid, R.W., Rare and Endangered Biota of Florida, Vol. 3, Amphibians & Reptiles, University Presses of Florida, Gainesville, 1979.

ENVIRONMENTAL SERVICES, INC.

Moreau, Mary Sara, Personal Communication, Project Coordinator, Sand Pine Nature Center, Deltona Lakes Elementary School, Deltona, 1989.

Myers, Ron L., Personal Communication, Tall Timbers Research Station, Tallahassee, 1989.

Peterson, R.T., "A Field Guide to the Birds", The Peterson Field Guide Series, Houghton Mifflin Company, Boston, 1980.

Phelps, Trudy, Personal Communication, United States Geological Survey, Orlando, 1989.

Smith, R.L., Ecology and Field Biology, Harper & Row, Publisher, New York, 1980.

Soil Conservation Service, "26 Ecological Communities of Florida", U.S. Department of Agriculture, 1981.

Soil Conservation Service, "Soil Survey of Volusia County", U.S. Department of Agriculture, 1980.

Ward, D.B., Rare and Endangered Biota of Florida, Vol. 5, Plants, University Presss of Florida, Gainesville, 1979.

Wunderlin, R.P., Guide to the Vascular Plants of Central Florida, University Presses of Florida, Tampa, 1982.

United States Department of Agriculture, Forest Service, "Silvicultural Systems for the Major Forests Types of the United States", Agriculture Handbook, No. 445, 1983.



FLORIDA DEPARTMENT OF STATE

Jim Smith  
Secretary of State

DIVISION OF HISTORICAL RESOURCES

R.A. Gray Building  
500 South Bronough

Tallahassee, Florida 32399-0250

Director's Office      Telecopier Number (FAX)  
(904) 488-1480      (904) 488-3353

RECEIVED

JAN 31 1990

FACILITIES PLANNING  
& RESEARCH

January 26, 1990

Ms. Patricia Drago  
Real Properties Planner  
Volusia County Schools  
P.O. Box 2118  
200 North Clara Avenue  
DeLand, Florida 32721-2118

In Reply Refer To:  
Robert C. Taylor  
Historic Preservation  
Planner  
(904) 487-2333  
Project File No. 900235

RE: Your Letter of January 22, 1990  
Request for Land Management Plan Information  
Section 16, T18S-R31E, Volusia County, Florida

In accordance with this agency's responsibilities under Chapter 234.034(4), Florida Statutes, we have reviewed the information contained in the Florida Master Site File to determine whether any archaeological or historical resources are recorded for the referenced tract, and also to determine the potential for the occurrence of such resources.

Our review indicates that no archaeological or historic sites are recorded in the subject tract. However, it is the opinion of this agency that there is a probability of significant, unrecorded archaeological sites being located within this land parcel.

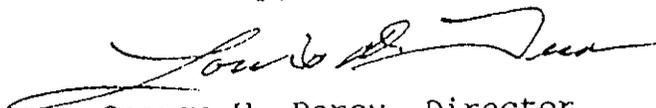
We have noted in the attachments to your January 22, 1990 letter that three school construction projects are proposed for this tract. Some of these areas may require archaeological survey prior to the initiation of land clearing or ground disturbing activities related to the construction projects.

We have enclosed for your use a copy of "Management Procedures for Archaeological and Historic Sites and Properties on State-Owned or Controlled Lands." This document should be referred to where appropriate in your land management plan, and attached to it.

Mr. Patricia Drago  
January 26, 1990  
Page 2

If you have any questions concerning our comments, please do not hesitate to contact us. Your interest in protecting Florida's archaeological and historical resources is appreciated.

Sincerely,

A handwritten signature in cursive script, appearing to read "George W. Percy".

George W. Percy, Director  
Division of Historical Resources

GWP/rt  
Enc. (1)

xc: Dawn Dunnam

# FLORIDA GAME AND FRESH WATER FISH COMMISSION

WILLIAM G. BOSTICK, JR.    DON WRIGHT    THOMAS L. HRES, SR.    MRS. GILBERT W. HUMPHREY    JOE MARLIN HILLIARD  
Winter Haven    Orlando    Lake Wales    Miccosukee    Clewiston

ROBERT M. BRANTLY, Executive Director  
ALLAN L. EGBERT, Ph.D., Assistant Executive Director



FARRIS BRYANT BUILDING  
620 South Meridian Street  
Tallahassee, Florida 32399-1600  
(904) 488-1960

April 20, 1990

Ms. Patricia Drago  
School Board of Volusia County  
P. O. Box 2118  
200 N. Clara Avenue  
DeLand, FL 32721-2118

Ms. Drago:

In response to your 9 April inquiry, the Florida Natural Areas Inventory (254 E. 6th Avenue, Tallahassee, FL 32303, 904/224-8207) should be contacted regarding the occurrence of protected species on the site you referenced in Volusia County. That entity's species occurrence database is more comprehensive than ours and, unlike ours, accessible on a site-specific basis. I have provided the Inventory with a copy of your request.

Cordially,

Don A. Wood  
Endangered Species Coordinator

666-8450/jh  
ESC 6-1 (Volusia County)  
cc: Mr. Jim Muller

RECEIVED  
APR 26 1990  
FACILITIES PLANNING  
& RESEARCH

# FLORIDA NATURAL AREAS INVENTORY

1018 Thomasville Road, Suite 200-C, Tallahassee, FL 32303

March 20, 1990

Patricia Drago  
Volusia County School Board  
P.O. Box 2118  
200 N. Clara Avenue  
DeLand, Florida 32721-2118

RECEIVED  
APR 20 1990  
FACILITY  
& RESEARCH  
TRAINING

Dear Ms. Drago:

In response to your request for information on the scrub site in Volusia County, we have reviewed our database and the site survey performed by Marsha Peacock at Environmental Services, Inc. and have the following comments and recommendations regarding the natural resources at the site.

The scrub community has long been recognized by biologists as ecologically unique. This natural community and many species associated with it are endemic or nearly endemic to Florida. Because of the dramatic loss of this habitat to development, and this is especially true of these well-drained ridge sites, the remaining scrub is highly valued for its natural resources.

As noted in the site evaluation by Environmental Services Inc., populations of scrub jays and gopher tortoises are very significant. Our records confirm the occurrence of scrub jays very near to the subject site. Additional field work such as a search for gopher burrows and periodic visits in search of foraging birds could confirm the occurrence of these species on the site. Both species are listed with the Florida Game and Freshwater Fish Commission due to their limited range, population numbers and biology. It is also very likely that the gopher tortoise burrows are providing habitat for other rare species such as the Florida mouse (Podomys floridanus), the only mammal endemic to this state. Several of these commensal species are listed in the site report. Additional surveys for these animals are needed to verify their occurrence.

In addition to the animals reported from this scrub, several rare plant species potentially occur on the site; additional field surveys are needed to determine the extent of rare plant resources on this site.

Based on the importance of the scrub community and its associated species, we strongly recommend that a management plan appropriate for this system be developed. Some aspects of management that the plan should address are threatened species habitat preferences, fire management - particularly how development around the site can be integrated into the fire plan - as well as educational access and presentation. Volusia County is very lucky to have an educational showcase so accessible to the schools; the Section 16 designation should certainly be maintained.

Please let me know if you have any questions concerning these recommendations.

Sincerely,

*Deborah L. White*  
vj

Deborah L. White  
Botanist

History.—s. 1, ch. 63-204, ss. 27, 35, ch. 69-106, s. 1, ch. 74-18, s. 9, ch. 79-05; s. 3, ch. 82-185

**253.033 Inter-American Center property; transfer to board; continued use for government purposes.—**

(1) All real and personal property presently owned by the Inter-American Center Authority, pursuant to 's. 554.072 or otherwise, and all existing liabilities of said authority are hereby transferred to the Board of Trustees of the Internal Improvement Trust Fund. However, the liability to the Department of Transportation for road and bridge work is hereby waived and satisfied. Except as provided in s. 4, chapter 75-131, Laws of Florida, all obligations in connection with contracts and bond issues of the authority shall be assumed and performed by the trustees as provided by law or contract. No action shall be taken as a result of this act that will impair the obligations of any such contract or outstanding bonds.

(2) It is hereby recognized that certain governmental entities have expended substantial public funds in acquiring, planning for, or constructing public facilities for the purpose of carrying out or undertaking governmental functions on property formerly under the jurisdiction of the authority. All property owned or controlled by any governmental entity shall be exempt from any local building and zoning regulations which might otherwise be applicable in the absence of this section in carrying out or undertaking any such governmental function and purpose.

(3)(a) Except as provided in this subsection, in no event shall any of the lands known as "the Graves tract," including, without limitation, the land previously transferred to the City of Miami and Dade County by the Inter-American Center Authority and the lands transferred pursuant to this act, be used for other than public purposes. However, the portion of "the Graves tract" owned by the City of North Miami on the effective date of this act shall not be subject to such public purpose use restriction and may be used for any purpose in accordance with local building and zoning regulations.

(b) Notwithstanding any provision of paragraph (a) or any other law to the contrary, the Board of Trustees of the Internal Improvement Trust Fund shall sell as soon as feasible that portion of "the Graves tract" described in this paragraph as set forth with particularity in s. 1, ch. 85-201, Laws of Florida. The purchase price for the conveyances of land specified in this paragraph shall be not less than the appraised value of such lands determined in accordance with the appraisal procedures set forth in s. 253.025(7). The proceeds derived from such sale shall be used to purchase lands within "the Graves tract" owned by the City of North Miami and designated by the city for purchase by the board of trustees. The purchase price for such purchase shall be determined in accordance with the provisions of s. 253.025. Alternatively, and at the option of the board of trustees, the board of trustees shall exchange the lands described above for an equivalently valued portion of lands within "the Graves tract" owned by the City of North Miami.

(4) The Board of Trustees of the Internal Improvement Trust Fund may lease to Dade County approximately 300 acres of land, and approximately 90 acres of abutting lagoon and waterways, designated as the Pri-

mary Development Area, and may also transfer to Dade County all or any part of the plans, drawings, maps, etc., of the Inter-American Center Authority existing at the date of transfer, provided Dade County:

(a) Assumes responsibilities of the following agreements:

1. That certain agreement entered into on June 12, 1972, between the City of Miami and Inter-American Center Authority whereby the authority agreed to repurchase, with revenues derived from the net operating revenue of the project developed on the leased lands after expenses and debt service requirements, the approximately 93 acres of lands previously deeded to the City of Miami as security for repayment of the \$8,500,000 owed by the authority to the City of Miami. Title to the land repurchased pursuant to the provisions of this subsection shall be conveyed to the State of Florida.

2. Those certain rights granted to the City of North Miami pursuant to the provisions of 's. 554.29(1)(a) and 's. 554.30 obligating the authority to issue a revenue bond to the City of North Miami, containing provisions to be determined by Dade County, to be repaid from all ad valorem taxes, occupational license fees, franchise taxes, utility taxes, and cigarette taxes which would have accrued to the authority or the City of North Miami by nature of property owned by the authority having been in the City of North Miami and from the excess revenue after operating expenses, development cost and debt service requirements, of the project developed on the leased lands.

(b) Develops a plan for the use of the land that meets the approval of the Board of Trustees of the Internal Improvement Trust Fund or that meets the following purposes heretofore authorized:

1. To provide a permanent international center which will serve as a meeting ground for the governments and industries of the Western Hemisphere and of other areas of the world.

2. To facilitate broad and continuous exchanges of ideas, persons, and products through cultural, educational, and other exchanges.

3. By appropriate means, to promote mutual understanding between the peoples of the Western Hemisphere and to strengthen the ties which unite the United States with other nations of the free world.

Any property leased under this subsection shall not be leased for less than fair market value.

History.—ss. 2, 3, 5, 7, 8, ch. 75-131, s. 1, ch. 85-201; s. 1, ch. 87-293

Note.—All sections of ch. 554 were repealed by s. 1, ch. 75-131

Note.—The words "this act" as appearing here were enacted by s. 5, ch. 75-131

Note.—The words "this act" as appearing here were enacted by s. 1, ch. 87-293, effective July 9, 1987.

Note.—The words "in this paragraph as set forth with particularity in s. 1, ch. 85-201, Laws of Florida" were substituted for the words "as follows" and the words constituting the particular notes and boards land description set forth in s. 1, ch. 85-201, because of the potentially limited use of the particular description

**253.034 State-owned lands; uses.—**

(1) As used in this section, the following phrases have the following meanings:

(a) "Multiple use" means the harmonious and coordinated management of timber, recreation, wildlife, forage, archaeological and historic sites, or water resources so that they are utilized in the combination that will best serve the people of the state, making the most



the disposal of such lands shall be placed in the Conservation and Recreation Lands Trust Fund.

(6) This section shall not be construed so as to affect:

(a) Other provisions of this chapter relating to oil, gas, or mineral resources.

(b) The exclusive use of state-owned land subject to a lease authorized and executed by the Board of Trustees of the Internal Improvement Trust Fund leasing state-owned land for private uses and purposes.

(c) Sovereignty lands not leased for private uses and purposes.

*History.*—s. 2, ch. 80-200, s. 167, ch. 81-259, s. 1, ch. 82-36, s. 3, ch. 83-223; s. 2, ch. 84-94, s. 4, ch. 84-197.

*Note.*—Repealed effective October 1, 1990, by s. 2, ch. 84-94, and scheduled for review pursuant to s. 11.611 in advance of that date.

*cf.*—s. 159.705 Leases to research and development authorities.

#### 253.037 Use of state-owned land for correctional facilities.—

(1) The Department of Natural Resources shall review, identify, and secure state-owned lands which may be used for correctional facilities subject to determination by the Department of Corrections of where sites are needed and their appropriateness for use as prisons or other correctional facilities.

(2) Notwithstanding the provisions of s. 253.025, the Board of Trustees of the Internal Improvement Trust Fund may purchase federal surplus lands for use as sites for correctional facilities, using federal land purchasing procedures, regulations, and requirements.

(3) The Auditor General is directed to conduct performance audits of any purchases made pursuant to the provisions of subsection (2).

*History.*—s. 50, ch. 83-131.

#### 253.04 Duty of board to protect, etc., state lands; state may join in any action brought.—

(1) The Board of Trustees of the Internal Improvement Trust Fund may police; protect; conserve; improve; and prevent trespass, damage, or depredation upon the lands and the products thereof, on or under the same, owned by the state as set forth in s. 253.03. The board may bring in the name of the board all suits in ejectment, suits for damage, and suits in trespass which in the judgment of the board may be necessary to the full protection and conservation of such lands, or it may take such other action or do such other things as may in its judgment be necessary for the full protection and conservation of such lands; and the state may join with the board in any action or suit, or take part in any proceeding, when it may deem necessary, in the name of this state through the Department of Legal Affairs.

(2) In lieu of seeking monetary damages pursuant to subsection (1) against any person or the agent of any person who has been found to have willfully damaged lands of the state, the ownership or boundaries of which have been established by the state, or willfully damaged or removed products thereof in violation of state or federal law or to have knowingly refused to comply with or willfully violated the provisions of this chapter, the board may impose a fine for each offense in an amount up to \$10,000 to be fixed by rule and imposed and collected by the board in accordance with the provisions of chapter 120. Each day during any portion of which such viola-

tion occurs constitutes a separate offense. This subsection does not apply to any act or omission which is currently subject to litigation wherein the state or any agency of the state is a party as of October 1, 1984, or to any person who holds such lands under color of title existing contained herein impairs the rights of any person to obtain a judicial determination in a court of competent jurisdiction of such person's interest in lands the subject of a claim or proceeding by the department under this subsection.

(3) Whenever any person or the agent of any person knowingly refuses to comply with or willfully violates any of the provisions of this chapter so that such action causes damage to the lands of the state or the products thereof, including removal of those products, such person or agent is liable for such damage. Whenever two or more persons or their agents cause damage, and if such damage is indivisible, each violator is jointly and severally liable for such damage; however, if such damage is divisible and may be attributed to a particular violator or violators, each violator is liable only for that damage and subject to the fine attributable to his violation.

(4) All fines imposed hereunder and damages awarded are a lien upon the real and personal property of the violator or violators, enforceable by the Department of Natural Resources as are statutory liens under chapter 85.

(5) All moneys collected pursuant to fines imposed or damages awarded shall be deposited into the Internal Improvement Trust Fund created by s. 253.01 and used for the purposes defined in that section.

*History.*—s. 2, ch. 15642, 1931, CGL 1936 Supp. 1446(14), s. 11, ch. 25035, 1949; s. 2, ch. 61-119, ss. 11, 27, 35, ch. 69-106, s. 11, ch. 84-79.

253.05 Prosecuting officers to assist in protecting state lands.—State attorneys, other prosecuting officers of the state or county, wildlife officers of the Florida Game and Fresh Water Fish Commission, conservation officers, together with the executive director of the Department of Natural Resources, and county sheriffs and their deputies shall see that the lands owned by the state, as described in ss. 253.01 and 253.03, shall not be the object of damage, trespass, depredation, or unlawful use by any person. The said officers and their deputies shall, upon information that unlawful use is being made of state lands, report the same, together with the information in their possession relating thereto, to the Board of Trustees of the Internal Improvement Trust Fund and shall cooperate with the said board in carrying out the purposes of ss. 253.01-253.04 and this section. State attorneys and other prosecuting officers of the state or any county, upon request of the Governor or Board of Trustees of the Internal Improvement Trust Fund, shall institute and maintain such legal proceedings as may be necessary to carry out the purpose of said sections.

*History.*—s. 3, ch. 15642, 1931, CGL 1936 Supp. 1446(15), s. 2, ch. 61-119, ss. 27, 35, ch. 69-106, s. 1, ch. 70-117; *cf.*—ch. 27 State attorneys, duties; ch. 30 Sheriffs, duties.

253.111 Notice to board of county commissioners before sale.—The Board of Trustees of the Internal Improvement Trust Fund of the state may not sell or convey any land to which they hold title unless and until they

those uses do not interfere or detract from the designated primary purpose. Single use properties will most often be managed by a single agency but may be placed under cooperative management if the expertise of two or more agencies is required to carry out the primary purpose.

(16) "Sole management" means management by one agency on a single or multiple use management tract.

(17) "State land" as used in this rule means land in which the title is vested in the Board.

(18) "Sublease" means a lesser than leasehold interest in lands executed by the lessee to a third party for a definite time period with specific conditions attached.

(19) "Surplus lands" means lands which are not needed by any State agency, and are recommended for disposal, pursuant to Rule 18-4.010.

*Specific Authority 253.03(7) FS. Law Implemented 253.022, 253.034 FS. History—New 4-4-84, Formerly 16Q-23.03, Transferred from 16Q-23.001.*

#### 18-4.004 Land Management Advisory Committee Composition and Procedures.

(1) The committee shall be composed of the following persons or their designees:

(a) The Executive Director of the Department of Natural Resources;

(b) The Commissioner of the Department of Agriculture and Consumer Services;

(c) The Secretary of State;

(d) The Executive Director of the Game and Fresh Water Fish Commission;

(e) The Secretary of the Department of Environmental Regulation;

(f) The Secretary of the Department of Corrections;

(g) The Commissioner of the Department of Education.

(2) The Chairmanship of the committee shall rotate annually on October 1 of each year in the order listed above as set forth in Section 253.034, F. S.

(3) The committee shall hold periodic meetings at the request of the chairman. The meetings shall be recorded electronically and such records shall be preserved pursuant to Chapters 119 and 267, F. S. *Specific Authority 253.03(7) FS. Law Implemented 253.022(1), (2) FS. History—New 4-4-84, Formerly 16Q-23.04, Transferred from 16Q-23.004.*

#### 18-4.005 Land Management Advisory Committee Responsibilities and Procedures.

(1) The responsibilities of the committee shall include:

(a) Reviewing each plan or sublease over 100 acres, and each surplus land determination within 60 days after receipt from the division.

(b) Considering the propriety of the agency's recommendations regarding the future use of the land, protection of fragile and non-renewable resources, maintenance and use of renewable resources.

(c) Identifying the potential for alternative or multiple uses not recognized by the managing agency.

(d) Identifying lands surplus to the agency's need which could be used by or reserved for other agency use or disposed of as surplus.

(e) Considering whether lands would be more appropriately owned or managed by a county or other local government and whether a sale, lease, or other conveyance would be in the interests of the State and local government.

(2) The procedures of the committee shall include:

(a) All management plans and subleases for areas over 100 acres in size, and all surplus land determinations shall be reviewed by the committee prior to submittal to the Board. Utilizing the policies, standards, and criteria of Rule 18-4.008, the committee shall specifically recommend to the Board whether to approve, approve with modifications, or reject a management plan, sublease, or surplus lands determination.

(b) Management plans and subleases for areas less than 100 acres in size, may at the request of three (3) or more committee members, be submitted to the committee for review and recommendations.

(c) A recommendation to the Board on management plans, subleases and surplus land designations by the committee shall be by the concurrence of at least four (4) members.

(d) The use of State-owned land in a manner which is inconsistent with the existing lease or the approved land management plan, shall cause the lease to be subject to termination by the Board. The committee shall recommend to the Board when such uses are not in accordance with the approved management plan or lease/agreement.

*Specific Authority 253.03(7), 253.034(4), (5) FS. Law Implemented 253.022(1), 253.034(3), (4), (5) FS. History—New 4-4-84, Formerly 16Q-23.05, Transferred from 16Q-23.005.*

#### 18-4.006 Agency Duties.

(1) Primary staff support for the committee shall be provided by the division, including the recording functions listed in paragraph (3) of Rule 18-4.004.

(2) The managing agency should be prepared to respond to any inquiries or issues.

(3) The managing agency shall prepare executive summaries which highlight important management facts, issues, or problems, and any public input which went into developing the plan or sublease.

*Specific Authority 253.03(7) FS. Law Implemented 253.022(2), 253.034(4) FS. History—New 4-4-84, Formerly 16Q-23.06, Transferred from 16Q-23.006.*

18-4.007 Management Plans. Plans submitted to the division for committee review under the requirements of Section 253.034, F. S., should contain, where applicable to the management of resources, the following:

(1) The common name of the property.

(2) A map showing the location and boundaries of the property plus any structures or improvements in the property.

(3) The legal description and acreage of the property.

(4) The degree of title interest held by the Board, including reservations and encumbrances such as leases.

(5) The land acquisition program (e.g., C. A. R. L., E. E. L., Save Our Coast), if any, under which the property was acquired.

(6) The designated single use or multiple use management for the property, including other managing agencies.

(7) Proximity of property to other significant State, local, or federal land or water resources.

(8) A statement as to whether the property is within an aquatic preserve or a designated area of critical State concern or an area under study for such designation.

(9) The location and description of known and reasonably identifiable renewable and non-renewable resources of the property including, but not limited to, the following:

(a) Brief description of soil types, using U. S. D. A. maps when available;

(b) Archaeological and historical resources;

(c) Water resources including the water quality classification for each water body and the identification of any such water body that is designated as an Outstanding Florida Water;

(d) Fish and wildlife and their habitat;

(e) State and federally listed endangered or threatened species and their habitat;

(f) Beaches and dunes;

(g) Swamps, marshes and other wetlands;

(h) Mineral resources, such as oil, gas and phosphate;

(i) Unique natural features, such as coral reefs, natural springs, caverns, large sinkholes, virgin timber stands, scenic vistas, and natural rivers and streams; and

(j) Outstanding native landscapes containing relatively unaltered flora, fauna, and geological conditions.

(10) A description of actions the agency plans to locate and identify unknown resources such as surveys of unknown archaeological and historical resources.

(11) The identification of resources on the property that are listed in the Natural Area Inventory.

(12) A description of past uses, including any unauthorized uses of the property.

(13) A detailed description of existing and planned use(s) of the property.

(14) A description of alternative or multiple uses of the property considered by the managing agency and an explanation of why such uses were not adopted.

(15) A detailed assessment of the impact of planned uses on the renewable and non-renewable resources of the property and a detailed description of the specific actions that will be taken to protect, enhance and conserve these resources and to mitigate damage caused by such uses.

(16) A description of management needs and problems for the property.

(17) Identification of adjacent land uses that conflict with the planned use of the property, if any.

(18) A description of legislative or executive directives that constrain the use of such property.

(19) A finding regarding whether each planned use complies with the State Lands Management Plan, particularly whether such uses represent "balanced public utilization", specific agency statutory authority, and other legislative or executive constraints.

(20) An assessment as to whether the property, or any portion, should be declared surplus.

(21) Identification of other parcels of land within or immediately adjacent to the property that should be purchased because they are essential to management of the property.

(22) A description of the management responsibilities of each agency and how such responsibilities will be coordinated, including a provision that requires that the managing agency consult with the Division of Archives, History and Records Management before taking action that may adversely affect archaeological or historic resources.

(23) A statement concerning the extent of public involvement and local government participation in the development of the plan, if any, including a summary of comments and concerns expressed. *Specific Authority 253.03(7), 253.034(4), (5) FS. Law Implemented 253.034(3), (4), (5) FS. History—New 4-84, Formerly 16Q-23.07, Transferred from 16Q-23.007.*

18-4.008 Policies, Standards, and Criteria. The following management policies, standards, and criteria will be used by the committee to determine whether to recommend approval, approval with conditions or modifications, or to reject any agency management plan, sublease or surplus land determination.

(1) The policies, standards, and criteria that are enumerated in the "Upland Management Rules of the Department of Natural Resources".

(2) The policies, standards, and criteria that are enumerated in the "Sovereignty Submerged Lands Management Rules of the Department of Natural Resources", Chapter 18-21, F. A. C.

(3) The policies, standards, and criteria that are enumerated in the "State Lands Management Plan", adopted March 17, 1981, by the Board. *Specific Authority 253.03(7), 253.034(4) FS. Law Implemented 253.034(3), (4), (5) FS. History—New 4-84, Formerly 16Q-23.08, Transferred from 16Q-23.008.*

#### 18-4.009 Sublease Reviews.

(1) An agency managing or leasing State-owned lands from the Board shall not sublease lands without prior review by the division and subsequent approval by the Board. Subleases for areas greater than 160 acres in size shall be reviewed by the committee prior to submittal to the Board.

(2) All sublease requests shall be made pursuant to applicable laws and rules governing the leasing and subleasing of State-owned lands.

(3) Subleases submitted to the division for

County of Volusia  
Florida

RECEIVED

MAR 12 1990



~~ENVIRONMENTAL MGMT.~~

BY ~~DISTRICT ADVISORY BOARD~~  
DELTONA MUNICIPAL SERVICE DISTRICT

March 9, 1990

Ms. Beebe White, Chairman  
Volusia County School Board  
334 John Anderson Drive  
Ormond Beach, FL 32176

Dear Ms. White:

At the March 6, 1990 meeting of the Deltona Municipal Service District Advisory Board, the Board approved Resolution No. 90-1 attached for your review, which supports maintaining all of the Section 16 lands located in Deltona in public ownership and under full and complete public control, and opposes any commercial development of these lands by private interests.

The Advisory Board acknowledges that complete control of Section 16 lands rests with the School Board, however, it was the Board's wish to advise your members and County Council of the concerns of the residents of Deltona that Section 16 be utilized in accordance with the best interests of this community.

Mr. Stephen S. Kintner, Director of the Department of Environmental Management, addressed the Advisory Board at its meeting of March 6, 1990 regarding the use of approximately 400 acres of Section 16 as a mitigation bank which would allow the area to be permanently established as a species and habitat preserve under the auspices of Federal, State and County wildlife agencies. We believe that utilizing the parcel to maintain, and indeed to enhance, its value to the community as a wildlife management area would represent an important step toward conservation for the future of Deltona and its citizens, and would present opportunities for our youth to develop interests and experience in resource management.

COUNTY COUNCIL MEMBERS

Clay Henderson - At Large

Big John - At Large

Allie Cyler - District #1

Wicky Jackson - District #2

Robert C. Tull - District #3

David L. ... - District #4

Dr. M. ... - District #5

We appreciate the opportunity of voicing our concerns regarding this issue.

Sincerely yours,



Patricia Northey,  
Chairman

PN:ch

Attachment

cc: Alice Cykler  
Big John  
Clay Henderson  
Vicky Jackson  
Robert Tuttle  
Deanie Lowe  
Roy Schleicher  
Ann McFall  
Dr. James Surratt  
Ronald McPherson  
Lonnie N. Groot  
Stephen Kintner  
Louis E. DiFiore

RES

**A RESOLUTION OF THE DELTONA MUNICIPAL SERVICES  
DISTRICT ADVISORY BOARD EXPRESSING OPPOSITION  
TO ANY COMMERCIAL DEVELOPMENT OF SECTION 16  
PROPERTIES IN DELTONA, FLORIDA.**

WHEREAS, in 1822 the 16th Section of every Township was reserved for use by the public for educational purposes and title to Section 16 lands was vested in the then Territory of Florida; and

WHEREAS, title to Section 16 in Deltona, Florida is now vested in the State of Florida and is being held in trust for the public; and

WHEREAS, the Section 16 lands within Deltona, Florida have significant environmental and educational value as well as a general benefit to the public by remaining in a commercially undeveloped condition; and

WHEREAS, Article II, Section 7, of the Constitution of the State of Florida provides that "[i]t shall be the policy of the State to conserve its natural resources and scenic beauty"; and

WHEREAS, the State Comprehensive Plan for the State of Florida as set forth in Chapter 187 of the Florida Statutes provides that "Florida shall protect ... unique natural habitats and ecological systems" and provides, further, that it is the policy of the State of Florida to "conserve forests", to "...retain, manage, and inventory public lands to provide recreation, conservation, and related public benefits", to "emphasize the ... maintenance of ecologically intact systems in all land and water planning, management, and regulation" and to "protect and expand park systems throughout the State"; and

WHEREAS, the Comprehensive Plan for Volusia County, Florida provides for the protection of environmentally valuable and sensitive lands and provides for the preservation of open space and recreational lands for the use and benefit of all citizens; and

WHEREAS, repeated attempts have been made to take the Section 16 public trust lands present in Deltona, Florida from the domain of the public and to develop those lands for commercial purposes by private development interests; and

WHEREAS, the Deltona Municipal Services District Advisory Board desires to protect the public health, safety and welfare of the citizens of the Deltona, Florida community,

NOW, THEREFORE, BE IT RESOLVED BY THE DELTONA MUNICIPAL SERVICES DISTRICT ADVISORY BOARD that:

The Board hereby supports maintaining all of the Section 16 lands located in Deltona, Florida in public ownership and under full and complete public control and opposes any commercial development of said lands by private development interests.

ADOPTED this 6<sup>th</sup> day of March, 1990.

DELTONA MUNICIPAL SERVICES  
ADVISORY BOARD

By: Patricia L. Northey  
PATRICIA L. NORTHEY  
Chairperson

# Town Meeting

## Our Opinion

### Section 16 land bank offers many benefits

The best deal a land seller can get is to receive money for property, then retain the use of it.

That unbeatable deal is what the Volusia County School Board would get if Section 16 is preserved as a land mitigation bank.

Developers required by state and federal rules to set aside land to mitigate, for example, scrub jay or gopher tortoise habitats they plan to destroy in other areas would "buy" a share of Section 16.

The 400-acre uplands scrub, set aside for educational purposes in the 1800s, would be managed as a wildlife preserve, with opportunities aplenty for Volusia County public school students to learn about conservation, wildlife, forestry and land management.

Scrub jays and gopher tortoises would benefit from a large tract of mitigation land set aside by many developers, rather than piecemeal parcels set aside here and there by individual developers. A scrub jay family needs 20 acres for survival; 10 acres preserved amidst a subdivision and commercial district would not assure that survival.

The school system would benefit by being reimbursed for its development rights on land that may not be the best location for new schools. The money could be used to buy school sites where they are needed, while Section 16 could still be used for environmental education.

Volusia County residents will benefit by providing a means to keep mitigation dollars and lands in Volusia County. Developers don't have to set aside miti-

gation lands in the same county where their building activity takes place. If there is no land bank established in Volusia County, it's likely that developers required to mitigate will take part in the large bank operated by the Nature Conservancy in Polk County.

The Volusia County School Board might be able to get more money by selling Section 16 outright to developers who would love to get their hands on the last large undeveloped piece of Deltona.

That move, however, would preserve nothing for future generations of Volusia County students. It would, on the other hand, saddle Deltona with a big development headache.

If this plan is approved, a percentage of the money developers pay will be used to "manage" the Section 16 land bank. An investment will be needed: to fence the land, to reforest nearly 80 acres destroyed by youths trespassing on motorbikes and all-terrain vehicles, to carve out nature trails, etc.

The county and school board, however, should guarantee that the percentage set aside for management doesn't swell into a bureaucracy. With coordination, the necessary tasks can be taken over by county and school board employees and shared with environmental groups whose members would be glad to volunteer.

Making a land bank of Section 16 has so many benefits — to students, taxpayers, wildlife — that we're tempted to say it kills several birds with one stone. In this case, though, we'll just call it an excellent idea.



FR. LAUDER  
SUN. SEVEN  
OCT. 1980

## Gro

I am not all  
but I think  
America who  
Hog Day part

(The reason  
that I once  
person who  
Pepper Song,  
ple wrote in v

I was just  
late January  
ly I realized  
would soon be

And I said  
ties for most  
Ground H~1

I actua  
'once. We all  
bark and had  
So, that's  
party began,  
again this year

Ground H  
It's the day t  
unic. Don

## Your Opinion

# Group rejects 'downtown' plan for school land

By Rick Tonyan

OF THE SENTINEL STAFF

DELTONA — A plan to create a commercial center for Deltona on land earmarked for school sites should be stopped, said a majority of members of the Deltona Civic Association in a straw vote.

However, the margin of votes opposed to the idea, 21 to 18, was so small that developers proposing the project said Thursday they will continue their plans.

Winning public opinion is vital to the project's success, the developers said. If they cannot get Deltona residents' backing, they said they will abandon the idea of negotiating for the school board land.

"I've been in this county long enough to know you need public sentiment behind a project like this," said

Herky Huffman, a Stone Island Realtor who is part of a team of developers. Although few cast ballots and the margin was slim, the association's vote shows that the community is not giving the developers that support.

Jim Kelly, an opponent of the project, said they still got only 18 votes. Kelly said, "That's a positive step from my standpoint."

The association has about 4,100 members. Slightly more than 40 were at the Wednesday night meeting and 39 of them cast ballots.

Huffman and another team member, Deltona attorney Kurt Borglum, said they consider the vote a draw.

Most association members at a meeting late Wednesday did not know enough details of the project to support it, Borglum said. "We basically split — and that's without their knowing the details."

Huffman, Borglum and Jacksonville

developer John Crabtree have described their project as a downtown area for Deltona — a commercial hub of shops and professional offices. The project would enlarge the tax base and provide jobs that is now a mostly residential community, the developers said.

In the Wednesday night straw vote, a bare majority, 20 to 19, said there was no need for more local shops and professional offices. Most of the commercial development serving Deltona is on the fringes of the community.

The project would be on 640 acres called Tract 16 in the middle of Deltona. Deltona Lakes Elementary School is on the southeast corner of the tract and the school board plans to build as many as three other schools on it. Opponents say they don't want heavy commercial development near schools.

Developers have planned to pay as

much as \$2.2 million for whatever land in the tract the school board does not use. That could be as much as 500 acres. The Florida Department of Natural Resources owns the land and leases it free to the county school board.

The school board and the state Department of Education would have to agree to sell the land. The tract got its name because it was the 16th section of a township surveyed near Lake Monroe when Florida first became a state in 1845. State and federal law dictated that the 16th section of each township be earmarked for educational purposes.

There were 1,627 such tracts in Florida. Hundreds of them have been sold for private development over the years, said Dan Crabb, director of the division of state lands. He said money from the sales was used for education.

# Deltona-area retail center turned down

By ANDY CAMPANARO  
Sun News Writer

DELAND — A shopping center about the size of Deltona Plaza, wrapped around the north end of Trout Lake, was denied unanimously Tuesday by the county's Planning and Land Development Regulation Commission.

DeLand attorney Allen Watts represented owner Colonial Properties Inc. and told the commission that this is the first developer to buy into a mitigation bank that Volusia County and the Volusia County School Board are trying to set up in Section 16 in the middle of Deltona.

Colonial Properties Inc. is asking for the current zoning of B-1, B-4, PUD-R and R-4 to be rezoned to B-PUD in order to develop the 50 acres into a retail shopping center of 122,000 square feet and 671 parking lots, a 5,000-square-foot bank and 7,500-square-foot drive-through restaurant, and a hotel and 7,500-square-foot restaurant.

About 50 people from the adjoining area and wearing signs saying "No B-PUD" were represented by James R. Clayton of Clayton and Teal, DeLand.

Watts presented Traffic Engineer Bill Tipton Sr., who told the commissioners that the traffic generated from the shopping center would be less than 10 percent of trips allowed on Finland Drive, once it was increased to an 80-foot

width.

"You're going to have to build an eight or 10-lane road to alleviate what's going to happen there," Commissioner Paul Holt said.

Objections heard before the commission unanimously voted to deny the project were:

- The proposed application is inconsistent with protecting residential neighborhoods from encroachment by incompatible land uses such as commercial or industrial development."

"The first law of zoning is 'protect the people'," Clayton said.

- One family of scrub jays exists on the subject site and development plans would require the clearing of this site.

- A list of planning comments literally from "A through Z" was attached, mostly stipulating landscaping buffering areas in and around the development, and parking spaces.

- The hotel-restaurant site is either partially or completely located within the 100-year flood plain of Trout Lake and the county is opposed to any development activity within the flood plain.

- The applicant's environmental consultants report several wading bird species, considered species of special concern, that were observed within Trout Lake.

RECEIVED

FEB 15 1990

FACILITIES PLANNING  
& RESEARCH

Section 16

C U R R I C U L U M O V E R V I E W  
K I N D E R G A R T E N T H R O U G H G R A D E T W E L V E  
C O M M I T T E E F O R T H E S I X T E E N T H S E C T I O N

May, 1990

DR. BARBARA FOSTER  
CHAIRPERSON

P R E F A C E

THE GOAL OF THIS COMMITTEE IS TO PRODUCE A WORKING DOCUMENT WHICH SUPPORTS THE PREMISE THAT THE SIXTEENTH SECTION, LOCATED IN DELTONA, FLORIDA, IS A LIVING LABORATORY, A CLASSROOM INTO THE PAST, WHICH WILL PROVIDE STUDENTS OF THE PRESENT WITH THE KNOWLEDGE, WISDOM AND CONCERN NEEDED TO ENSURE A SAFE AND HEALTHY ENVIRONMENT FOR ALL OF US.

## EDUCATIONAL OBJECTIVES: OVERVIEW

The principal educational objectives of Section 16 can be stated as follows:

1. To develop an awareness, appreciation and an affection for nature.
2. To develop an awareness that all things in nature constantly change.
3. To present conservation concepts in natural settings so that students will learn them easily.
4. To develop a desire and will to protect and to use wisely the living and non-living natural resources of the earth important to man.
5. To increase knowledge of our natural world and man's responsibility towards nature.

PERSONNEL LIST FOR 16th SECTION COMMITTEE

COUNTY ADMINISTRATION: DR. BARBARA FOSTER

BICENTENNIAL YOUTH PARK: ROBERT HORN

DELTONA HIGH SCHOOL: CHUCK WILLIAMS-PRINCIPAL  
PAMELA LAVERTY-ADMN.  
SUSAN CRAIN  
MINCE DUNCAN -ECOLOGY  
AL EVANS -BOTANY  
ALEX NELSON -EARTH SCIENCE

DELTONA LAKES ELEMENTARY: RON MCPHERSON -PRINCIPAL  
PAUL LEFFLER -ASST. PRINCIPAL  
DOROTHY TAYLOR-ASST. PRINCIPAL  
ALICE CROSS  
MIKE FLIGOR  
PAMELA HARRIS  
JANE HILLE  
MARY SARA MOREAU  
BARBARA PENN  
MARTHA BUSH  
DONNA SCHAEFFER-REYNOLDS  
GAY WEIKEL

DELTONA MIDDLE SCHOOL BETH DORAN -SCIENCE  
BARBARA GARBER  
DOUGLAS HEPWORTH  
JEANNE HILL  
GREG MAKRIS -SCIENCE  
CINDY MCCONKEY-SCIENCE  
SUSAN SWARTZFAGER-AGRICULTURE

DISCOVERY ELEMENTARY SUELLEN BIFERIE  
KAREN BURGESS  
SHARON SANFORD

ENTERPRISE SCHOOL DAVID FISHER -PRINCIPAL  
PAT ZEOLLA  
SUSANNE GOODIN

OSTEEN SCHOOL MICHAEL MONGELLI-ASST. PRINCIPAL  
GAIL FILSON  
JAMIE ZIMMERMAN

STETSON UNIVERSITY KRISTEN MAUCERI (WITH DR. FOSTER)  
TRIPP ODOM (WITH DR. FOSTER)

Section 16  
PROPOSED ENVIRONMENTAL STUDY STATIONS  
K-12 Unit Development

- |  |   |
|--|---|
| 1. Sinkhole Stations   | 17. Environmental Lab<br>indoor lecture hall  |
| 2. Rotten Log Station  | 18. Observation platform  |
| 3. Soil Study Station/Geology  | 19. Camping areas   |
| 4. Tree Growth Study Station   | 20. Challenge Course Trail<br>(fitness)   |
| 5. Tracking Station  | 21. Tree Identification<br>Trail  |
| 6. Fence Row Habitat Station<br>Identification Trail                         | 22. Wildflower  |
| 7. Native Plant Station  | 23. Reflection,<br>meditation, quiet spot<br>area for poetry, art<br>work, reading. |
| 8. Fungi (Moss, Lichen Growth<br>Study Station)                              | 24. Collection Trail  |
| 9. Insect Activity Station   | 25. Blind-Fold Trail  |
| 10. Native Floridian Study<br>Station (Indian, Early<br>Settlers, Geography) | 26. Energy Experimental<br>Station  |
| 11. Orienteering Station   | 27. Arts and Crafts Area  |
| 12. Land Measurement Station   | 28. Outdoor Theater   |
| 13. Sundial Station  | 29. Agriculture Farm  |
| 14. Weather Station  | 30. Bird Sanctuary  |
| 15. Outdoor Classroom  | 31. Chickee   |
| 16. Picnic Area  |   |

SECTION I  
KINDERGARTEN THROUGH SECOND

## KINDERGARTEN THROUGH SECOND GRADE

In order for a new environmental curriculum to be incorporated into the K-2 curriculum, it was necessary to utilize many Science Priority Skills. The activities and units utilize the process-inquiry skills that are the "tools" of scientific investigation. The Environmental Assessment Outline of Section 16 reflects the units that can be developed unique to the environmental center.

### PROCESS-INQUIRY SKILLS

- P-1 Observing-using the senses to find out about subjects and events (Observing at Sand Pine Scrub)
- P-2 Classifying-grouping things according to similarities or differences. (Classifying at Sand Pine Scrub)
- P-3 Measuring-making quantitative observations. (Measuring at Sand Pine Scrub)
- P-4 Using spatial relationships-identifying shapes and movement. (Spatial Relationships at Sand Pine Scrub)
- P-5 Communicating-using the written and spoken word, graphs, drawings, diagrams, or tables to transmit information and ideas to others. (Communicating about Sand Pine Scrub)
- P-6 Predicting-making forecasts of future events or conditions based upon observations or inferences. (Predicting about Sand Pine Scrub)
- P-7 Inferring-explaining an observation or set of observations. (Inferring about Sand Pine Scrub)

### KINDERGARTEN UNITS

- 1. All about Me
- 2. Growing Things
- 3. Daily Weather

### FIRST GRADE UNITS

- 1. The Wonderful World in our Neighborhood
- 2. The Wonderful Earth
- 3. World of Animals
- 4. World of Plants
- 5. Wonderful World of Me

### SECOND GRADE UNITS

- 1. Working with Weather
- 2. Plants
- 3. Animal Awareness
- 4. Magical Matter
- 5. Wonderful Me

ENVIRONMENTAL ASSESSMENT OUTLINE OF SECTION 16

I. Sand Pine Scrub

- A. define - The Sand Pine Scrub is a forest built on dunes.
- B. vegetation-
  - 1) Pine tree
  - 2) Oak tree
  - 3) Palmetto bush
- C. wildlife - Florida scrub jay  
Gopher Turtle

II. Sink Hole/Sandhill Lakes

- A. define - Sink holes occur when a crack grows in the clay that lies under the sand and over the limestone.
- B. vegetation- 3 distinct areas
- C. wildlife - several endangered or threatened species.

SECTION II  
THIRD THROUGH FIFTH GRADE

### THIRD THROUGH FIFTH

All children need contact with the earth to know and value it's essential role in their future. Once this beautiful, natural Sand Pine forest is destroyed there will be no possibility to rethink or regain the immense loss to all citizens of Deltona and Volusia County.

The value of this natural reserve is immeasurable. As our young citizens move into the future they must know what and where their roots are, they must be firmly anchored in appreciation of the earth as their habitat. Only by deliberate acts at this time, which is our time to choose the course of the future, can we save, preserve, and reserve the earth for it's future citizens.

#### Implement Environmental Stations

1. Overnight Campground
2. Outdoor Theater
3. Agriculture Farm
4. Observatory
5. Bird Sanctuary
6. Trails
7. Ponds Studios/Sinkholes
8. Geology
9. Permanent Science Labs
10. Chickee
11. Observation Sites

#### I. Language Arts

- A. Creative writing
- B. Language development
  1. LEP students (Limited English Proficient)
  2. journals
- C. Plays/playwriting
  1. history - explorers/Indians
  2. habitat/environment
- D. Listening skills
- E. Storytelling
- F. Public speaking

## II. Science

- A. Scientific method
- B. Experiments relevant to environment
- C. Observe/describe
- D. Plants
  - 1. adopt-a-tree
  - 2. locate, identify, classify
  - 3. endangered
  - 4. adaptive behavior
  - 5. redistribution
  - 6. poisonous/nonpoisonous
  - 7. seeds/grafting
  - 8. conservation
  - 9. effects of heat/light
  - 10. native
- E. Weather station
  - 1. measurement
  - 2. instruments/student made
- F. Matter
  - 1. living/nonliving
  - 2. identification/mass
- G. Water table
  - 1. Floridan aquifer
  - 2. salt water intrusion
  - 3. recharge
  - 4. percolation
- F. Wildlife
  - 1. adaptation
  - 2. native
  - 3. endangered/extinct
  - 4. record animal tracking on trail
  - 5. identification
  - 6. habitats
  - 7. food chains
  - 8. producers/consumers
  - 9. balance of nature
  - 10. harmony with man
  - 11. sanctuary for injured

- I. Geology
  - 1. landforms
  - 2. history
- J. Recycle
- K. Health/safety
- L. Erosion
  - 1. controlled
  - 2. lake beds
  - 3. preventative (dry sink)
- M. Energy
  - 1. potential/kinetic
  - 2. tools/machines
  - 3. solar/wind

### III. Math

- A. Measurement/geometry
- B. Graphing/map skills
- C. Fractions
- D. Statistics/probability/ratios
- E. Area, perimeter, circumference
- F. Per cent - increase/decrease
- G. Problem solving
- H. Estimation

### IV. Art

- A. Nature sketching
- B. Expanded vision
- C. Photography/publication
- D. Awareness of change

- V. Social Studies
  - A. Florida history
    - 1. Chickee (Indians)
    - 2. Deland Ridge
  - B. Development/change/effects
  
- VI. Technology
  - A. Computer process
  - B. Calculators

SECTION III  
SIXTH THROUGH EIGHTH

## SIXTH THROUGH EIGHTH

With Florida's burgeoning population and shrinking natural environment, it is crucial that students have the opportunity to witness and participate in the preservation of a small but pristine area. This involvement will heighten the awareness of future generations to the necessity of man's interdependence with nature.

This land should be set aside for the use of the culturally and economically deprived segment of the student population as well as the enrichment of those more fortunate. For it is an aware and informed population that can make educated decisions about the quality of the world in which man must coexist with nature.

- I. Social Studies and Science
  - A. Students will demonstrate effects of the human and non-human acts in forested areas. (i.e. power line and Providence, global warming, oxygen depletion).
  - B. Distinguish between healthy and unhealthy trees. Examine the value of each to a forest ecosystem.
  - C. Describe the interdependence of various forest organisms (examples: show interdependence of rotting and plant and animal growth around it).
  - D. Students will locate components of a forest ecosystem.
  - E. Measurement using metrics-distance, temperature, capacity, and mass.
  - F. Identification and study of invertebrate species and their habitats.
  - G. Bird watching
    1. identification
    2. study migration
  - H. Isolation of microorganisms
    1. identification
    2. bacteria in soil, water, plants

- I. Ecology
  - 1. biotic and abiotic factors
  - 2. ecosystems
  - 3. biomes
  - 4. wildlife
  - 5. factors specific to sand pines
  - 6. factors that disrupt the ecosystem
  - 7. recycling: biodegradability of types of garbage
  - 8. composting
  - 9. observe/describe periodic and continuous changes
  - 10. cause and effect relationships in the environment
  - 11. environmental and energy education
  - 12. soil conservation: water run off; erosion; seasonal water fluctuation
  
- J. Fossil evidence
  
- K. Aquatic Biology
  - 1. water testing
  - 2. soil testing
  - 3. organism
  - 4. mapping lakes
  
- L. Identification of foods: what each species lives on; what humans could eat.
  
- M. Study genetic mutation and hybrids
  
- N. Plant unit
  - 1. identification
  - 2. planting
  - 3. seeds (types, dispersal)
  - 4. ferns
  - 5. fungi
  - 6. occurrence
  - 7. native Florida plants
  - 8. natural pesticides
  - 9. agriculture students from various school would maintain area.

- O. Man's impact on ecology
    - 1. factors that disrupt ecosystems
    - 2. preventive measures
    - 3. direct impact of building, development and growth on the ecology of Deltona
  - P. Local endangered plant and animal life
    - 1. identify species
    - 2. develop plan to save/possible organizations to contact
- II. Physical Science
- A. Orienteering-navigate using a compass, following a guide of distance and degrees to find set points.
  - B. Gravitational Studies
  - C. Water Testing
    - 1. quality testing
    - 2. graphing and predicting trends
  - D. Energy center to study solar power and wind power
- III. Mathematics
- A. Percolation
    - 1. calculate rate in the active sink hole
    - 2. determine the water percolation rates of designated areas
  - B. Measurement
    - 1. draw to scale various nature trail sites such as the outdoor classroom
    - 2. calculate water volume of the dry lakes
  - C. Graphing and Mapping
    - 1. develop a topological map of the area using appropriate elevations
    - 2. use grids and graph the area

IV. Language arts

- A. Describe legends created in a forest and then visit the forest to see the relationship i.e. HIAWATHA, ROBIN HOOD.
- B. Writing
- C. Blindfold student in a forest area as an awareness experience.
- D. Write a weekly journal (How does the area change through the year?)
- E. Examine the forest from different perspectives: artist, ecologist, bird, logger, camper, etc.

V. Geography

- A. Map/geographic skills
  - 1. development of topographic maps based on contour and elevation changes.
  - 2. identification of specific areas by reading various types of maps
  - 3. identify migrating birds. Research and map the migration routes
  - 4. wildlife location map
  - 5. comparison, location, and study of the land by use of aerial photography
  - 6. create a map along with the legend/key of the environment
  - 7. compass use
- B. Geographic/geologic features
  - 1. landmark identification
  - 2. study geographic causes of sink holes
  - 3. make soil and water comparisons close to the sink holes and farther from the sink hole
  - 4. identify the unique features of the pine ridge as created by its formation
  - 5. identify characteristic of soil
  - 6. relate topography, flora and fauna of this area

C. Career Education

1. identify natural species of area and environmental circumstance that provide for their existence
2. examine the effects of animal life on the environment in a time study
3. identify unique properties of the scrub as an ecosystem
4. identification of food chains around the sink hole areas
5. exploration and examination of pristine Florida geography
6. controlled burns--identify need, procedure, results, patterns in wild, etc. Compare different areas.

VI. Fine Arts for Middle School Students

A. Fiber Art/Textiles

1. weaving with natural materials
2. natural dyes and fiber products

B. Crafts

1. crafts from natural source/materials
2. musical instruments from forest products

VII. Vocational Agriculture

A. Agriculture Production

1. animal production
  - a. bird sanctuary
  - b. seed crops grown to attract native and migrating birds for observation
  - c. identification of native and migrating birds
2. plant production
  - a. organically grown vegetables
  - b. vegetables and native plants cultivated by groups of students from local schools
  - c. use of only hand tools and horse powered tools
  - d. students shown a demonstration and given a chance for hands-on experience
  - e. use of water conservation practices: rain barrels and cisterns to collect water for irrigation

- B. Horticulture
- C. Forestry
- D. Natural Resources

#### VIII. Vocational Magnet Schools

- A. Forestry
- B. Engineering
- C. Surveying
- D. Agriculture
- E. Photography
- F. Geology
- G. Geography
- H. Science
- I. Construction

#### IV. Career Education

- A. Environmental/Conservation
- B. Cartography
- C. Zoology
- D. Entomology
- E. Forestry
- F. Fish and Wildlife Management
- G. Plant Pathology
- H. Soil conservation
- I. Wildlife Biology
- J. Agencies that employ conservationists

SECTION IV  
NINTH THROUGH TWELFTH

I. Life Science (Biology, Zoology, Botany)

- A. Botany
  - 1. Taxonomy of sand-pine community
  - 2. Wildflower research
    - a. best adapted species for road-side beautification
    - b. hormone research-dormancy
  - 3. Endangered species-(research)
    - a. pollinators of *Garbaria heterophylla* (research)
    - b. reintroduce *Bonamia grandiflora*
  - 4. Insectivorous plants
- B. Microscience
  - 1. Protozoans taxonomy (research)
    - a. soil
    - b. sinkhole
  - 2. Preparation of permanent slides
  - 3. Effect of acid rain on protozoans (research)
- C. Ichthyology
  - 1. fish farming
    - a. students tag and monitor movement and patterns
    - b. population studies (research)
    - c. mercury contamination (research) large tank
    - d. genetic studies on fish species(research)
    - e. introduce new species adaptable to area that naturally sequester mercury
- D. Ornithology
  - 1. Taxonomy
  - 2. Population studies (research)
    - a. feeder station-quiet center for observation drawing station, poetry writing
  - 3. Birds as secondary pollinators and dispersers(research) population counts
  - 4. Recovery area for injured birds- cages, etc.
  - 5. Mercury contamination (research)
- E. Entomology
  - 1. Glass beehives-observation center
  - 2. Butterfly farm & Greenhouse Comb. (research-monarch butterfly migration path)
    - a. all metamorphic stages observed
    - b. symbiotic relationships
  - 3. numerous endangered species(research)
    - a. scarab beetle(*Aphodius troglodytes*)
- F. Herpetology
  - 1. taxonomy-(sand-pine scrub)
  - 2. (research) endangered species
    - a. indigo snake
    - b. king snake - gopher tortoise
  - 3. population studies (research) competition
- G. Greenhouse
  - 1. Plant research
    - a. wildflower
    - b. hormone studies
    - c. tissue culture studies
    - d. woody ornamentals - plant propagation
    - e. insect studies-butterfly
    - f. *Microfilium*(parrot feather) research

## II Environmental - Ecology

- A. Ecosystems
  - 1. Sand-pine scrub
  - 2. Sink-hole
  - 3. Lake beds returning to original state
- B. Soil
  - 1. Water
    - a. ground water recharge(research)
    - b. holding capacity studies(research)
    - c. analysis of soil fertility
  - 2. testing - ph - nutrient studies
  - 3. paleo-ecology-ancient soils(research)
- C. Erosion
  - 1. effect of Providence extension(research)  
new school sites(research)
  - 2. lake-beds erosion
  - 3. trails
  - 4. effect of lining of water retention areas
- D. Salt-water intrusion
  - 1. well analysis(research)
  - 2. seasonal studies(research)
  - 3. purification studies(research)
- E. Population
  - 1. wildflowers(research)
  - 2. endangered species(research)
  - 3. insectivorous plants
  - 4. fish farming
  - 5. birds
  - 6. butterflies-monarch
  - 7. insects
- F. Food-chains and Food Webs
  - a. unique to sand-pine scrub(research)
- G. Fire Ecology(research)

## III Earth Science

- A. Minerals research - substances indigenous to area
- B. Paleo-ecology
  - 1. see Ecology Part B - Soil
  - 2. fossils
- C. Cartography
  - 1. large outdoor map for visitors
  - 2. small individual maps
- D. Telescope
  - 1. permanent observatory
- E. Salt-water intrusion
  - 1. see Ecology (D)
- F. Paleo-geology
  - 1. Deland Ridge studies
  - 2. fossil studies
- G. Climatological Research Center
  - 1. rainfall studies
  - 2. wind pattern studies
  - 3. temperature & humidity studies
- H. Pine-resin studies
  - 1. collecting pine resin
  - 2. making resin for amber-insect
  - 3. "cat-facing" - pots

# Chart Summarizing Processes Common to All Scientific Disciplines

Grade Level Content				Processes	Learner's Developmental Stages
9-12	6-9	3-6	K-3		
				<b>Observing</b> • Seeing • Hearing • Feeling • Tasting • Smelling	Sensory Motor
				<b>Communicating</b> • Silent • Oral • Written • Pictorial	Preconceptual
				<b>Comparing*</b> (includes measuring) • Sensory comparisons • Relative position comparisons • Linear comparisons • Weight comparisons • Capacity comparisons • Quantity comparisons	Intuitive
				<b>Organizing*</b> • Data gathering • Sequencing • Grouping • Classifying	Concrete Operational
				<b>Relating*</b> • Using space-time relationships • Formulating experimental hypotheses • Controlling and manipulating variables • Experimenting	
				<b>Inferring*</b> • Synthesizing, analyzing • Generalizing • Recognizing and predicting patterns; stating laws • Formulating explanatory models and theorizing	Formal Operational
				<b>Applying*</b> • Using knowledge to solve problems • Inventing (technology)	

Usable-Applicative Principles

Explanatory-Predictive, Theoretical Principles

Active-Relational, Interactive Principles

Static-Organizational Principles



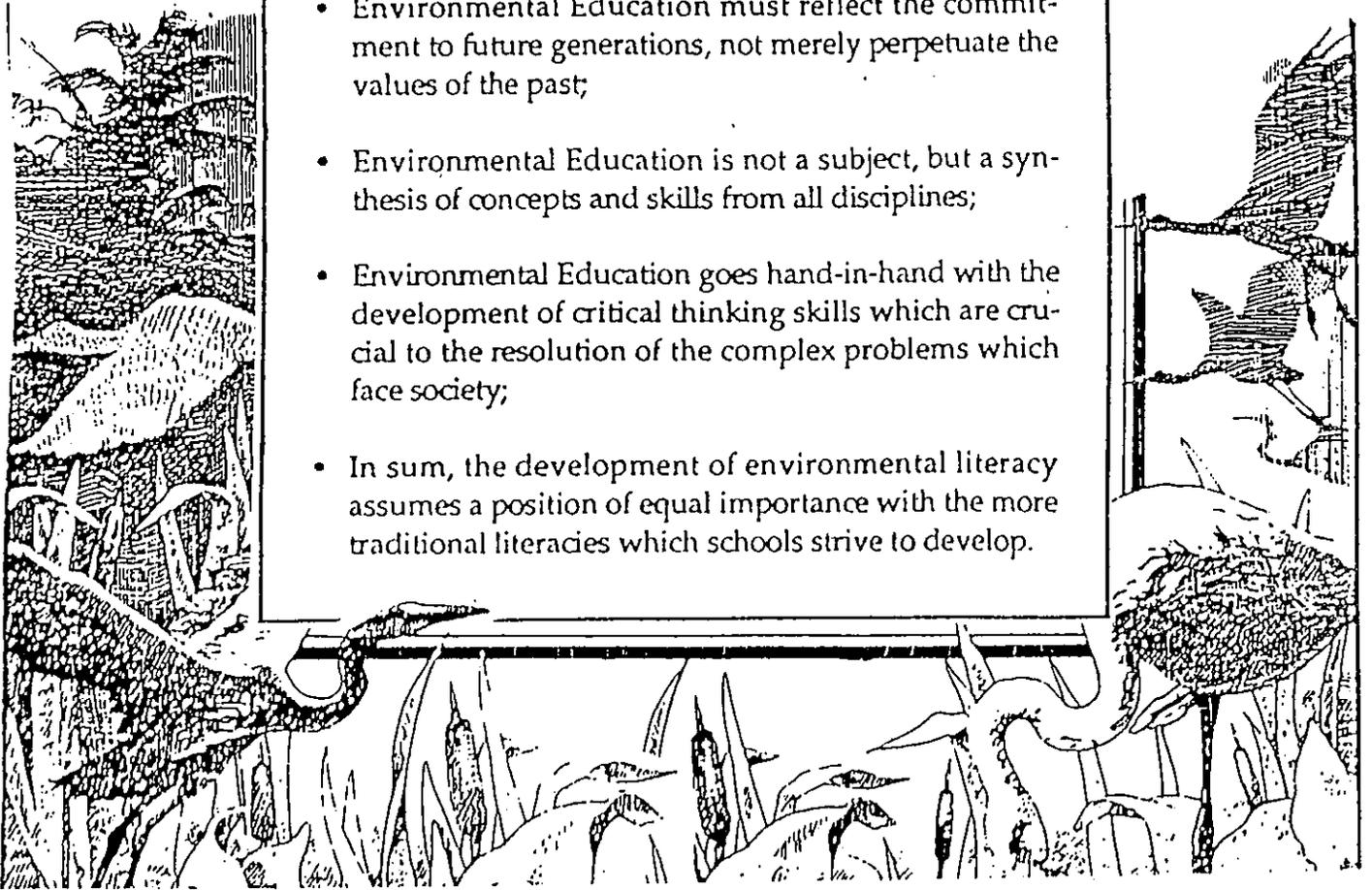
\* These processes include the application of appropriate mathematical concepts and skills in interpreting data and solving problems.

Taken from: Science Framework Addendum for California Public Schools, California State Department of Education, 1984, p. 4.

## A Point of View

The quality of the environment and the quality of life for the inhabitants of planet Earth are directly related. The primary goal of Environmental Education is to develop citizens who are knowledgeable about the environment and involved in working toward a more liveable future. This goal is based upon the following assumptions:

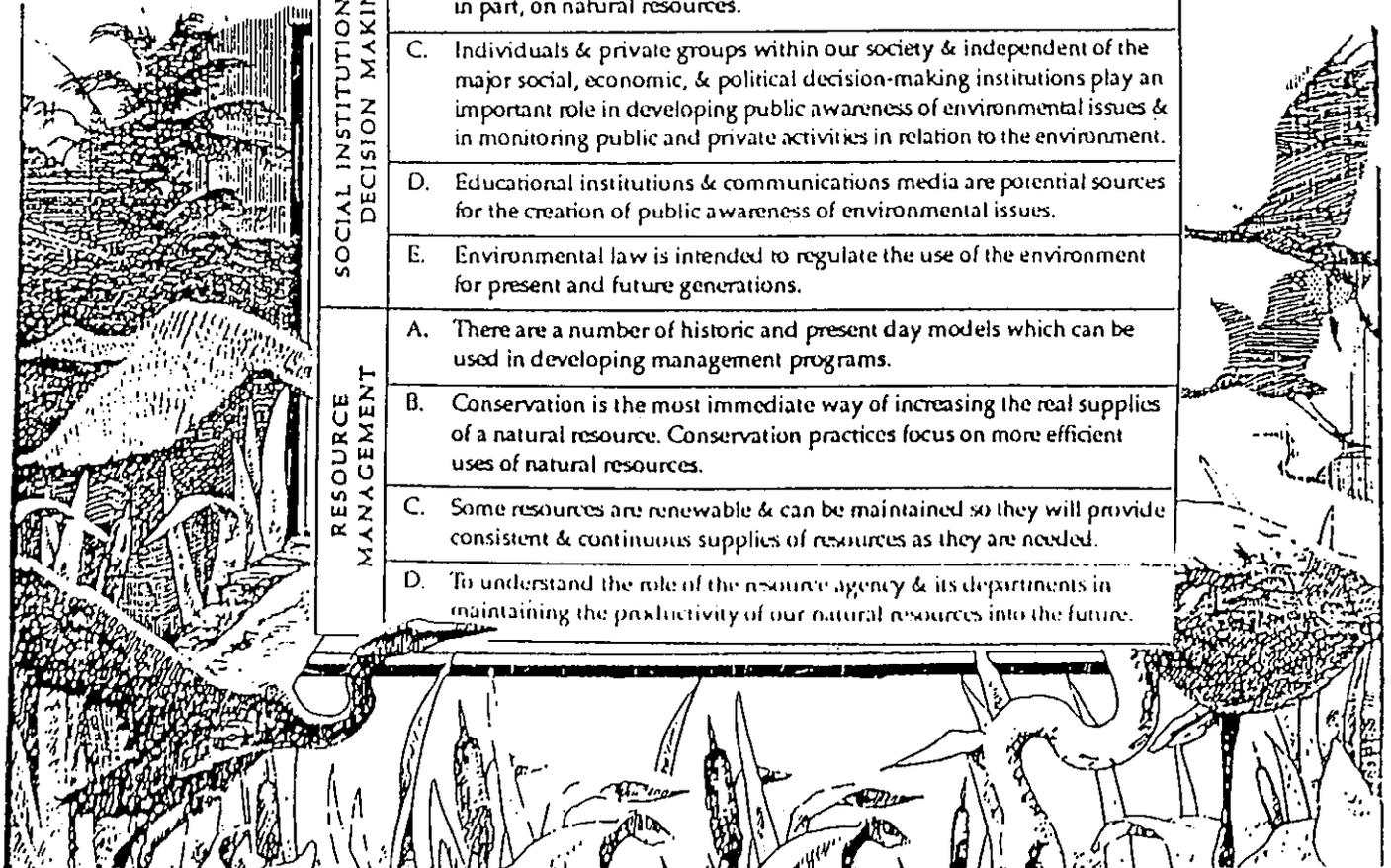
- The environment is not only biophysical; it is also aesthetic, economic, social, political, and intrapsychic as well;
- Environmental Education must promote an environmental ethic in which people are not exploiters of the environment but are stewards concerned with the preservation of all life systems;
- Environmental Education must reflect the commitment to future generations, not merely perpetuate the values of the past;
- Environmental Education is not a subject, but a synthesis of concepts and skills from all disciplines;
- Environmental Education goes hand-in-hand with the development of critical thinking skills which are crucial to the resolution of the complex problems which face society;
- In sum, the development of environmental literacy assumes a position of equal importance with the more traditional literacies which schools strive to develop.



Taken from: The Eagle, An Educator's Guide to Environmental Education, The Pomona Valley Audubon Society, 1989, p.5.

## ENVIRONMENTAL EDUCATION CONCEPTS AND GOALS

NATURAL ENVIRONMENT	A. The natural environment functions according to patterns of established relationships between living and nonliving things.
	B. All species of plants and animals live in habitats and many species exploit more than one habitat in order to meet their needs.
	C. The sun is the ultimate source of energy which all life on earth needs in order to exist.
	D. The environment is being shaped continually by naturally & humanly produced forces which can alter the balance of conditions & lead to changes in the plants & animals which are able to exist.
BUILT ENVIRONMENT	A. Built environments depend on resources from the natural environment for survival.
	B. The design and maintenance of built environments have both reflected and influenced the values, ethics and lifestyles of the inhabitants.
	C. Built and natural environments function in similar ways and share many basic needs for survival and growth.
SOCIAL INSTITUTIONS AND DECISION MAKING	A. Environmental problems transcend political entities, state and national boundaries & cultural differences.
	B. The goals for every society include economic prosperity which is based, in part, on natural resources.
	C. Individuals & private groups within our society & independent of the major social, economic, & political decision-making institutions play an important role in developing public awareness of environmental issues & in monitoring public and private activities in relation to the environment.
	D. Educational institutions & communications media are potential sources for the creation of public awareness of environmental issues.
	E. Environmental law is intended to regulate the use of the environment for present and future generations.
RESOURCE MANAGEMENT	A. There are a number of historic and present day models which can be used in developing management programs.
	B. Conservation is the most immediate way of increasing the real supplies of a natural resource. Conservation practices focus on more efficient uses of natural resources.
	C. Some resources are renewable & can be maintained so they will provide consistent & continuous supplies of resources as they are needed.
	D. To understand the role of the resource agency & its departments in maintaining the productivity of our natural resources into the future.



Taken from: The Eagle, An Educator's Guide to Environmental Education, The Pomona Valley Audubon Society, 1989, p.6.

**Exhibit C**

*Florida Scrub-jay Habitat Management Plan for the Lyonia Preserve Phase II and Phase III  
Project Site, Volusia County, Florida, revised on March 15, 2004*

98094

**FLORIDA SCRUB-JAY HABITAT MANAGEMENT PLAN FOR THE  
LYONIA PRESERVE PHASE II AND PHASE III PROJECT SITE,  
VOLUSIA COUNTY, FLORIDA**

Revised:  
March 15, 2004

Prepared for:

Ms. Saralee L. Morrissey, AICP  
Director of Site Acquisition  
and Intergovernmental Coordination  
Volusia County School District  
3750 Olson Drive  
Daytona Beach, FL 32124

Prepared by:

  
Robert G. Epperson, Jr., M.S.  
President

## EXECUTIVE SUMMARY

This habitat management plan is an attachment to a Memorandum of Understanding (MOU) between the County of Volusia, Florida (County), the School Board of Volusia County, Florida (School Board), and the U.S. Fish and Wildlife Service (Service) for the Lyonia Preserve Phase II and Phase III project site. The specific goal of the Lyonia Preserve Phase II and Phase III habitat management plan is to perpetuate optimal habitat for the Florida scrub-jay (*Aphelocoma coerulescens*). Lyonia Preserve will provide a conservation area to offset or compensate for impacts to the scrub-jay from County public works and School Board projects.

The habitat management plan and draft MOU were initially provided to the Service on December 14, 2001 for review and comment, and written comments were issued by the Service on March 11, 2003. The County, School Board and Service met on June 16, 2003 to discuss the written comments, and to resolve outstanding issues concerning the habitat management plan and the MOU. Among the main concerns were issues related to xeric habitat management, cat predation, public access, and potential roadway mortality. Revisions to address these issues were incorporated into the habitat management plan and MOU, and provided to the Service in drafts dated January 16, 2004. Based on February 25, 2004 written comments from the Service, all issues were adequately addressed, and minor revisions were requested for the reporting requirements, which have been incorporated into the final habitat management plan and final MOU, dated March 15, 2004.

The importance of the xeric habitat component has been emphasized in this habitat management plan. The maintenance of suitable vegetative structure has been included along with specific criteria that define optimal habitat conditions. Habitat management and maintenance are now proposed to be performed based on routine assessment of the habitat criteria, and a combination of prescribed fire and/or mechanical restoration and enhancement methods will be implemented based on actual habitat conditions as opposed to the broad window for management and maintenance proposed in the earlier draft of this plan. Management activities and potential future adaptive management strategies have been included to address the issues of cat predation, public access, and potential roadway mortality. During the meeting referenced above, it was agreed that if these issues were addressed to the satisfaction of the Service, mitigation credits would be assigned at 2:1 for occupied habitat and 3:1 for unoccupied habitat. This habitat management plan has been revised accordingly, and fully addresses the issues and concerns of the Service.

The Florida scrub-jay is an endemic species listed as threatened by both the Service and the Florida Fish and Wildlife Conservation Commission (Commission). Florida scrub-jay populations occur in three distinct areas of Volusia County; the southwest, northeast, and southeast. Due to the extent of scrub-jay habitat, the County and the School Board anticipate that County public works and School Board projects currently planned and/or future projects will result in adverse impacts to populations of the Florida scrub-jay.

Section 16, Township 18 South, Range 31 East, is a land tract that was reserved for public education by an Act of Congress in 1845, and was leased for fifty years by the School Board in

## EXECUTIVE SUMMARY (Continued)

1987. The Section 16 lands currently contain two elementary schools, a middle school, a school bus transportation facility, a public library/environmental learning center, and the Daytona Beach Community College Deltona Campus. The School Board has determined that surplus lands are available in Section 16; therefore, a remainder of land totaling 357.08 acres can be utilized for non-facilities related educational activities. Given the management alternatives available and recognition of the increased need to provide listed species mitigation, the School Board designated those Section 16 lands not slated for development, now known as the "Lyonia Preserve," to serve as a scrub habitat mitigation management area.

In 1993, permits were obtained to establish the northwestern 100.01 acres, Phase I of the Lyonia Preserve, as a Florida scrub-jay mitigation area to offset impacts to four scrub-jay families associated with a County public works project, the West Volusia Beltline. As part of the mitigation, a habitat management plan was developed with the initial management consisting of scrub restoration through removal of the pine tree canopy, and creation of openings within the scrub vegetation. Prior to the 1994 habitat restoration, no scrub-jays had been documented; by the year 2000, the 100.01 acres provided habitat for 11 families of scrub-jays. Due to the success of Phase I, the School Board and the County have developed a MOU with the Service to utilize Phase II and Phase III of the Lyonia Preserve as scrub-jay habitat mitigation. A habitat management plan is required as part of the MOU.

Formal surveys were conducted on the Lyonia Preserve in 2000 to obtain current numbers of scrub-jays and numbers of families, and to define territory limits. This survey represented the first complete survey of all three phases of the project site conducted since 1992, and provided an update of the comprehensive Phase I and II survey last performed in 1996. A total population of 88 Florida scrub-jays was estimated on the Lyonia Preserve based on the results of the 2000 survey. This population estimate represents an increase of 70 birds compared to the 18 scrub-jays found on the project site during the last formal survey that was performed in 1996. In addition, successful breeding and production of young scrub-jays has been documented on the Lyonia Preserve during each of the last eight years, and the present 2003 population is estimated to exceed over 100 scrub-jays. Response by scrub-jays to the habitat management has been significant, particularly given that no scrub-jays occupied Section 16 prior to the Phase I enhancement.

The previous habitat management conducted on the Lyonia Preserve has resulted in a large population of scrub-jays distinguished by a greater average number of birds per family and a higher density of territories per unit area than has been reported for most other scrub-jay populations. Based on these characteristics, an assessment of the habitat encompassed by the 20 scrub-jay territories found on the Lyonia Preserve was performed to provide insight and guidance for future management activities.

Habitat quality and group size are the primary variables affecting territory size, and oak scrub interspersed with numerous sandy openings comprises essential scrub-jay habitat. The Phase I

## EXECUTIVE SUMMARY (Continued)

area contains 65% managed xeric oak and 31% total open habitat. These data suggest that oak scrub is an essential habitat component, and that higher densities of scrub-jays may occur within smaller areas of xeric oak that are managed to maintain appropriate vegetative structure and composition for both the xeric and open habitat components.

The specific goal of the Lyonia Preserve Phase II and III habitat management plan is to perpetuate optimal habitat for the Florida scrub-jay. The management techniques for these future phases will expand on the methodologies employed under Phase I. Overall management targets for Phases II and III include the provision of 35% total open habitat and 65% managed xeric habitat with less than 1% forested habitat. The initial management activity for both Phase II and Phase III will be a fuel wood harvest of sand pine canopy trees from the overgrown scrub habitats. For Phase II, only a buffer of sand pine remains along the south and west boundaries. The majority of Phase III is vegetated by both sand pine and xeric flatwoods, which will be completely harvested. Prescribed fire and/or mechanical methods will be the selected techniques used to manage the Phase II and III areas, and will be applied on an individual management cell basis. Subsequent maintenance will be performed and specific techniques prescribed based on assessment of actual habitat conditions. Additional openings in the xeric habitat needed by the scrub-jays can be created by a variety of mechanical means, including root raking, which will be the selected technique used to create managed open habitat. Maintenance through periodic mowing of the trails, including fire breaks, will be performed annually, or as needed, to preclude the re-vegetation of these openings by scrub and other woody species.

Establishment of the Lyonia Preserve Florida Scrub-Jay Mitigation Park will provide a conservation area to offset or compensate for impacts to the scrub-jay from County public works and School Board projects. Phase II of the Lyonia Preserve is currently occupied by the Florida scrub-jay and contains 120.69 acres of habitat that is suitable for restoration, management and use as mitigation. Phase III is not currently occupied by scrub-jays, however, it contains 126.50 acres of habitat that is suitable for restoration, management and use as mitigation. Mitigation credits available to the County and School Board will be determined based on scrub-jay occupancy and habitat quality. Scrub-jays already occupy Phase II, and a mitigation ratio of 2:1 will apply to Phase II once optimal habitat conditions have been documented. Mitigation credits for Phase III will occur at a 3:1 mitigation ratio, given that the area is unoccupied habitat. The number of mitigation credits potentially available in Phase II of the Lyonia Preserve is 60.34, which is based on a mitigation ratio of 2:1 for occupied habitat applied to a total available habitat area of 120.69 acres. Phase III of the Lyonia Preserve would have 42.17 mitigation credits available based on a mitigation ratio of 3:1 for unoccupied habitat applied to a total available habitat area of 126.50 acres. The credits available for Phase III will be re-evaluated once the area becomes occupied, and the 2:1 ratio will apply as the phase becomes occupied and optimal habitat conditions are achieved.

## TABLE OF CONTENTS

### EXECUTIVE SUMMARY

1.0	INTRODUCTION .....	1
1.1	Section 16 Description .....	1
1.1.1	School Board Lease Agreement .....	1
1.1.2	Land Management Plan and Designated Uses .....	2
1.2	Previous Florida Scrub-Jay Mitigation .....	3
1.3	Lyonia Preserve Habitat Management Goals .....	3
2.0	SITE DESCRIPTION .....	4
2.1	Environmental Setting .....	4
2.2	Soil Types .....	5
2.3	Land Use and Cover Types .....	5
2.3.1	Phase I - North Management Area .....	7
2.3.2	Phase II - South Management Area .....	7
2.3.3	Phase III - East Management Area .....	7
2.4	Fish and Wildlife Habitats .....	8
2.4.1	Fish and Wildlife Occurrence .....	8
2.4.2	Listed Species Occurrence .....	8
3.0	STATUS OF THE FLORIDA SCRUB-JAY .....	9
3.1	Occurrence in Volusia County .....	9
3.2	Previous Section 16 Florida Scrub-Jay Surveys .....	10
3.3	2000 Lyonia Preserve Florida Scrub-Jay Survey .....	11

## TABLE OF CONTENTS (Continued)

3.3.1	Playback Testing	11
3.3.2	Survey Methodology	12
3.3.3	Florida Scrub-Jay Survey Results	13
3.3.3.1	Number of Families, Group Size and Family Composition	13
3.3.3.2	Territory Extent	14
3.3.3.3	Population Density	15
3.3.3.4	Spatial Structure	16
4.0	FLORIDA SCRUB-JAY HABITAT ASSESSMENT	16
4.1	Territory Habitat Composition	17
4.2	Comparison of Territories in Phase I and Phase II Areas	17
4.2.1	Group Size	18
4.2.2	Habitat Composition	18
4.2.2.1	Managed Open Habitat	19
4.2.2.2	Un-Managed Open Habitat	19
4.2.2.3	Total Open Habitat	19
4.2.2.4	Managed Xeric Habitat	20
4.2.2.5	Forested Habitat	21
4.2.2.6	Unsuitable and Unoccupied Habitat	22
4.3	Phase I North Management Area Habitat Management	22
4.3.1	Baseline Conditions and Habitat Restoration	22
4.3.2	Habitat Maintenance	23
4.4	Comparison of Habitat Management Techniques	24
4.5	Habitat Management Recommendations	24
5.0	LYONIA PRESERVE PHASES II AND III HABITAT MANAGEMENT PLAN	25
5.1	Management Cells	26

## TABLE OF CONTENTS (Continued)

5.2	Habitat Management and Maintenance Techniques .....	27
5.2.1	Initial Restoration of Xeric Oak - Fuel Wood Harvest .....	27
5.2.2	Initial Enhancement of Created Open Habitat - Root Raking .....	28
5.2.3	Habitat Maintenance - Prescribed Fire and Mechanical Methods .....	29
5.2.4	Nuisance and Exotic Plant Control .....	30
5.3	Habitat Management and Maintenance Schedule .....	31
5.4	Adaptive Management .....	31
5.4.1	Management of Public and Educational Uses .....	32
5.4.2	Management of Feral and Domestic Cats .....	32
5.4.3	Management of Potential Roadway Mortality .....	33
5.5	Other Future Land Uses .....	33
5.6	Management and Maintenance Funding .....	34
6.0	MITIGATION CREDIT ESTABLISHMENT AND ALLOCATION .....	35
6.1	Available Mitigation Credits .....	35
6.2	Mitigation Service Area, Credit Users, and Withdrawal of Credits .....	36
6.3	Future Credit Determination for Phase III - East Management Area .....	37
7.0	FLORIDA SCRUB-JAY OCCURRENCE AND HABITAT MONITORING .....	37
7.1	Florida Scrub-Jay Occurrence Monitoring .....	37
7.2	Habitat Monitoring .....	37
7.3	Monitoring of Other Potential Impacts .....	38
7.4	Reporting .....	38

## LITERATURE CITED

## TABLE OF CONTENTS (Continued)

### LIST OF FIGURES

- Figure 1. Location of the Lyonia Preserve Project Site, Section 16, Township 18 South, Range 31 East, Volusia County, Florida
- Figure 2. Soils of the Lyonia Preserve Project Site, Volusia County, Florida
- Figure 3. Land Use and Cover Types on the Lyonia Preserve Project Site, Volusia County, Florida (map pocket)
- Figure 4. Location of Florida Scrub-Jay Survey Transects and Playback Stations on the Lyonia Preserve Project Site, Volusia County, Florida, March 2000
- Figure 5. Estimated Florida Scrub-Jay Territories on the Lyonia Preserve Project Site, Volusia County, Florida, March 2000
- Figure 6. Florida Scrub-Jay Territory Size Relative to Group Size on the Lyonia Preserve Project Site, Volusia County, FL, March 2000
- Figure 7. Florida Scrub-Jay Territory Size Relative to Percentage of Managed Open Habitat on the Lyonia Preserve Project Site, Volusia County, FL, March 2000
- Figure 8. Florida Scrub-Jay Territory Size Relative to Percentage of Un-Managed Open Habitat on the Lyonia Preserve Project Site, Volusia County, FL, March 2000
- Figure 9. Florida Scrub-Jay Territory Size Relative to Percentage of Total Open Habitat on the Lyonia Preserve Project Site, Volusia County, FL, March 2000
- Figure 10. Florida Scrub-Jay Territory Size Relative to Percentage of Managed Xeric Habitat on the Lyonia Preserve Project Site, Volusia County, FL, March 2000
- Figure 11. Florida Scrub-Jay Territory Size Relative to Percentage of Forested Habitat on the Lyonia Preserve Project Site, Volusia County, FL, March 2000
- Figure 12. Typical Tract and Cell Structure of Section 16, Deltona, FL. (Taken from Young and Palmer 1992)
- Figure 13. Habitat Management Plan for Phase II and Phase III of the Lyonia Preserve Project Site, Volusia County, Florida (map pocket)

## TABLE OF CONTENTS (Continued)

Figure 14. Florida Scrub-Jay Mitigation Service Area for the Lyonia Preserve

### LIST OF TABLES

- Table 1. Land Use and Cover Types on the Lyonia Preserve Project Site, Section 16, Volusia County, Florida
- Table 2. Florida Scrub-Jay Numbers and Family Composition for the Lyonia Preserve Project Site, Section 16, Volusia County, Florida, March 2000
- Table 3. Estimated Florida Scrub-Jay Territory Size and Number of Family Members for the Lyonia Preserve Project Site, Volusia County, Florida, March 2000
- Table 4. Summary of Habitat Types for the Florida Scrub-Jay Territories on the Lyonia Preserve Project Site, Volusia County, Florida, March 2000
- Table 5. Florida Scrub-Jay Habitat Management Recommendations for the Lyonia Preserve Project Site, Volusia County, Florida
- Table 6. Summary of Habitat Types by Management Cell for the Phase II South Management Area on the Lyonia Preserve Project Site, Volusia County, Florida
- Table 7. Summary of Habitat Types by Management Cell for the Phase III East Management Area on the Lyonia Preserve Project Site, Volusia County, Florida
- Table 8. Proposed Schedule for Management and Maintenance Activities for the Lyonia Preserve Project Site, Volusia County, Florida

APPENDIX Section 16 School Board Lease

## **1.0 INTRODUCTION**

The County of Volusia, Florida (County) and the School Board of Volusia County, Florida (School Board) anticipate that County public works and School Board projects currently planned and/or future projects will result in adverse impacts to populations of the Florida scrub-jay (*Aphelocoma coerulescens*) in Volusia County. The Florida scrub-jay is listed as a threatened species by both the U.S. Fish and Wildlife Service (Service) and the Florida Fish and Wildlife Conservation Commission (Commission). The School Board has previously established that portion of the Section 16 land known as the "Lyonia Preserve" as a conservation area that allows for natural resource impacts to be mitigated through the management of important wildlife habitats. The County has mitigated previous unavoidable impacts to the scrub-jay within Phase I of the Lyonia Preserve. Based on the availability of the Section 16 to be designated as preservation lands and the success realized in Phase I, the Lyonia Preserve provides a unique opportunity to establish additional Florida scrub-jay habitat mitigation areas in order to mitigate for unavoidable impacts to this listed species resulting from County public works and School Board projects.

The purpose of this habitat management plan is to document the technical foundation for implementing the Lyonia Preserve Phase II and III Florida scrub-jay mitigation areas, and to provide the basis for determining the total number of available mitigation credits. This habitat management plan was prepared as a supporting attachment to the Memorandum of Understanding between the County of Volusia, Florida, School Board of Volusia County, Florida, and U.S. Fish and Wildlife Service for the Lyonia Preserve Phase II and Phase III project site.

### **1.1 Section 16 Description**

The 357.08 acre Lyonia Preserve is located east of Interstate 4 in southwest Volusia County, Florida, along Providence Boulevard between Eustace Avenue and Elkcam Road in Section 16, Township 18 South, Range 31 East (Figure 1). Lyonia Preserve is part of a 640 acre Section 16 tract that was reserved for public education by an Act of Congress when Florida was admitted into the Union in 1845. In addition to the Lyonia Preserve, the balance of Section 16 currently contains two elementary schools, one middle school, a school bus transportation facility, a public library/environmental learning center, and a community college. An electrical power line traverses the section, and borders the northwest corner of Lyonia Preserve. Surrounding land uses adjacent to Section 16 include primarily residential development, along with agricultural and undeveloped woodlands to the east, and a golf course to the west.

#### **1.1.1 School Board Lease Agreement**

The School Board utilizes Section 16 for public education purposes through a lease agreement with the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida that

was executed through the Florida Department of Environmental Protection. The lease was executed on June 15, 1987 for a period of 50 years, and the School Board has approximately 34 years remaining on the lease as of the date of this habitat management plan. A copy of this lease (Lease Agreement No. 3403) is provided in the Appendix.

### **1.1.2 Land Management Plan and Designated Uses**

The Section 16 lease held by the School Board required preparation and submittal of a Land Management Plan, which was accomplished on May 22, 1990. The Land Management Plan provides the basic guidance for all management activities on the leased lands. Four management alternatives for Section 16 are available to the School Board: education, preservation, recreation, and development. The Land Management Plan retains education as the primary purpose, however, it recognizes the importance of preservation as a complement to education, and also acknowledges recreation, through nature and hiking trails, as another public purpose for which the tract could be used. The Land Management Plan indicates that current uses include the existing elementary schools, middle school, school bus transportation facility, public library/ environmental learning center, and the future community college. The School Board has determined that surplus lands are available in Section 16; therefore, a remainder of land totaling 357.08 acres can be utilized for non-facilities related educational activities.

Given the management alternatives available and recognition of the increased need to provide listed species mitigation, the School Board designated those Section 16 lands not slated for development to serve as a scrub habitat mitigation management area. The mitigation area was intended to compensate for County public works and School Board project impacts to the scrub-jay that will occur elsewhere in Volusia County. These surplus lands as designated in the Land Management Plan are currently known as the "Lyonia Preserve." This management action was predicated by an extensive history of environmental educational uses of the property, local environmental concerns, and a desire by the School Board to provide environmental education opportunities and proper management of the undeveloped lands. Prior to the School Board lease, the section was previously leased beginning in 1958 by the DeLand Chapter of the Future Farmers of America (FFA). An Educational Agricultural Demonstration Project was initiated by the FFA to manage the tract for its forest resources. In 1982, during development of the first school site, Deltona Lakes Elementary School, located in the southeast corner of the section, a large wet sinkhole was proposed to be filled during construction. Following opposition from community members and school officials, the wet sinkhole was preserved as a natural feature. Subsequently, the wet sinkhole was incorporated into nature trails associated with the Sand Pine Nature Center, which was established on 25 acres of Section 16 located adjacent to the school. The nature center has received numerous state and national awards for its environmental programs.

The School Board recognized that preservation of undeveloped lands on Section 16 would meet the basic purpose of public education by promoting environmental awareness, and combined this use with proposed land management practices that can enhance a threatened ecosystem. The

Land Management Plan specifically proposes restoration of scrub habitats, and indicates that the lands now known as the Lyonia Preserve should be managed as mitigation areas for listed scrub species such as the Florida scrub-jay. As such, this habitat management plan is a supplement to the Land Management Plan.

It is important to recognize that the Lyonia Preserve portion of Section 16 is not a typical public environmental land with underlying assumptions of future management for environmental benefit. As mandated by an Act of Congress, Section 16 is to be used for public education as a first priority. The School Board retains the options of using the land for education, preservation, recreation, and/or development. Prior to designation of the Lyonia Preserve in the approved Land Management Plan as a preservation and scrub habitat mitigation management area, the other options were fully evaluated. As previously described, the School Board did not foresee the need to construct additional schools on the property. The next alternative was to fence the unused portion of the tract and leave it untouched. Simple preservation was not proposed because that option would fail to restore the scrub habitats and forfeit a rare opportunity to provide an environmental learning experience. The remaining option was to relinquish leasehold interest and recommend the uncommitted acreage for surplus. At this point, the property could have been leased by another state agency, and potentially developed for a number of uses, such as a state prison, or even sold for private development. This option would have released the School Board from the obligation of managing a large tract of land. However, it would have also ceded a long held interest by Volusia County in one of the last two remaining section 16's, and would have precluded the opportunity to provide present and future school children with educational benefits intended by the legislative act.

## **1.2 Previous Florida Scrub-Jay Mitigation**

The foresight shown by the School Board in designating a portion of Section 16 for environmental preservation and management provided the opportunity for the initial restoration of scrub habitats on the Lyonia Preserve. In 1994, the northwestern 100.01 acres of the Lyonia Preserve was established as a Florida scrub-jay mitigation area to offset impacts to four scrub-jay families associated with a County public works project, the West Volusia Beltline. This area became Phase I of the scrub-jay mitigation project, and is also known as the North Management Area. The initial habitat management basically consisted of removal of the tree canopy, and creation of openings within the remaining scrub vegetation as discussed in further detail in Section 4.3 of this habitat management plan. Prior to the 1994 habitat restoration, no scrub-jays had been documented in the Phase I area; by the year 2000, Phase I provided habitat for 11 families of scrub-jays as detailed in Section 3.3.3 of this habitat management plan.

## **1.3 Lyonia Preserve Habitat Management Goals**

The specific goal of the Lyonia Preserve habitat management plan is to perpetuate optimal habitat for the Florida scrub-jay. Scrub habitat will be restored and managed to enhance and maintain the

numbers and distribution of scrub-jays within the Lyonia Preserve. Implementation of habitat management activities will establish a conservation area available to offset or compensate for impacts to the scrub-jay from County public works and School Board projects, and to further the conservation of the scrub-jay in Volusia County. The management techniques employed in Phase I provide a basis for restoration of scrub habitats in Phases II and III, and the resulting success in site colonization by scrub-jays in Phase I appears unparalleled. Alternative scrub habitat management practices have been used on many other restoration sites with varying degrees of success, and improved management techniques will undoubtedly be developed in the future. Therefore, the use of adaptive management strategies will be integral to attaining the habitat management goals.

## **2.0 SITE DESCRIPTION**

### **2.1 Environmental Setting**

The 357.08 acre Lyonia Preserve is one of the largest remaining undeveloped tracts of land in the Deltona, Florida area. Providence Boulevard extends north-south through Section 16, and defines the boundaries for the various scrub-jay mitigation area phases. The existing 100.01 acre Phase I area occurs in the northern portion of the lands located west of Providence Boulevard, and Phase II, 127.32 acres, is found immediately south. The Phase III area is 129.75 acres, and occurs east of Providence Boulevard.

Phase I is bounded to the north by the public library/environmental learning center, to the northwest by the electrical power line and a middle school, to the west by residential and golf course development, to the south by Phase II, and to the east by Providence Boulevard. Phase II is bounded to the west by residential and golf course development, to the south by residential development, to the east by Providence Boulevard, and to the north by Phase I. Phase III is bounded to the west by Providence Boulevard, to the south by residential development, to the southeast by the Deltona Lakes Elementary School, to the east by low density housing and undeveloped woodlands, to the north by wetlands, and to the northwest by the future community college site.

Prior to the habitat restoration activities conducted for Phase I, the site was dominated by a closed canopy of mature sand pine (*Pinus clausa*). The Phase III area east of Providence Boulevard still retains its dominance by sand pine, although the northern portion is interspersed with xeric flatwoods, sand pine, freshwater marsh, and deep marsh wetlands. The pines have been removed from the project site west of Providence Boulevard, except for buffer areas along the south and west property boundaries. This western portion of the site is characterized by extensive xeric oak habitat interspersed with natural marshes and associated herbaceous uplands, and within Phase I, numerous man-made clearings created during initial site restoration.

The topographic relief on the Lyonia Preserve varies from undulating sandhills found above the 80 feet NGVD elevation contour to depressional wetlands that lie below the 15 feet NGVD contour.

## 2.2 Soil Types

There are six soil types found on the project site as mapped in the "Soil Survey of Volusia County, Florida" prepared by the U.S.D.A. Soil Conservation Service (1980), now known as the Natural Resources Conservation Service (NRCS): Daytona sand, 0 to 5 percent slopes (17); Myakka fine sand (32); Myakka fine sand, depressional (33); Orsino fine sand, 0 to 5 percent slopes (37); Paola fine sand, 0 to 8 percent slopes (42); and Paola fine sand, 8 to 17 percent slopes (43) (Figure 2).

As designated by the NRCS, only one hydric, or wetland, soil type, occurs on the project site, Myakka fine sand, depressional (33). This soil type is mapped within the northeast portion of Phase III and generally coincides with freshwater marsh and deep marsh habitats, although its actual occurrence on-site is not as extensive as mapped.

The remaining soil types are considered upland soils by the NRCS. The Myakka fine sand (32) soil type typically occurs in depressions in the flatwoods, and the natural vegetation is upland grasses; this soil type is found on-site in herbaceous uplands surrounding the marshes. The Daytona sand, 0 to 5 percent slopes (17), Orsino fine sand, 0 to 5 percent slopes (37), Paola fine sand, 0 to 8 percent slopes (42), and Paola fine sand, 8 to 17 percent slopes (43) dominate the project site, and are moderately to excessively well drained soils that occur in association with undulating sandhills vegetated by sand pine-scrub oak and/or sand pine vegetation.

## 2.3 Land Use and Cover Types

Existing land uses and cover types were identified and mapped for the Lyonia Preserve project site based on groundtruthing and photo-interpretation of 1" = 200' true color aerial photography flown in 1998. Boundary surveys were used in production of the base map, which was scaled to overlay on the aerial photograph. A total of 16 different cover types was mapped on the 357.08 acre project site based on the "Florida Land Use, Cover and Forms Classification System" (FLUCFCS) (Florida Department of Transportation 1985). The cover types are depicted on the figure titled "Land Use and Cover Types on the Lyonia Preserve Project Site, Section 16, Volusia County, Florida," included in the attached map pocket as Figure 3. Acreages were calculated by cover type for each of the three phases, and are summarized in Table 1.

The western portion of the project site, including Phases I and II, is unique due to the previous mitigation performed for the West Volusia Beltline. The initial habitat management for the mitigation project consisted of removal of the tree canopy, and creation of openings, termed "managed open habitat," within the remaining scrub vegetation as discussed in further detail in Section 4.3 of this habitat management plan. The harvested areas were converted from a sand pine (413) cover type to a xeric oak (421) cover type following pine removal. The xeric oak (421) cover type is dominated by varying densities of four species of oak, including myrtle oak (*Quercus myrtifolia*), sand live oak (*Quercus geminata*), Chapman's oak (*Quercus chapmanii*),

and turkey oak (*Quercus laevis*). This managed cover type also contains rusty lyonia (*Lyonia ferruginea*) for which the site is named, young sand pine, saw palmetto (*Serenoa repens*), and low densities of various herbaceous species.

Creation of openings in the scrub resulted in a number of managed open habitat cover types for which individual FLUCFS codes were assigned, including the following: managed trail, 50' wide (311); managed clearing (312); managed fire break, 15' wide (313); managed trail, 8' wide (314); other trails, 8' wide/existing, logging, and added trails (315); and managed nature trail, 4' wide (316). The managed openings, with exception of nature trails, were created by root raking to reduce the growth of oaks and to provide sandy open areas. The nature trails were created by hand clearing. Since the initial management by root raking in Phase I, the managed open habitats have re-vegetated with varying densities of young oaks, young sand pine, rusty lyonia, rosemary (*Ceratiola ericoides*), and numerous herbaceous species. Several listed plants have populated the managed openings as discussed in Section 2.4.2 of this habitat management plan.

Natural un-managed cover types found on the project site include herbaceous (310), xeric flatwoods (412), sand pine (413), mixed hardwood-conifer (434), freshwater marsh, seasonally dry (641), and emergent aquatic vegetation (644). The herbaceous (310) cover types are typically associated with the marsh areas, and occur as perimeter uplands dominated by broomsedge (*Andropogon virginicus*) and other upland grasses. Xeric flatwoods (412) are found in the northeast corner of Phase III, and consist of mixed longleaf pine (*Pinus palustris*) and scattered slash pine (*Pinus elliotii*) in the canopy, a subcanopy of xeric oaks (*Quercus* spp.), and saw palmetto in the ground cover. The sand pine (413) cover type contains a moderate to dense canopy of sand pine, an understory of various xeric oaks, and a ground cover dominated by saw palmetto. The mixed hardwood-conifer (434) cover type occurs adjacent to the marshes west of Providence Boulevard. This cover type includes a co-dominance of longleaf pine, slash pine, and sand live oak, along with occasional sweetgum (*Liquidambar styraciflua*).

The freshwater marsh, seasonally dry (641) cover type occurs in the central portion of the project site west of Providence Boulevard, and in the northeast corner of the property. This cover type is dominated by herbaceous wetland species, including maidencane (*Panicum hemitomon*), various sedges (*Cyperus* spp.) and rushes (*Rhynchospora* spp.), yellow-eyed grass (*Xyris* sp.), hat pin (*Eriocaulon compressum*), and bog button (*Lachnocaulon anceps*), along with several species of St. John's wort (*Hypericum* spp.). The marshes are ephemeral, and contain standing water generally only during the summer wet season. The emergent aquatic vegetation (644) cover type occurs in the lower central portions of two of the marshes. Fragrant water lily (*Nymphaea odorata*) is the dominant species, and standing water is present through most of the year in these deep marshes.

Several man-altered cover types, other than managed cover types, are found on the Lyonia Preserve. Mowed landscape/roadway grassland (317) occurs adjacent to Providence Boulevard, and is predominately bahiagrass (*Paspalum notatum*) that is mowed along the roadside. During construction of this roadway, borrow areas (742) were excavated as cut material to meet road

grades. These borrow areas (742) cover types consist of largely bare sand on steep slopes. The marshes found in the northeast corner of Phase III have been subjected to severe disruption by off-road vehicles. The surrounding uplands have been denuded of vegetation, and are classified as a sand, other than beach (720) cover type.

### **2.3.1 Phase I - North Management Area**

Phase I totals 100.01 acres and includes 13 different cover types (Figure 3). Approximately 26% of the North Management Area contains managed open habitat cover types totaling 26.07 acres. The xeric oak (421) cover type totals 65.52 acres, or 66% of Phase I. Remaining cover types include freshwater marsh, seasonally dry (641), herbaceous (310) cover types that border the marsh, and a forested mixed hardwood-conifer (434) stand that was left intact adjacent to the marsh to provide a buffer and increased habitat diversity.

### **2.3.2 Phase II - South Management Area**

Phase II totals 127.32 acres and includes 13 different cover types (Figure 3). The majority, 73%, of the South Management Area is vegetated by managed xeric oak (421) totaling 92.85 acres. Sand pine (413) was left intact along the south and west boundaries of Phase II to provide a buffer from adjacent residential development. Two areas of freshwater marsh, seasonally dry (641) occur within this phase, the largest of which contains an interior emergent aquatic vegetation (644) cover type and an adjacent perimeter herbaceous (310) cover type. Forested mixed hardwood-conifer (434) stands are found adjacent to the marshes.

A portion of Phase II was treated with managed clearings during the Phase I mitigation. This "4.59 Acre Area" occurs between the southern boundary of the east-west managed trail, 50' wide (311) cover type and the Phase I and Phase II boundary. For purposes of management, the 4.59 Acre Area is included in Phase I, however, for purposes of future scrub-jay mitigation credit, the 4.59 Acre Area remains in Phase II.

### **2.3.3 Phase III - East Management Area**

Phase III totals 129.75 acres and includes six different cover types (Figure 3). The majority, 82%, of the East Management Area contains forested cover types, including: xeric flatwoods (412), 11.79 acres; and sand pine (413), 94.50 acres. Several freshwater marsh, seasonally dry (641) cover types occur within this phase, the largest of which contains an interior emergent aquatic vegetation (644) cover type. The sand, other than beach (720) cover type occurs adjacent to these marshes.

## 2.4 Fish and Wildlife Habitats

As detailed in the previous section of this habitat management plan, the Lyonia Preserve contains a wide range of cover types that span the ecological spectrum from deep marsh to xeric oak habitats. Extensive management of Phase I and partial management of Phase II have increased the diversity of cover types, resulting in an increase in the availability and suitability of habitats for numerous fish and wildlife species, including a variety of listed species.

### 2.4.1 Fish and Wildlife Occurrence

A total of 91 fish and wildlife species have been observed on the Lyonia Preserve as documented by Volusia County Environmental Management staff (Sleister, pers. comm., 2000). Included are two fish, 10 amphibian, 12 reptile, 60 bird, and seven mammal species. Due to the occurrence of the Florida scrub-jay and the numerous other birds species found on-site, the Lyonia Preserve has been included by the Commission on a list of ecologically significant birding sites known as the Great Florida Birding Trail. Inclusion on the Trail is reflective of the uniqueness of the Lyonia Preserve and the habitat value it provides for birds and other wildlife.

### 2.4.2 Listed Species Occurrence

In addition to the Florida scrub-jay, the Lyonia Preserve currently provides suitable habitat for another 10 listed wildlife species, including the following species that have been documented to occur on-site: gopher frog (*Rana capito*); indigo snake (*Drymarchon corais couperi*); gopher tortoise (*Gopherus polyphemus*); little blue heron (*Egretta caerulea*); snowy egret (*Egretta thula*); white ibis (*Eudocimus albus*); southeastern American kestrel (*Falco sparverius paulus*); Florida sandhill crane (*Grus canadensis pratensis*); wood stork (*Mycteria americana*); and Florida mouse (*Podomys floridanus*). The County has performed several gopher tortoise relocations onto the Lyonia Preserve, and their burrows are readily evident in the managed open habitats. Prior to management in 1994, few tortoises were observed on-site, likely due to closed canopy conditions and the general absence of herbaceous ground cover, which is used as forage by the tortoise.

Several listed plant species have been documented to occur on the Lyonia Preserve, including jointweed (*Polygonella basiramia*), garberia (*Garberia heterophylla*), and Curtiss' milkweed (*Asclepias curtissii*). The listed species nolina (*Nolina brittoniana*), conradina (*Conradina brevifolia*), and scrub plum (*Prunus geniculata*) were planted on the Lyonia Preserve. Garberia and milkweed have been observed within the managed open habitats, and jointweed has been observed in several localities.

### 3.0 STATUS OF THE FLORIDA SCRUB-JAY

The Florida scrub-jay is the only avian species endemic to Florida, and is found primarily along well drained ancient interior and coastal dune systems that are vegetated by scrub (Fitzpatrick *et al.* 1991). Scrub, or xeric habitat, is also favored for citrus groves and land development, and consequently, significant decreases in the extent of scrub habitat have occurred in Florida. The remaining scrub exists as fragmented parcels that have decreased in suitability for the scrub-jay due to fire suppression, or lack of other management (Cox 1987). Scrub-jay populations have gradually declined as the scrub disappeared or became unsuitable.

Cox (1987) estimated the total scrub-jay population in 1984 to be 15,600 to 22,800 birds, potentially 50 percent less than levels that existed 100 years ago. Fitzpatrick *et al.* (1991) considered 50 percent to be an underestimate of the statewide decline. As of 1993, the total population was estimated to contain about 4,000 pairs, which suggested a 25 to 50 percent decrease from Cox's (1987) study (Stith *et al.* 1996). Based on an average scrub-jay family group size of 2.8 birds, Toland (1999) translated the 4,000 pair estimate to a total population of  $11,000 \pm$  scrub-jays present statewide in 1993. A recent assessment suggests that the current scrub-jay population is less than 10 percent of the historic population (Bowman and Woolfenden 1998).

Concurrent with decreased numbers, the geographical range of the scrub-jay has also declined such that the species is no longer present in 10 of the 39 formerly occupied counties, and five of the 29 remaining counties with scrub-jay populations have only 10 or fewer pairs (Fitzpatrick *et al.* 1994).

For this habitat management plan, a review of documented scrub-jay occurrence in Volusia County was performed, previous studies of the project site and vicinity were evaluated, and specific surveys were conducted on the Lyonia Preserve to obtain a current population estimate.

#### 3.1 Occurrence in Volusia County

Historical and current documentation of Florida scrub-jay occurrence in Volusia County was reported by Cox (1987) based on surveys conducted from 1980 to 1984. A population of 63 scrub-jays was estimated at 17 localities. The scrub-jay observations were clustered in three distinct areas of Volusia County; the southwest, northeast, and southeast. These population clusters are now considered to represent three separate metapopulations, which are defined as demographically independent populations separated by at least 12 km ( $7.5 \pm$  miles) (Stith, *et al.* 1996). Four of the localities documented by Cox (1987) occur within a five mile radius of the Lyonia Preserve, including two sites (Deltona No. 5 and Deltona No. 6) harboring 19 scrub-jays, which represented the largest concentration in the southwest metapopulation of Volusia County. Deltona No. 5 is located approximately one mile north of the Lyonia Preserve, and Deltona No. 6 is found about three miles to the south/southeast. Cox (1987) stated that these two sites would probably disappear given continued development in the Deltona area.

Toland (1999) reported that Cox's (1987) study missed a substantial number of smaller scrub-jay subpopulations and isolated family groups throughout Florida; among other localities, this undercount likely occurred for scrub-jays in Volusia County. Data from the most recent statewide scrub-jay surveys conducted in 1992-1993 indicate that 131 scrub-jays in 54 family groups occurred within the southwest metapopulation in Volusia County (Stith 1999). The southwest metapopulation generally extends from DeLand southward to DeBary and Osteen and encompasses the Lyonia Preserve project site.

### **3.2 Previous Section 16 Florida Scrub-Jay Surveys**

The earliest known assessment of the status of scrub-jays on Section 16 was provided by Peacock and Robinson (1989). The authors noted that no scrub-jays had been recorded to date on Section 16. Although specific survey methodologies were not reported, no scrub-jays were documented in their report. Reference was made to the scrub-jay occurrence on Section 9, the adjacent section to the north, as first described by Cox (1987).

Scrub-jay surveys were conducted on Section 16 and adjacent lands during development of the mitigation plan for Phase I (Young and Palmer 1992). The survey methodology employed standard playback of scrub-jay territorial calls. No scrub-jays were found on Section 16, and the researchers surmised that the absence of scrub-jays was due to the lack of suitable habitat. Two scrub-jay families, however, were located on adjacent lands. One family was observed in a partially developed residential area in the southwest quarter of Section 9, which is the adjacent section to the north. This family group contained five individuals, and appears to coincide with the Deltona No. 5 site reported by Cox (1987). The second family group was observed along the electrical power line approximately 1,000 feet west of Section 16. Although reported as a single family, observations of up to five individuals were documented at three separate locations extending over one mile southwest along the power line. This second scrub-jay family group was not previously reported by Cox (1987).

The Lyonia Preserve Phase I mitigation was initiated in February 1994 with timber harvesting that was completed in March 1994. A prescribed fire was conducted on the southeast management cell in April 1994. All initial management activities were completed by August 1994, including creation of the managed open habitats; additional details of the Phase I management techniques are provided in Section 4.3 of this habitat management plan. The first Florida scrub-jay, an individual bird, was documented on the Lyonia Preserve on September 3, 1994 (Sleister, pers. comm. 2000). The bird was seen in the eastern portion of Phase I near Providence Boulevard. The first scrub-jay family was observed on-site in Phase I on March 24, 1995, and three separate scrub-jay families were documented on June 16, 1995. The first scrub-jay observation in the Phase II portion of the Lyonia Preserve occurred on September 27, 1995.

Scrub-jay observations continued through 1995, and the first formal survey subsequent to initiation of the management activities was performed the following spring (Richardson 1996).

The survey was conducted from April 18, 1996 to May 6, 1996 using standard playback of scrub-jay territorial calls broadcast in a grid pattern that fully covered both Phase I and Phase II of the Lyonia Preserve. Based on the survey results, 18 individual scrub-jays representing six family groups were estimated to occur on the Lyonia Preserve. Although territories were not defined during Richardson's (1996) study, four scrub-jay families appeared to occupy the Phase I area, and two families used the Phase II area, which had been harvested but not treated with managed open habitat clearings, prescribed fire, or other enhancements.

### **3.3 2000 Lyonia Preserve Florida Scrub-Jay Survey**

Formal surveys were conducted on the Lyonia Preserve in 2000 to obtain current numbers of scrub-jays and numbers of families, and to define territory limits. This survey represented the first complete survey of all three phases of the project site conducted since 1992, and provided an update of the comprehensive Phase I and II survey last performed in 1996.

The surveys were greatly facilitated by the color-banding of scrub-jays that was initiated in August 1998. Prior to performing the 2000 survey, a total of 47 scrub-jays had been color-banded on the Lyonia Preserve by Volusia County Environmental Management in cooperation with the Florida Park Service (Sleister, pers. comm. 2000). One additional scrub-jay, wearing only a silver metal Service leg band, was known to be present prior to the survey, resulting in a potential occurrence of up to 48 banded individuals on the project site.

Standard surveying techniques based on tape playback of scrub-jay territorial vocalizations (Fitzpatrick *et al.* 1991) were used to locate scrub-jays as described below.

#### **3.3.1 Playback Testing**

Prior to conducting the survey, playback of scrub-jay territorial vocalizations obtained from the Archbold Biological Station (Archbold) was evaluated to determine effective distance in various habitat types and terrains representative of the project site. A handheld "boom-box" cassette tape player was used to provide playback at measured intervals along transects located through open habitats, low growth scrub, and densely forested areas. Playback was also tested across topographic gradients in the various habitats, including areas with higher elevations between the observation and playback locations.

The test results indicated that playback was readily detected at distances of up to 500 to 600 feet through open, level terrain. Playback was clearly audible at distances of up to 450 feet through low scrub and densely wooded areas and across uneven topography in all habitats.

### 3.3.2 Survey Methodology

The results of the playback testing and general knowledge of known scrub-jay locations from previous site studies were used to select survey transects and stations. A total of 22 survey transects representing 92 playback stations was established at varying intervals relative to habitat and topographic conditions to obtain effective coverage of all potential scrub-jay habitat on the Lyonia Preserve (Figure 4). Transects and playback stations were placed at more frequent intervals in the Phase I portion of the project site where higher densities of scrub-jays were known to occur. Numerous managed trails and clearings in Phase I and existing trails in Phase II aided in selection of playback locations, and facilitated plotting of stations and scrub-jay observations on aerial photographs.

Playback stations were located throughout the relatively open areas in the northern portion of Phase III. The southern portion of Phase III contains an extensive continuous canopy of dense sand pine, which was assumed to represent unsuitable habitat for the scrub-jay (Fitzpatrick *et al.* 1991). Therefore, playback stations were established around the perimeter of the southern portion of Phase III, and the densely wooded sand pine interior was not surveyed. Playback stations along the west side of Phase III were extended north along Providence Boulevard to determine if the scrub-jays known to be present west of the roadway were also utilizing areas to the east.

Scrub-jay surveys were timed to occur prior to nesting, and were performed between March 10, 2000 and March 28, 2000. Surveys generally began one hour after sunrise and continued until midday. No surveys were conducted during rain or windy conditions. During each playback, the time, temperature, wind speed and direction, barometric pressure, visibility, cloud cover, and precipitation were documented. Playback at each station was broadcast for at least one minute in all four cardinal directions. At the conclusion of the playback, observations continued for several minutes if an immediate response was not obtained, and on several occasions, playback was repeated to confirm the absence of scrub-jays.

The locations, numbers, and color-banding sequences of all observed scrub-jays were recorded. For the majority of the observations, the color-banding sequence, or lack of bands, was confirmed by at least two observers. Initial locations, territorial interactions, other pertinent behaviors, and direction and distance of departure were plotted on an aerial photograph based on compass bearing and distance data obtained for each observation.

The survey was conducted in two phases, with the initial phase targeted to cover all 92 stations and determine the presence or absence of scrub-jays. For those stations where scrub-jays were not observed, playback was repeated on at least one to two subsequent dates. The second phase of the survey involved determination of family groupings and territorial boundaries. Playback was repeated at stations where previous observations indicated the potential for occurrence of two or more separate scrub-jay families. In addition, playback was performed at 50 intermediate stations that were established to refine family numbers, family membership and territorial limits.

In total, 142 transect stations and intermediate stations were surveyed involving 199 playbacks. An intensive and thorough analysis of the survey data was performed to determine total numbers of birds, family affiliations, and territorial boundaries as presented in the following sections of this habitat management plan.

### **3.3.3 Florida Scrub-Jay Survey Results**

A total population of 88 Florida scrub-jays was estimated on the Lyonia Preserve based on the results of the 2000 survey (Table 2). This population estimate represents an increase of 70 birds compared to the 18 scrub-jays found on the project site during the last formal survey that was performed in 1996 (Richardson 1996). In addition, the Lyonia Preserve population as of this report date was estimated to exceed over 100 scrub-jays based on the observed nesting success during the subsequent breeding seasons following the 2000 survey (Sleister, pers. comm. 2003).

Response by scrub-jays to the habitat management has been considerable, particularly given that no scrub-jays occupied Section 16 prior to the Phase I enhancement, and only two groups of scrub-jays were documented in the immediate vicinity (Cox 1987; Young and Palmer 1992). These adjacent groups occur in suburban habitats that have been isolated from large scrub tracts. Breininger (1999) stated that scrub-jays in fragmented habitats can be an important source of individuals to colonize formerly unoccupied habitats that have been restored. Breininger (1999) also noted that dispersal distances were longer for scrub-jays residing in urban habitats than for birds found in natural landscapes where non-breeders typically disperse to adjacent territories. Given these dispersal patterns, in addition to dispersal that has undoubtedly occurred from the two nearby groups, it is likely that scrub-jays from other territories found on fragmented habitats within the southwest metapopulation have dispersed to the Lyonia Preserve.

Scrub-jay dispersal from isolated habitats is one of several mechanisms that can allow colonization of restored habitats. The extensive newly managed habitat on the Lyonia Preserve provided favorable conditions for population increases among the scrub-jays that dispersed to the project site. Available habitat also becomes occupied by territorial expansion and through a process known as territorial budding (Woolfenden and Fitzpatrick 1978). As a scrub-jay pair produces offspring that become helpers, productivity of the pair increases as more helpers are retained, which results in increased territory size. Male helpers frequently become breeders by inheriting a portion of the expanded natal territory and acquiring a mate, thereby, establishing a new territory that may also encompass available adjacent habitat. The population increase on the Lyonia Preserve, from 18 birds in 1996 to 88 birds in 2000, paralleled an increase in the number of family groups as discussed below.

#### **3.3.3.1 Number of Families, Group Size and Family Composition**

Based on the results of the 2000 survey, 20 separate family groups of Florida scrub-jays were estimated to occur on the Lyonia Preserve (Table 2). Groups varied in size from two to eight

individuals, and averaged 4.4 members per group. Only one group contained a simple mated pair, 25% of the groups contained three birds, 35% included four members, and 35% had five or more members. The average group size reported by Fitzpatrick *et al.* (1991) was three members, and although large groups are rare, extended-family groups of eight adults and one to four juveniles have been documented. Family No. 5 consisted of eight family members, the highest number among all groups, and may potentially constitute an extended-family group. The current number of family groups represents an increase of 14 families compared to the six families found in 1996 by Richardson (1996).

Color-banded scrub-jays were present in 15 of the 20 family groups (Table 2). The five families with no color-banded individuals occurred on territories found entirely within the Phase II portion of the project site, as discussed in the following section of this habitat management plan. To date, no banding activity has been conducted in the interior of the Phase II area. All groups contained unbanded members, except for Family No. 4 from which two of its members were banded on March 10, 2000 immediately prior to the survey.

A total of 45 color-banded scrub-jays was observed during the survey, which represents 94% of the 48 birds banded on the Lyonia Preserve prior to the survey. No juvenile plumage birds were color-banded due to the seasonal timing of the banding activities, and consequently the ages of individual birds are unknown. However, the survival rate of scrub-jays on the Lyonia Preserve appears to be very high since 50% of the colored-banded birds were banded from one to two years before the survey, and it is likely that a number of these birds were yearlings due to the recent colonization and population expansion on the Lyonia Preserve.

### 3.3.3.2 Territory Extent

Florida scrub-jay territories as depicted on Figure 5 were primarily estimated based on family group composition and observed locations, and numerous territorial interactions noted during the survey. Several assumptions were also formulated to refine the estimated territory configurations. Members of several of the scrub-jay families found along the northwest side of Phase I were observed off-site within the adjacent power line easement. This easement contains a mosaic of sand roads and trails, and open sandy areas interspersed with xeric oaks that are maintained as low shrubs, which in essence fits the classic description of preferred scrub-jay habitat (Fitzpatrick *et al.* 1991). Territories for Family Nos. 1, 2, 7, and 8 were assumed to extend off-site to fully encompass the adjacent power line easement. The assumed territory limits were terminated at the adjacent school site where fully developed areas and dense sand pine appeared unsuitable for use by scrub-jays.

Scrub-jays in Family Nos. 2 and 3 were observed in the grass areas on the south side of the parking lot of the Deltona Public Library located off-site to the north, and territory limits were extended to include these areas. Scrub-jays from the families adjacent to Providence Boulevard were seen within the grass area on the west side of the right-of-way on several occasions, and

rarely within the grass area on the east side. No observations occurred in the dense sand pine found in Phase III east of the roadway. The territories for Family Nos. 3, 4, 10, 11, and 20 were extended to the east side of the roadway. Few survey observations of scrub-jays occurred along the south and west boundaries, which contain a perimeter fire break bordered by a 100 feet wide zone of sand pine. However, numerous backyard bird feeders occur along the fire break, and the homeowners reported frequent scrub-jay sightings. Territories for Family Nos. 8, 15, 16, 17, 18, 19, and 20 were assumed to extend to the property boundaries.

Territory size was calculated for the 20 scrub-jay families based on the estimated extent, and segregated into the component on-site and off-site acreages (Table 3). Territory size ranged from 6.07 acres to 21.85 acres, and averaged 12.54 acres. All territories combined fully encompassed the 227.33 acres contained within Phases I and II of the Lyonia Preserve, and an additional 23.42 acres was included off-site, primarily within the power line easement and the right-of-way of Providence Boulevard. The smallest territories occurred within the Phase I area, while the largest territories were observed in Phase II (Figure 5).

As cited in Fitzpatrick *et al.* (1991), Woolfenden and Fitzpatrick (1984) reported that overall average territory size in good quality scrub-jay habitat at Archbold is 9.0 hectares (22.23 acres), and stable territories ranged in size from 4 to 18 hectares (10 to 45 acres). Also reported were data for the smallest stable territory sizes that ranged from 2 to 9 hectares (5 to 22 acres) and averaged 5.4 hectares (13.5 acres). Breininger *et al.* (1995) reported an average total territory size of 9.3 hectares (22.97 acres), based on data collected in 1991 at the Kennedy Space Center (KSC) in Brevard County, Florida. The scrub-jay territories consisted of patches of open oak, oak-palmetto, ruderal-maintained, and marsh habitats interspersed with the dominant vegetation, palmetto-lyonia. The average territory contained 6.5 hectares (16.05 acres) of palmetto-lyonia, a mesic association, and only 2.6 hectares (6.42 acres) of open oak and oak-palmetto; the latter associations more closely parallel the xeric oak habitat on the Lyonia Preserve compared to the other habitats at KSC. The smallest territories at KSC were observed where scrub oaks were adjacent to sandy areas among ruderal grass.

The 12.54 acre average territory size observed on the Lyonia Preserve is slightly smaller than the 13.5 acre average territory for small, but stable territories at Archbold. Average territory size on the project site is about half of the 22.97 acre average territory size reported at KSC. Territories at KSC were characterized by scattered patches of scrub in contrast to the extensive contiguous xeric oak found at the Lyonia Preserve.

### **3.3.3.3 Population Density**

Fitzpatrick *et al.* (1991) stated that the most useful measure of scrub-jay density is the number of territories defended within a unit of scrub area, and that mean density in prime habitat at Archbold was about five territories per 40 hectares (100 acres). Natural variation between about two to six territories per 40 hectares was observed. Larger territory sizes and corresponding lower densities

of between 2.5 and 3.5 territories per 40 hectares was noted for poor quality scrub habitats, which consisted of widely scattered oak patches interspersed with extensive areas of low saw palmetto and sparse oaks. In comparison with all previously reported data, Fitzpatrick *et al.* (1991) concluded that 6.5 territories per 40 hectares should be the maximum sustainable density of scrub-jays in optimal habitat. The scrub-jay density at the Lyonia Preserve is 7.9 territories per 40 hectares based on the observed 20 territories and a total combined territory extent of 250.75 acres.

#### **3.3.3.4 Spatial Structure**

Based on terminology described by Stith *et al.* (1996), a subpopulation of scrub-jays is spatially separated from other scrub-jays by gaps of 3.5 km (2.2 miles). This distance represents the maximum dispersal distance for 80% of all scrub-jay dispersals at Archbold, on which, along with the KSC, most studies of the Florida scrub-jay have been conducted (Breininger 1999). A metapopulation is separated by 12 km (7.5 miles), representing the maximum dispersal distance for more than 99% of all dispersals at Archbold (Stith *et al.* 1996). The scrub-jays residing on the Lyonia Preserve are members of the southwest metapopulation, one of three metapopulations defined in Volusia County by Stith, *et al.* (1996). The resident scrub-jays represent a significant portion of a subpopulation that appears to be centered on the project site. The scrub-jays found in the section to the north (Cox 1987), and the scrub-jays observed in the adjacent sections to the west and southwest (Young and Palmer 1992) would also be included within this subpopulation.

The Lyonia Preserve, with 20 family groups, forms the nucleus of a subpopulation that is greater in group size than 80% of all known scrub-jay subpopulations evaluated by Stith *et al.* (1996). Woolfenden and Fitzpatrick (1991) estimated that an isolated preserve must be large enough to support 20 to 40 breeding pairs of scrub-jays to allow a 90% chance of persisting for more than 100 years. Since the Lyonia Preserve already contains a scrub-jay population only exceeded by 20% of all known populations, the proposed Phase II and III management will enhance the current significance of the project site as future management is performed and the scrub-jay population increases accordingly.

## **4.0 FLORIDA SCRUB-JAY HABITAT ASSESSMENT**

Oak-dominated scrub, which is classified as the xeric oak (421) cover type, provides the essential habitat component for the scrub-jay. Optimal habitat is described as containing low-growing oaks between one and three meters in height that is interspersed with numerous patches of exposed sand, which can vary down to 10 to 15% open sand (Fitzpatrick *et al.* 1991). The Lyonia Preserve project site contains extensive coverage by the xeric oak (421) cover type, which has been managed in Phases I and II through the removal of the sand pine canopy. To replicate the open sandy component of optimal scrub-jay habitat, managed open habitat was created by clearing a variety of open areas, including wide and narrow trails, pocket clearings, and fire breaks. Scrub-jay territories often contain a variety of other natural herbaceous and forested

cover types that provide habitat. For the Lyonia Preserve, these cover types include herbaceous (310) grasslands, freshwater marsh, seasonally dry (641), and mixed hardwood-conifer (434), which were incorporated into the management area in their natural state.

The previous habitat management conducted on the Lyonia Preserve has resulted in a significant population of scrub-jays distinguished by a greater average number of birds per family and a higher density of territories per unit area than has been reported for most other scrub-jay populations. Based on these characteristics, an assessment of the habitat encompassed by the 20 scrub-jay territories found on the Lyonia Preserve was performed to provide insight and guidance for future management activities.

#### **4.1 Territory Habitat Composition**

Individual land use and cover types found within each separate scrub-jay territory were analyzed and grouped into the following primary habitat types: managed open habitat; un-managed open habitat; managed xeric oak habitat; forested habitat; and unsuitable habitat (Table 4). Managed open habitat includes the following cover types: managed trail, 50' wide (311); managed clearing (312); managed fire break, 15' wide (313); managed trail, 8' wide (314); other trails, 8' wide/ existing, logging, and added trails (315); managed nature trail, 4' wide (316); mowed landscape/ roadway grassland (317); and electrical power transmission line (832) the latter of which occur off-site. Un-managed open habitat includes herbaceous (310) grasslands, freshwater marsh, seasonally dry (641), and the bare sand borrow areas (742). Since the managed open habitat and un-managed open habitat provide openings, to varying degrees, that are required by scrub-jays, these habitat categories were combined into total open habitat for purposes of analysis. Forested habitat includes the sand pine (413) and mixed hardwood-conifer (434) cover types, which both contain an understory of scrub oak.

The managed open habitat, un-managed open habitat, and forested habitat constitute the suitable habitat types found on the Lyonia Preserve. On-site unsuitable habitat includes only the deep marsh, emergent aquatic vegetation (644) cover type. The roadway pavement (814) cover type is unsuitable habitat that occurs within several territories, however, this cover type occurs off-site.

#### **4.2 Comparison of Territories in Phase I and Phase II Areas**

The Phase I area contains the majority of the managed habitat on the Lyonia Preserve. The pine canopy was harvested from both Phases I and II to create managed xeric habitat, and although Phase II has become populated by scrub-jays, it has not been fully managed to provide the open managed habitat that was created in Phase I. As stated in Section 3.3.3.2 of this habitat management plan, the smallest scrub-jay territories occurred within the Phase I area, while the largest territories were observed in Phase II (Figure 5). It was postulated that this difference may be largely attributed to the lower percentage of total open habitat in Phase II, among other possible factors.

Woolfenden and Fitzpatrick (1978) found that habitat quality and group size are the most important variables affecting territory size. These variables were evaluated for the scrub-jay territories on the Lyonia Preserve with emphasis on the location of individual territories as follows. Three scrub-jay territories (Nos. 5, 6, and 9) occur entirely within the boundaries of the Phase I North Management Area (Figure 5). The limits of eight territories (Nos. 1, 2, 3, 4, 7, 8, 10, and 13) have greater than 50% extent within the Phase I area. Five scrub-jay territories (Nos. 16, 17, 18, 19, and 20) occur entirely within the boundaries of the Phase II South Management Area. The limits of the remaining four territories (Nos. 11, 12, 14, and 15) have greater than 50% extent within the Phase II area.

#### **4.2.1 Group Size**

Based on a scatter plot of all scrub-jay territories, the territory size does not appear to be related to group size (Figure 6). However, if the territories found entirely within Phase II are not considered, the remaining territories tend to increase in size as group size increases. Woolfenden and Fitzpatrick (1978) stated that a direct relationship exists between scrub-jay territory size and family group size, and provided supporting data demonstrating that pairs with two or more helpers occupied territories that averaged 50% to 100% larger than those occupied by simple pairs. In addition, territory size within individual families was noted to increase or decrease with comparable changes in family size. The five territories located entirely within Phase II have below average group sizes, yet, above average territory size, which appears to be related to location of these territories within the less intensively managed portion of the Lyonia Preserve.

In contrast, the three territories located entirely within Phase I have above average group size, yet, below average territory size. These smaller territories occur totally within habitats that have been intensively managed. The effect of habitat quality is also apparent at the extremes of group size observed on the Lyonia Preserve. The only territory that contained a single mated pair (No. 16) was located entirely within the Phase II area, whereas, the territory with the highest group size (No. 5) was located entirely within the Phase I area.

#### **4.2.2 Habitat Composition**

Based on the analysis presented in the previous section, it appears that smaller territories were occupied by larger groups for those scrub-jay families possessing territories in areas of higher quality habitat. The importance of habitat is also evidenced by the territories located entirely within the intensively managed areas, which had above average group size, yet below average territory size. The relationship between habitat type and territory size on the Lyonia Preserve is discussed in the following sections.

#### **4.2.2.1 Managed Open Habitat**

The percent coverage of managed open habitat within scrub-jay territories ranged from as little as 2% to a maximum of 57% (Figure 7). Territory size tended to decrease as the percentage of open managed habitat increased. The majority, 83%, of territories with more than 20% open managed habitat were smaller than the average territory size. All of these territories occurred within the Phase I area with exception of No. 11, which straddled both Phases I and II (Figure 5). The smallest territory (No. 1) had the highest coverage by managed open habitat (57%), and occurred in the Phase 1 area. The four largest territories (Nos. 16, 17, 18, and 19) all had less than 6% managed open habitat, and occurred entirely within the Phase II area.

#### **4.2.2.2 Un-Managed Open Habitat**

Un-managed open habitat constituted from 0% to 7% coverage for the majority of the scrub-jay territories at the Lyonia Preserve (Figure 8). This habitat type did not occur on eight of the 20 territories, and there was no clear relationship between territory size and un-managed open habitat, likely due to the low frequency of occurrence of this habitat type. However, as observed for the managed open habitat, scrub-jay territories with the highest percentage un-managed open habitat were smaller in size than average.

The majority of the un-managed open habitat consisted of herbaceous (310) grasslands and freshwater marsh, seasonally dry (641) cover types. Ruderal-maintained habitats consisting of grasses and bare sand constituted about 3.2% of the territories at KSC (Breininger (1995)). A similar percentage of un-managed herbaceous habitat, totaling 3.3% of the territories, was observed on the Lyonia Preserve.

Woolfenden and Fitzpatrick (1984) excluded marsh in calculation of average territory size, however, marshes comprised 20% of the average territory at KSC (Breininger (1995)). For the Lyonia Preserve, freshwater marsh totaled 24% of Territory No 12, which had the highest coverage by un-managed open habitat, 29%. Although the extent of marsh coverage was the highest in Territory No. 12, the group size was larger than average, and the territory size was smaller than average. During the 2000 survey, scrub-jays were seen foraging in marshes, and defense of territory within marshes was observed. The limits of Territory Nos. 12, 14, 17, and 18 were refined based on territorial interactions wherein each of these four family groups defended a separate portion of a single marsh system (Figure 5). Based on these observations, the seasonally dry marshes found on the Lyonia Preserve provide suitable un-managed open habitat that may constitute up to one-quarter of the territory area.

#### **4.2.2.3 Total Open Habitat**

The combined effect of managed and un-managed open habitat was evaluated as natural open areas occur throughout the Lyonia Preserve, and future management will provide both habitat

types, which together will comprise the total open habitat. Territory size decreased as the total open habitat increased on the Lyonia Preserve (Figure 9), and the combined effect of total open habitat appears to be more direct than that of the managed habitat component (Figure 7). The scrub-jay families located primarily in Phase I typically had smaller territory sizes and higher coverage by total open habitat, which ranged between 26% and 57%. Territories in the Phase II area had larger territories with lower total open habitat that ranged from 4% to 38%. The minimum amount of total open habitat for all territories of less than average territory size was 11%, while most exceeded 25%.

Breininger *et al.* (1995) reported that unoccupied habitat at KSC had less than 4% average open space, while occupied habitat averaged 10% open space. Scrub-jay densities at KSC were the highest where open space exceeded 10%. The average coverage of open managed habitat for all territories at the Lyonia Preserve was 29%, over three fold the amount of open space at KSC. The additional open habitat found on the Lyonia Preserve likely contributes to the smaller average territory size of 12.54 acres compared to the 22.97 acre average at KSC. Breininger (1995) found that habitat use increased as open space increased up to 50%, then declined as open space increased beyond 50%, because, although openings are needed, scrub-jays require openings in association with scrub oak.

#### 4.2.2.4 Managed Xeric Habitat

Managed xeric habitat within the scrub-jay territories ranged from a minimum of 39% to a maximum of 84% (Figure 10). Territory size increased as the percentage of managed xeric habitat increased. The smallest territory (No. 1) contained 43% managed xeric habitat, and the largest territory (No. 19) contained the maximum of 84%. The larger territories typically had greater than 60% managed xeric oak and occurred within Phase II, while the smaller territories had between about 40% and 60% managed xeric oak and occurred within Phase I. Breininger (1995) found that unoccupied areas averaged 29% scrub oak and areas occupied by scrub-jays averaged 47% scrub oak.

As previously discussed, habitat quality and group size are the primary variables affecting territory size (Woolfenden and Fitzpatrick 1978), and oak scrub interspersed with numerous sandy openings comprise essential scrub-jay habitat (Fitzpatrick *et al.* 1991). The territories on the Lyonia Preserve with the highest percentage of managed xeric oak also had lower group sizes (Figure 6) and lower percentages of total open habitat (Figure 9). These territories occurred in the Phase II area that is 73% managed xeric habitat, with only 12% total open habitat (Table 1). In contrast, the Phase I area contains 65% managed xeric oak and 31% total open habitat. These data suggest that although oak scrub is an essential habitat component, higher densities of Florida scrub-jays may occur within smaller areas of xeric oak that are managed to provide increased open areas.

While the creation of open habitat appears to reduce the amount of xeric oak habitat required by scrub-jays, the quality of the xeric oak component needs to be sufficient if smaller territory sizes are to be supported. Fitzpatrick *et al.* 1991 characterized the optimal xeric oak component as containing low-growing oaks between one and three meters in height. Long term maintenance of suitable vegetative structure in the xeric oak component is a critical factor in providing quality habitat. Therefore, management of xeric oak habitat on the Lyonia Preserve will focus on the need to provide low-stature oaks and to maintain this vegetative structure.

#### 4.2.2.5 Forested Habitat

Forested areas containing mature, closed canopies, are rare in habitats preferred by scrub-jays (Fitzpatrick *et al.* 1991). Forested habitat, which includes sand pine and mixed hardwood-conifer stands, occurs within 75% of the scrub-jay territories on the Lyonia Preserve (Figure 11). The territories (Nos. 1, 4, 6, 7, and 13) that lack a forested habitat component are all found within the Phase I area, and these territories are also the smallest among all scrub-jay groups. Overall, the territory size tended to increase as the percentage of forested habitat increased. This relationship was more evident for the territories located in the Phase II area.

The two territories (Nos. 10 and 18) with the highest forested habitat coverage, 21%, provide contrast in the effectiveness of site management. Territory No. 10 with 4 group members is located in the Phase I area. The territory contains 51% managed xeric habitat, 26% total open habitat, and is below average in territory size. Territory No. 18 with 3 group members is located in the Phase II area. The territory contains 69% managed xeric habitat, only 10% total open habitat, and is above average in territory size. Although the two scrub-jay territories have equal percentages of forested habitat and similar amounts of managed xeric habitat, territory size was lower and group size was higher for Territory No 10. These differences in group size and territory size may be related to differences in the percentages of open habitat. Higher amounts of total open habitat appear to offset the larger territories associated with increased percentages of forested habitat.

Overall forested habitat use is likely low on the Lyonia Preserve as has been reported elsewhere (Fitzpatrick *et al.* 1991; Breininger 1995). These areas do provide some habitat functions as scrub-jays were observed in the forested habitat on several occasions during the 2000 survey. Most observations were related to perching or sentinel activity that occurred on the habitat edges, often in snags or isolated trees. Territorial interactions were noted where intruders were pursued through forested areas. Scrub-jays also were seen foraging in forested habitat interiors on occasion; these stands contain scrub oaks in the subcanopy. The natural mixed hardwood-conifer (434) stands found on the Lyonia Preserve are proposed to be retained to provide scrub-jay habitat, to serve as wetland buffers, and to increase landscape diversity. Given the provision of sufficient total open habitat in adjacent areas, scrub-jay densities in areas encompassing forested habitat could be increased through intensive management.

#### **4.2.2.6 Unsuitable and Unoccupied Habitat**

No unsuitable habitat occurred in 14 of the 20 scrub-jay territories residing on the Lyonia Preserve (Table 4). Territory Nos. 3, 4, 10, 11, and 20 extended off-site to the east side of the Providence Boulevard right-of-way, and therefore, contained an unsuitable roadway pavement (814) cover type that ranged from 2 to 6% of the total territory size. Territory No. 12 included a deep marsh emergent aquatic vegetation (644) cover type that totaled 4% of the total territory size, and was the only unsuitable habitat contained within the Phase I and II areas.

Phase III of the Lyonia Preserve currently represents habitat that is unoccupied by scrub-jays. This phase does not contain any low growth oak scrub, however, extensive areas of sand pine and xeric flatwoods are available for restoration and management, and natural open areas, including marshes and bare sand can provide suitable scrub-jay habitat. The only unsuitable habitat in Phase III includes two deep marsh wetlands totaling 3.25 acres, or 2.5% of the phase.

### **4.3 Phase I North Management Area Habitat Management**

The 100.01 acre Phase I portion of the Lyonia Preserve was established as a scrub-jay mitigation area in 1994 to offset impacts to four scrub-jay families associated with the West Volusia Beltline. This section describes the baseline conditions, initial habitat restoration, and maintenance activities that have been conducted to date, and provides a comparison of the various habitat management techniques implemented in Phase I.

#### **4.3.1 Baseline Conditions and Habitat Restoration**

Prior to the 1994 habitat restoration, no scrub-jays had been documented in the Phase I area. The habitats existing at that time were predominantly sand pine and mixed sand pine/xeric oak cover types. Several trails traversed the project site, and the marsh and adjacent herbaceous and mixed hardwood-conifer areas described previously in this habitat management plan were also present.

Phase I was divided into four management cells (Figure 12) that were originally intended to provide habitat for four scrub-jay families (Young and Palmer 1992). Cells were separated by 50' wide clearings to be used as fire breaks, maintenance roads, and pedestrian trails. Perimeter fire breaks were sited along the Phase I boundaries and offset 100' from the east boundary to provide a vegetated buffer between the management area and Providence Boulevard. The fire break was extended into Phase II to the south property boundary. Fire breaks were located along the south and west boundaries that are adjacent to residential areas. Approximately 25% of the mitigation site was proposed for clearings; subsequent vegetation mapping discussed in Section 2.3 of this habitat management plan confirmed that 25.6 acres of open managed habitat are present, including several minor trails that previously existed (Table 1). In addition to the 50' wide clearings and perimeter fire breaks, numerous "pocket" clearings were designed, ranging in size from 0.25 acres

to 1.4 acres. Circular pocket clearings were limited to 1.0 acres. Trails 8' in width were sited between all pocket clearings to provide interconnections.

Management of Phase I was accomplished through a variety of techniques. The initial plan included harvesting of the sand pine canopy in the Phase I area. Prior to logging, the Phase II area was added to the harvest plan to provide a funding source for creation of the managed openings in Phase I and fire breaks around the Phase II perimeter. Harvesting operations began in February 1994 and were completed in March 1994. A 100' wide sand pine area was left unharvested along the south and west property boundaries to provide a buffer. A controlled burn was performed in Cell 4 in April 1994 (Figure 12). Fencing was installed along the Phase I and II boundaries in July 1994.

Pocket clearings, roads, and trails were created in all four cells by root raking. In addition, the herbaceous area surrounding the marsh located in Cell 4 was root raked. The nature trails were created by hand clearing. The xeric habitat in Cell 2 was strip roller chopped in a north-south pattern to create 100' wide strips that were separated by un-chopped strips also 100' wide. Management of Cell 1 and Cell 3 was limited to timber harvest and creation of the clearings. All management activities were completed by August 1994. Final locations and shapes of the open managed areas as delineated on the current land use and cover map (Figure 3) differ slightly from the proposed plan drawing provided by Young and Palmer (1992).

#### **4.3.2 Phase I Habitat Maintenance**

The habitat maintenance conducted on Phase I since the initial restoration has included roller chopping of Cell No. 1 in March 2003, along with routine mowing of the main trails. In December 2003, removal of sand pine was initiated in Cell No. 3 using a Franklin Brush Cutter C4950 S2. Early preliminary results from this mechanical treatment are promising, and following further evaluation, the brush cutter will likely be used for sand pine control in the remaining management cells. The 50' wide clearings and several of the minor 8' wide trails that are used for vehicular access have received regular mowing. In addition, encroachment of woody growth from adjacent areas into the trails has been controlled by periodic vegetation trimming. The initial management plan for Phase I specified that maintenance activities would occur as needed without a determinant schedule. The plan also provided latitude for use of various techniques, and indicated that adaptive management strategies would be used if one technique appeared more successful than others, or if new technology became available.

Currently planned maintenance activities include a fuel wood harvest of the sand pine buffers along the west side of Cell No. 1 and Cell No. 3 in Phase I. The logging will occur concurrent with initiation of the Phase II and Phase III restoration harvest in February 2003. These pines occur within 15' of the property boundary, many are aged and leaning, and present a fire and safety hazard to the adjacent residential areas.

#### **4.4 Comparison of Phase I Habitat Management Techniques**

The original intent of the Phase I management was to provide sufficient habitat to accommodate four families of scrub-jays (Young and Palmer 1992). As previously discussed, this expectation has been greatly exceeded by the 20 families found on the Lyonia Preserve. The Phase I area presently provides habitat for three scrub-jay families that reside entirely within the Phase I boundaries (Figure 5). In addition, the territories of eight other scrub-jay families occur primarily within Phase I, extending either slightly off-site, or into Phase II to the south. Likewise, the territories of four families that are found primarily within the Phase II area extend partially onto Phase I. The territories of five families occur entirely within Phase II.

Given the extensive overlap of territorial boundaries, scrub-jay densities within individual management cells are not readily determined. Qualitative evaluation revealed that Cell 1, the smallest cell, and Cell 2, which was strip roller chopped, contained portions of the territories of five different families (Figure 5). Cell 3 and Cell 4, which was burned and is also the largest cell, both included portions of six territories. Although no single territory was fully encompassed within the boundaries of any one management cell, Territory No. 10 occurred largely within the burned Cell 4, and Territory No. 13 was found largely within Cell 3, which did not receive any additional management such as strip roller chopping or burning. Group size was identical for these families, and Territory No. 10 was average size while Territory No. 13 was the third smallest. Habitat composition of xeric oak is similar for the two territories, but the open habitat is over 50% larger for Territory No. 13. Additionally, Territory No. 10 contained the highest coverage of forested habitat and Territory No. 13 had no forested habitat. These observations do not directly favor burned versus unburned or chopped versus un-chopped cell management. However, the data seem to confirm that habitat type composition, regardless of the technique from which habitats were derived, is an important variable in determining scrub-jay occupancy and territorial size.

Based on qualitative assessment by Volusia County Environmental Management staff (Sleister, pers. comm. 2000), and observations obtained during this study, the burned area, Cell 4, currently contains more sandy openings within the managed xeric habitat compared to other cells. The open sandy areas can be detected on the aerial photograph provided in Figure 5. The strip roller chopped cell (No. 2) appeared only slightly more effective in creating sandy openings in the managed xeric habitat compared to the two cells (Nos. 1 and 3) where this technique was not employed. Strip roller chopping and burning both allowed regrowth of oaks, while root raking was effective in reducing or eliminating oak occurrence.

#### **4.5 Habitat Management Recommendations**

The Lyonia Preserve has been intensively managed to provide scrub-jay habitat as detailed in the previous sections of this habitat management plan. In summary, previous habitat management consisted of removal of the tree canopy to restore the xeric habitat in both Phases I and II, and

more intensive management in Phase I involving creation of openings within the resultant scrub vegetation, prescribed fire, and mechanical management as discussed in detail in Section 4.3 of this habitat management plan. Additional management is proposed for Phase II, and restoration is planned for Phase III. The project site has become occupied by scrub-jays that overall, exhibit group sizes larger than average, and territories that are smaller in size than those reported for most other scrub-jay populations. The scrub-jay territories within the more intensely managed Phase I have yielded larger group sizes and smaller territories in comparison with the families found in the less intensely managed Phase II.

Given these population characteristics, and the results of the habitat assessment previously discussed, the three territories (Nos. 5, 6, and 9) that occur entirely within the managed Phase I boundaries were selected as model territories on which to base future management activities. Habitat type percent occurrences for these territories were summarized and averaged to provide a basis for target goals by managed habitat type (Table 5). Ranges for the target habitat type percentages were based on the variation within the three territories, and supplemented by data from other representative territories occurring within the Phase I area. Overall management targets for Phases II and III include the provision of 35% total open habitat (range 25% to 50%), and 65% managed xeric habitat (range 40% to 75%) with less than 1% forested habitat, as applied in the following section.

## **5.0 LYONIA PRESERVE PHASES II AND III HABITAT MANAGEMENT PLAN**

The specific goal of the Lyonia Preserve Phase II and III habitat management plan is to perpetuate suitable habitat for the Florida scrub-jay. Volusia County has already implemented habitat management within Phase I and portions of Phase II of the project site, and the results have been highly successful. Additional population studies were initiated on the Lyonia Preserve in 2003 by the University of Central Florida, in coordination with the County. These studies will further evaluate scrub-jay demographics, including factors such as productivity and juvenile survival, and may provide data to confirm whether the population represents a biological sink or a biological source. Based on preliminary data, the scrub-jay population on the Lyonia Preserve was estimated to exceed 100 birds in 2003 compared with the 88 birds documented during the 2000 survey.

The proposed habitat management for Phase II and Phase III is intended to continue this success. The management techniques for these future phases will build on the methodologies employed under Phase I, and may be further modified in the future based on analysis of additional population studies currently underway. As discussed in the previous section, management will focus on the provision of an average of 35% total open habitat (range 25% to 50%), and an average of 65% managed xeric habitat (range 40% to 75%). Although the open habitat component has been identified as a factor contributing to larger group size and smaller territory size as exhibited by the scrub-jays found in the intensely managed Phase I, the importance of the managed xeric oak habitat is recognized. Restoration of xeric oak and maintenance of suitable

vegetative structure will be a key to successful management of the xeric oak habitat. The specific management targets for the xeric oak habitat are discussed in Section 5.2.3 of this habitat management plan, and assessment and monitoring of these targets are addressed in Section 7.2.

Habitat management on the Lyonia Preserve will involve initial restoration of overgrown scrub, including pine canopy removal and creation of openings, followed by long term maintenance of the improved habitats. Management and maintenance will be conducted within individual management cells, as described below.

## 5.1 Management Cells

Similar to Phase I of the Lyonia Preserve, habitat management in Phases II and III will be performed within individual management cells. A total of 14 management cells was identified for Phases II and III based on existing natural and managed features and habitats, and based on various access and maintenance considerations (Figure 13). The existing managed 50' wide trails will be extended from Phase I into Phase II, and expanded into a network that delineates the boundaries between management cells. Pocket clearings were sited along the 50' wide trail network in Phase II to provide open managed habitat within the interior of individual management cells. These locations simplify the logistics of the proposed clearing operations since timber harvesting has already been completed in the majority of Phase II. A single continuous managed 50' wide trail will begin in the northeast corner of Phase III and wind south through the area. The central location of this trail will allow access during the timber harvesting in Phase III. Two enlarged portions of the trail will provide open managed habitat, and also facilitate the logging operations by providing landing and loading areas. A variety of shapes and sizes of managed open habitat was designed for the cells within Phase III.

The patterns of the managed openings in Phase II and Phase III incorporate varying applications of the firebreaks, wide tails, narrow trails, and pocket clearings found to provide suitable scrub-jay habitat in Phase I. The majority of the openings proposed for Phase II and Phase III are more linear compared to the circular openings created in Phase I.

Cell design for Phases II and III was guided by the recommendations for percentages of managed habitat types as presented in Section 4.5 of this habitat management plan (Table 5). The overall goals were to provide 35% total open habitat with individual cells ranging from 25 to 50% total open habitat, and to provide 65% managed xeric habitat ranging from 40 to 75% for individual cells. For both Phases II and III combined, the total open habitat provided is 102.46 acres, or 41%, and the managed xeric habitat is 139.53 acres, or 55% (Figure 13). Forested habitat will total 6.85 acres, or 3%, while unsuitable habitat totals only 3.64 acres, or 1% of the combined Phases II and III.

Individual management cells within Phase II will provide total open habitat ranging between 26.81% and 37.61% (Table 6), which approximates the target 35% and meets the recommended

25% to 50% range for this habitat type (Table 5). Managed xeric habitat proposed in Phase II also meets the recommended ranges, with individual cells varying between 44.09% and 72.75%. The existing forested habitat in Phase II totals 18.24 acres, or 14%, and includes 11.39 acres of sand pine buffer that will be harvested to reduce the overall occurrence of forested habitat to 6.85 acres, or 5% of the Phase II area. Two management cells, Nos. 8 and 9, will have remaining forested habitat consisting of mixed hardwood-conifer stands that will total 17.12% and 10.81% respectively, which is within the recommended range for this habitat type. Unsuitable habitat is minimal in Phase II, and includes only 0.39 acres of deep marsh in Cell No. 8, or 1.18% of the management cell.

Individual management cells within Phase III, with exception of Cell No. 18, will meet the targeted habitat percentages with total open habitat ranging between 34.04% and 50.91% and managed xeric habitat ranging between 49.09% and 65.96% (Table 7). The existing un-managed open habitat in Cell No. 18 totals 41.40%, and includes 26.37% seasonally dry marsh and 15.03% bare sand. The total open habitat was necessarily increased to provide fire breaks and managed 50' wide access trails, yet Cell No. 18 will still provide 36.29% managed xeric habitat, which is only slightly below the targeted 40 to 75% range. Forested habitat will not occur in the managed Phase III area, while unsuitable habitat will total only 3.25 acres, or 2.5% of the entire area.

## **5.2 Habitat Management and Maintenance Techniques**

Management and maintenance of habitats will be performed through a combination of prescribed fire and/or mechanical techniques. Timber harvest, roller chopping, strip chopping, root raking, and mowing are included among the proposed mechanical techniques. The initial management activity will involve a timber harvest conducted to restore the overgrown scrub habitats and root raking to create the open habitats. Subsequent maintenance will be performed by either fire and/or mechanical methods, and the timing and specific maintenance activity will be determined by actual habitat conditions as monitored within individual management cells.

### **5.2.1 Initial Restoration of Xeric Oak - Fuel Wood Harvest**

Sand pine regeneration has been identified as a potential constraint to successful long term habitat management and maintenance on the Lyonia Preserve. Areas of regeneration have been observed along some of the trails, in many of the openings, and in several xeric stands in Phases I and II that were initially restored in 1994. Based on these findings, a fuel wood harvest is proposed for the initial restoration of Phase III, which is vegetated primarily by sand pine with limited xeric flatwoods. Concurrently, the fuel wood harvest will be extended to the sand pine buffer areas that remain in Phases I and II. During the fuel wood harvest, the trees along with most of the stems, branches, needles, and cones will be removed. The fuel wood harvest is anticipated to be more effective in control of sand pine regeneration compared to tradition logging methods, and should minimize sand pine regeneration in the treated areas.

Although it is unlikely that the sand pine will be completely eliminated from Phases I and II, maintenance activities as discussed later in Section 5.2.3 will be implemented to specifically control sand pine at desirable levels, and to generally maintain optimal habitat conditions.

### 5.2.2 Initial Enhancement of Created Open Habitat - Root Raking

Timber harvest alone can provide habitat suitable for occupancy by scrub-jays, as demonstrated in the Phase II area. Scrub-jay habitat in the Ocala National Forest, which has the highest known scrub-jay population, has been maintained by mechanical harvesting of sand pine largely without the use of fire or other management practices (MacAllister and Harper 1998). Differences in scrub-jay response to varying management practices in the four original management cells on the Lyonia Preserve are not readily apparent at this time, however, higher densities and larger group sizes were observed in Phase I where a variety of management practices was implemented in addition to timber harvest. These additional management practices included a prescribed fire in Cell No. 4 following the timber harvest, and the mechanical creation of pocket clearings and trails that comprise the managed open habitat found throughout Phase I.

The additional openings in the xeric habitat needed by scrub-jays can be created by mechanical means, including chopping and root raking, or through use of herbicides. Breininger and Schmalzer (1990) studied the long-term effects of mechanical disturbance in an oak scrub site that was cleared 20 years earlier. Compared to an adjacent undisturbed scrub site, the managed site had lower occurrences of saw palmetto in the ground cover and more bare ground was present. The root raking performed in Phase I was successful in providing openings and precluding oak regrowth (Sleister, pers. comm. 2003), and this technique will be repeated to create the managed open habitats in Phases II and III (Figure 13). The majority of the created openings in Phases II and III will be more linear compared to the circular openings created in Phase I. This design will provide a greater edge effect, and increase the habitat value of the openings.

The effectiveness of root raking in creating openings is due to the total removal of plant biomass, including below ground roots. Root raking creates soil disturbance, which as a negative aspect, may temporarily effect soil arthropods and provide conditions suitable for exotic plant invasion. Typical scrub habitat contains several thousand species of arthropods per acre, however, only a few of these insect species are actually restricted to scrub (Myers 1990). An extensive area of undisturbed xeric soils will remain following initial management in Phases II and III; 139.53 acres of managed xeric oak habitats will provide conditions suitable for scrub arthropods (Table 6 and Table 7). The potential for invasion by exotic plant species is likely only a minor issue for the Lyonia Preserve; occurrence to date has been limited to scattered sprouts of Chinese tallow (*Sapium sebiferum*) that have been successfully controlled by hand removal. Conversely, many listed scrub plant species, including the garberia (*Garberia heterophylla*) and scrub beargrass (*Nolina brittoniana*) that currently occur on-site, respond favorably to bare soils conditions that result from disturbances such as root raking (Myers 1990).

Management techniques other than root raking are often less efficient in creating bare soil conditions. Mowing will not remove the plant biomass, and will only encourage herbaceous growth. Burning of slash piles is dependent on attaining an intense burn, and fire may need to be repeated several times to achieve the bare soil conditions created by root raking. For these reasons, and based on the success of Phase I, root raking will be performed to create the trails, fire breaks, and pocket clearings in Phases II and III. The root raking will be conducted subsequent to the fuel wood harvest. Creation of the managed open habitat using this two step approach is anticipated to reduce the potential for sand pine regeneration in the clearings due to removal of biomass within the clearings and due to elimination of the sand pine seed sources from the adjacent xeric habitats.

### 5.2.3 Habitat Maintenance - Prescribed Fire and Mechanical Methods

Use of prescribed fire, widely regarded as the preferred management technique for scrub-jay habitat, has the highest potential to provide the most long-term benefit (Fitzpatrick *et al.* 1991). Prescribed fire is proposed as the preferred management tool for the Lyonia Preserve. However, given the inherent restrictions and logistical complications associated with the use of prescribed fire, mechanical habitat maintenance may be performed as an alternative or supplement to burning. A prescribed fire had been planned for several years for Cell No. 1 in Phase I, but, was repeatedly postponed due to constraints related to weather conditions. It was recognized that maintenance was needed, and since a controlled burn could not be implemented, Cell No. 1 was roller chopped in March 2003. Although prescribed fire is preferred, habitat maintenance will be performed using a combination of prescribed fire and/or mechanical methods, such as chopping and mowing.

Fitzpatrick *et al.* 1991 stated that the optimal frequency for prescribed fire within scrub habitat occurs within a 10 to 20 year interval. The time interval between prescribed burns, or other habitat maintenance activities, depends on a number of factors, including soils, nutrients, water table, climate, previous stand composition, level of regeneration, and previous fire history. Based on recent discussions with Service staff, a more frequent maintenance cycle may be needed for the Lyonia Preserve given the habitat conditions observed within the previously managed areas. Sand pine regenerated along some of the trails, in many of the openings, and in several xeric stands in Phases I and II following initial restoration in 1994. A future maintenance frequency of less than 10 years may be performed as was conducted in Cell No. 1, and the need for maintenance will be based on actual habitat conditions rather than a specified time period.

The need for habitat maintenance will be determined through qualitative site assessment applied on an individual management cell basis. Management and maintenance activities on the Lyonia Preserve will be implemented as needed to achieve optimal habitat conditions, which are defined by the following criteria:

- a.) the average canopy coverage of sand pine shall not exceed 10% aerial cover of a management cell; and

- b.) the canopy, including sand pine and xeric oak, shall not exceed an average of 10 feet in height within a management cell.

These criteria will be applied on an individual management cell basis, and separately for the following habitat components of an individual cell: the managed xeric habitat; the un-managed open habitat, which is primarily freshwater marshes; and the pocket clearings. Maintenance of the trails and firebreaks will be conducted through periodic mowing to preclude re-vegetation of these openings by scrub, or other woody plant species including sand pine. Mowing will be performed annually, or as needed. Habitat maintenance will, therefore, be scheduled pursuant to actual habitat conditions rather than determined by a specific time table.

Management prescriptions will be flexible for the various techniques, whether prescribed fire and/or mechanical methods, and will be based on an evaluation of vegetative structure, including canopy height, degree of pine invasion, extent of openings, and other structural conditions. Selection of a particular management technique will be based on the most cost-effective means to obtain the desired vegetative structure. Assessment of weather conditions, smoke management issues, and the availability of burning permits will be important considerations for the timing and execution of prescribed fires.

Latitude will be provided to implement maintenance for individual cells, or cell portions, based on actual habitat conditions. The management cells have been designed with numerous trails and other clearings, which can serve to define mechanical maintenance areas, or provides fire breaks if a partial burn of an individual cell is specified. Maintenance activities will be scheduled to occur outside of the scrub-jay nesting season, and fire prescriptions will be designed to avoid burns that encompass the entire territory of a scrub-jay family as recommended by Toland (1999).

#### **5.2.4 Nuisance and Exotic Plant Control**

Nuisance and exotic plant species occurrence has been minor to date, and limited solely to scattered Chinese tallow sprouts. After the initial restoration of Phase I, scattered tallow seedlings were observed in several areas. Higher concentrations of tallow seedlings occurred along the managed openings, including cell boundaries and fire breaks, although some seedlings were found in the managed xeric areas where the sand pine had been harvested. Off-site residential areas were the most likely seed source. Tallow seedling were controlled by hand removal, and completely eliminated within two years of the initial restoration. Subsequent monitoring indicated no further sprouting by tallow until after Cell No. 1 was roller chopped in March 2003. Less than 10 Chinese tallow sprouts were observed at that time, and the plants were controlled by hand removal, which will continue as needed. The newly restored areas within Phase II and Phase III will be monitored for the presence of tallow and other nuisance and exotic plant species, and appropriate treatment will be applied as needed.

### **5.3 Habitat Management and Maintenance Schedule**

The initial habitat management of Phase I was completed in 1994, and on-going maintenance activities continue to date (Table 8). The Phase I initial site restoration included removal of the sand pine canopy and the creation of managed open areas through clearing of ground cover by root raking. In addition, Cell No. 2 was strip roller chopped, and Cell No. 4 received a prescribed burn during initial restoration. Maintenance of Phase I since the initial restoration has included roller chopping of Cell No. 1 in March 2003, removal of sand pine in Cell No. 3 in December 2003 using a Franklin Brush Cutter, and routine mowing of the main trails.

Future maintenance planned in Phase I includes the following activities as identified in Table 8. Removal of the sand pine buffer areas that extend along the perimeters of Cell Nos. 1 and 3 will be performed during a fuel wood harvest conducted in February to March 2004. Maintenance of the remaining three cells (Nos. 1, 2, and 3) in Phase I is anticipated during the next few years based on a combination of prescribed fire and/or mechanical means. Timing of maintenance will be determined based on assessment of habitat conditions with emphasis on evaluation of vegetative structure as discussed in the previous section.

The proposed management activities in Phase II will be initiated in February 2004 beginning with the fuel wood harvest of the timber in the sand pine buffer areas (Table 8). Subsequently, the managed openings in Phase II will be created by root raking of these areas as identified on Figure 13. As an additional management enhancement, prescribed fire is planned for both Cell No. 7 and Cell No. 9 in March to April 2004. Future maintenance will be determined based on assessment of habitat conditions with emphasis on evaluation of vegetative structure. Routine maintenance of the trails in Phase II will be performed annually beginning in 2005.

The initial restoration and management of Phase III of the Lyonia Preserve will begin in February 2004 (Table 8), although it is not anticipated that mitigation credits will be needed for several years. The initial restoration will involve a fuel wood harvest of the sand pine areas and xeric flatwoods, and the creation of managed open habitat (Figure 13). In addition, prescribed fires will be conducted in Cell Nos. 15 and 17 in March to April 2004. Future maintenance will be determined based on assessment of habitat conditions with emphasis on evaluation of vegetative structure. Annual maintenance of the trails, including fire breaks, will be initiated in Phase III in 2005.

### **5.4 Adaptive Management**

The County and School Board will manage the Lyonia Preserve, using the previously described techniques, to perpetuate the Florida scrub-jay, and adaptive management strategies other than those specified in this habitat management plan may be used in consultation with the Service. The results of the qualitative habitat assessment based on the optimal habitat criteria presented in Section 5.2.3 will be used to evaluate on-going management techniques, and to determine the

need for adaptive management. Adaptive management strategies will be used if one technique appears more successful than others, or if new technology becomes available.

Adaptive management may also be needed for related issues other than habitat management. Potential impacts associated with public and educational uses, feral and domestic cat predation, and roadway mortality, are addressed below.

#### **5.4.1 Management of Public and Educational Uses**

The educational value of the Lyonia Preserve, as realized through public access, provides significant benefits to scrub-jay conservation. Few other areas exist in Volusia County where the public can so readily view scrub-jays. Public access is promoted at the Lyonia Preserve, particularly for school groups given that the site is controlled by the School Board and three adjacent public schools border the property. Public access to date has consisted mainly of small groups or school classes, totaling up to  $\pm$  20 to 30 individuals, that are escorted through the property via foot traffic using the existing trail system in Phase I.

The County and the School Board recognize the concerns that the Service has expressed over the potential for impacts to scrub-jays related to unrestricted public access. To address this issue, future public access to Phase II and Phase III of the Lyonia Preserve will have the following restrictions: a) access will be limited to foot traffic; b) access will be limited to the trails; and c) access will be limited to a single entry location west of Providence Boulevard and a single entry location east of Providence Boulevard. These actions should minimize the potential for impacts to the resident scrub-jays. Additional strategies may be implemented in the future, and public access issues will be monitored by County land management staff.

#### **5.4.2 Management of Feral and Domestic Cats**

Contrary to previous understanding by the Service, feral and domestic cats are not frequently observed within the Lyonia Preserve, and cat predation is not a problem on the property. Observations of feral or domestic cats have been extremely rare, and have been limited to only two individual sightings during the past nine years that the Lyonia Preserve has been managed for scrub-jays. Furthermore, no incidences of cat predation on scrub-jays have been identified. The County and the School Board concur that feral and domestic cats could possibly become an issue in the future, and agree to address this issue now by promoting awareness among management staff and by providing visitor education regarding problems associated with feral and free-ranging domestic cats. In addition, should feral and domestic cats become a concern, control actions will be implemented as an adaptive management strategy.

### **5.4.3 Management of Potential Roadway Mortality**

Road mortality has been documented as a potential threat to scrub-jay populations elsewhere (Dreschel *et al.* 1990). Based on banding data and observations from the 2000 scrub-jay survey, road mortality does not appear to be an issue for the Lyonia Preserve. A total of 45 color-banded scrub-jays was observed during the survey, which represented 94% of the 48 birds banded on the Lyonia Preserve between 1998 and 2000. No juvenile plumage birds were color-banded due to the seasonal timing of the banding activities, and consequently the ages of individual birds were unknown. However, the survival rate of scrub-jays on the Lyonia Preserve appears to be very high since 50% of the colored-banded birds were banded from one to two years before the survey, and it is likely that a number of these birds were yearlings due to the recent colonization and population expansion on the Lyonia Preserve.

During the 2000 survey, scrub-jays were occasionally observed along the west side of Providence Boulevard, and only rarely crossed the roadway. It is likely that the few documented crossings were in direct response to the played tape vocalizations as opposed to normal foraging behavior. Currently no suitable habitat exists east of Providence Boulevard, except for a narrow band of mowed grass found in the right-of-way.

These habitat conditions will change once future management is initiated in Phase III, and future road improvements are constructed. Following the restoration management proposed east of the roadway, Providence Boulevard will bisect the Lyonia Preserve. In addition, the roadway will eventually be widened to four lanes in the future. As a positive aspect of the road improvement, most of the right-of way that is currently mowed grassland will be paved, and the right-of-way will become less attractive as potential scrub-jay foraging habitat. Although no incidences of scrub-jay road mortality have been documented for the project site, measures will be implemented to lessen the potential for future occurrence. Based on discussions with the Service, it was agreed that a narrow buffer of mature trees would be maintained along the road side to minimize the potential impacts of Providence Boulevard. The potential for road mortality will be monitored, and adaptive management actions such as educational signage, and/or potential lowering of the current 45 mph speed limit will be evaluated and implemented as practicable.

### **5.5 Other Future Land Uses**

The County and School Board, at their discretion and with the concurrence of the Service, may elect to use areas within the Lyonia Preserve for wetlands mitigation or other listed species mitigation, as long as use of the area in question does not detract from its management as mitigation for the scrub-jay. In addition, an extensive network of nature trails has been established in Phases I and II. These trails may be expanded in Phases I and II, and undoubtedly replicated in the future Phase III as this portion of the site comes under active management.

Public access will continue to be promoted, and the access restrictions are compatible with the educational uses. Numerous pamphlets and other literature regarding the Lyonia Preserve are available in the adjacent Sand Pine Nature Center and Deltona Library/Environmental Learning Center. The educational benefits of these interpretative uses are consistent with the land management goals of the School Board, and the managed Lyonia Preserve provides a unique opportunity to promote environmental education and awareness of the threatened scrub-jay and its associated habitat. As stated in Section 5.4.1, to minimize the potential for impacts associated with educational use and public access, restrictions of public access will be implemented, and public access issues will be monitored by County land management staff.

## **5.6 Management and Maintenance Funding**

The County and the School Board will provide the funding necessary to conduct the management and maintenance activities for the Lyonia Preserve. In 2000, a Volusia County voter referendum was approved that will provide at least \$100 million in funding over a 20 year period with the monies targeted for acquisition and management of environmentally sensitive lands. The \$100 million is a conservative estimate that will most likely be exceeded based on the first three years of funding. Following the voter referendum, the County demonstrated its commitment to land management through a reorganization in 2001 that resulted in the creation of a Land Acquisition and Management Division. The Division will receive 10% annually from this ad valorem tax funding source for use in management and maintenance, with the remainder allocated to acquisition. Budgets for management and maintenance of individual parcels are not available, however, the County is committed to providing funding for the Lyonia Preserve and other environmentally sensitive lands in need of management and maintenance.

Additional funding will be available from the sale of timber to be harvested from the extensive pine stands in Phase III and from the forested buffer areas in Phase I and Phase II. Exact dollar amounts will depend on market conditions at time of harvest, and it is anticipated that the timber value will off-set a large portion of the initial management costs for Phase II and Phase III. All of the initial restoration and management in Phase I was accomplished through the proceeds from the timber harvest in 1994.

Alternative funding will be available on an individual project basis for those County and School Board projects that impact scrub-jay habitat and utilize the Lyonia Preserve for mitigation. It is anticipated that this funding mechanism will be implemented as a permit condition, similar to the requirements of the Incidental Take Permit (No. TE05160-0), which was issued by the Service on April 14, 2003 for impacts to 3.21 acres of scrub-jay habitat on Howland Boulevard public road improvement project. The County was required to provide funding for the initial enhancement and restoration of 6.24 acres within the Lyonia Preserve. Additional funds were placed in escrow for five years to provide for land management. The \$38,180.00 total funding requirement was allocated from the general roadway budget, and was based on estimated costs of \$4,000.00 per acre for restoration and \$2,500 per acre for management. Assurances of future funding

allocations will be provided by the County and School Board prior to the release of mitigation credits for those individual County and School Board projects that utilize the Lyonia Preserve for scrub-jay mitigation.

Annual funding allocations and expenditures associated with all management and maintenance activities will be provided in the annual reports as discussed in Section 7.4.

## **6.0 MITIGATION CREDIT ESTABLISHMENT AND ALLOCATION**

### **6.1 Available Mitigation Credits**

Based on recent negotiations with the Service, it was agreed that mitigation credits will be assigned at 2:1 for occupied habitat and 3:1 for unoccupied habitat if the importance of xeric habitat management and optimal habitat conditions, and the issues of feral cat, public access, and road mortality were incorporated to the satisfaction of the Service in this habitat management plan. The importance of xeric habitat management has been addressed throughout this revised document, and optimal habitat conditions have been defined and included as the criteria for management and maintenance under Section 5.2.3. Management activities related to the issues of feral cat, public access, and road mortality have been addressed under Section 5.4. The discussion below details the available mitigation credits using these mitigation ratios of 2:1 for occupied habitat and 3:1 for unoccupied habitat.

Phase II of the Lyonia Preserve is currently occupied by the Florida scrub-jay and contains 126.93 acres of habitat suitable for restoration, management and use as mitigation for impacts to scrub-jay habitat. A total of 6.24 acres was recently reserved in Phase II as mitigation for scrub-jay habitat impacts associated with the Howland Boulevard road improvement project, pursuant to Permit No. TE054160-0 issued by the Service on February 21, 2003. Thus, Phase II presently has 120.69 acres that are suitable for restoration, management and use as mitigation for impacts to scrub-jay habitat. Phase III is not currently occupied by scrub-jays, however, it contains 126.50 acres of habitat that is suitable for restoration, management and use as mitigation. Mitigation credits available to the County and School Board will be determined based on scrub-jay occupancy and habitat quality. Allowable mitigation credits will be calculated at a 2:1 ratio when Florida scrub-jays occupy mitigation lands and optimal habitat conditions have been achieved, as defined in Section 5.2.3. Mitigation credits will be calculated at a 3:1 ratio when Florida scrub-jays do not occupy mitigation lands, regardless of the habitat conditions. The number of mitigation credits available to the County and School Board in Phase II of the Lyonia Preserve is 60.34, which is based on a mitigation ratio of 2:1 for occupied habitat applied to a total available habitat area of 120.69 acres. Phase III of the Lyonia Preserve has 42.17 mitigation credits available to the County and School Board based on a mitigation ratio of 3:1 for unoccupied habitat applied to a total available habitat area of 126.50 acres.

## 6.2 Mitigation Service Area, Credit Users, and Withdrawal of Credits

Use of the Lyonia Preserve to mitigate impacts to the scrub-jay will apply to those Volusia County public works and School Board projects that occur within the service area that encompasses the West Volusia Scrub-jay Metapopulation (Figure 14). Use of the Lyonia Preserve will be contingent upon maintenance of the Deltona Section 16 lands lease, management of Phase II and Phase III pursuant to Section 5.0 of this habitat management plan, and concurrence by the Service, on an individual project basis, that directing all or part of required mitigation to Phase II and/or Phase III of the Lyonia Preserve is an acceptable and effective biological solution for resolving impacts to the Florida scrub-jay that result from County public works and School Board projects.

The number of mitigation credits the County or School Board must withdraw to mitigate for Florida scrub-jay impacts will be based on the amount of occupied habitat impacted for each individual project determined at the conclusion of any consultation under Section 7 of the Act or permitting under Section 10 of the Act associated with individual County public works projects or School Board projects. Efforts to avoid or minimize impacts to the scrub-jay at the construction site must be explored by the County and/or School Board prior to use of the Lyonia Preserve for mitigation.

The County and School Board may begin to withdraw mitigation credits from Phase II of the Lyonia Preserve upon demonstration that optimal habitat conditions have been achieved. Optimal habitat conditions include the following criteria: a) the average canopy coverage of sand pine shall not exceed 10% aerial cover of a management cell; and b) the canopy, including sand pine and xeric oak, shall not exceed 10 feet in height within a management cell.

The withdrawal of scrub-jay mitigation credits from Lyonia Preserve must be satisfied prior to the commencement of clearing or construction activities at the County public works or School Board project site identified in a Notice of Withdrawal, unless otherwise agreed to by all signatories to the Memorandum of Understanding, to which this habitat management plan is an attachment.

The Service will maintain records regarding the status of the mitigation credits within the Lyonia Preserve. A simple mitigation credit ledger will be maintained, by Phase, listing the total number of credits available, the number of credits withdrawn to date, and the number of remaining available credits.

The County or School Board shall provide the Service with a written Notification of Withdrawal requesting a withdrawal of mitigation credits from the Lyonia Preserve. The notice shall specify the County public works or School Board project and its impacts, the Phase from which the credits will be withdrawn, and provide a proposed Balance Statement reflecting the requested withdrawal. Within 30 days of each withdrawal, the Service shall provide a Balance Statement to the County and the School Board showing the total number of credits available, and the balance of mitigation credits.

### **6.3 Future Credit Determination for Phase III - East Management Area**

It is anticipated that following timber harvest and other initial management activities, Phase III will become occupied by Florida scrub-jays based on the success realized in Phase I of the Lyonia Preserve. Accordingly, the 42.17 mitigation credits available initially in Phase III, based on a 3:1 mitigation ratio for unoccupied habitat, will eventually increase once the phase becomes occupied by scrub-jays and optimal habitat conditions are demonstrated. The maximum availability for Phase III is 63.25 mitigation credits, based on a mitigation ratio of 2:1 for occupied habitat.

If Phase III is entirely occupied, the 2:1 mitigation ratios will apply to the total acreage of suitable habitat. Partially occupied areas of Phase III must be defined by acreage to allow determination of the number of credits using a 2:1 mitigation acreage applied to the occupied acreage, and a 3:1 mitigation ratio applied to the unoccupied acreage.

## **7.0 FLORIDA SCRUB-JAY OCCURRENCE AND HABITAT MONITORING**

Monitoring of the Phase II and III management areas is proposed to evaluate the occurrence of the Florida scrub-jay on the Lyonia Preserve, to assess vegetative composition and structure as a basis for future maintenance prescriptions, and to evaluate other potential impacts.

### **7.1 Florida Scrub-Jay Occurrence Monitoring**

For the purposes of maintaining the availability of mitigation credits in Phases II and III, scrub-jays will be monitored through annual survey intended to document occurrence. The survey will not entail a complete census since the mitigation credits are based on occupied versus unoccupied habitat, rather than on scrub-jay density, productivity, or other demographics. The survey will be designed by the County and School Board to document that family groups continue to occupy the area, and transects and stations will be located to fully assess the Phase II area, and the Phase III area once it becomes occupied. Surveys will be performed annually in late-summer for a period of five years, then repeated at five year intervals, or until the mitigation credits are completely withdrawn. Additional insight on habitat suitability can be gained by conducting the survey during the late-summer period when the yearling scrub-jays are still in juvenile plumage.

### **7.2 Habitat Monitoring**

Monitoring of the habitat conditions on the Lyonia Preserve project site will be performed periodically by a qualified biologist, and will consist of a qualitative assessment of the vegetative composition and structure of the managed habitats. Given the importance of maintaining optimal habitat through appropriate vegetative composition and structure in both the xeric and open

habitats, the conditions defining optimal habitat that will guide the qualitative assessment are again reiterated as follows:

- a.) the average canopy coverage of sand pine shall not exceed 10% aerial cover of a management cell; and
- b.) the canopy, including sand pine and xeric oak, shall not exceed an average of 10 feet in height within a management cell.

The need for habitat maintenance will be determined based on the results of the qualitative site assessment as monitored on an individual management cell basis. The results of the habitat monitoring will be translated to specific maintenance prescriptions as discussed in Section 5.2.3 of this habitat management plan. Maintenance activities will be performed as needed based on actual habitat conditions rather than a specified time table. In addition, the results of the qualitative habitat assessment will be used to evaluate on-going management techniques, and to determine the need for adaptive management.

### **7.3 Monitoring of Other Potential Impacts**

Strategies have been developed to address potential impacts associated with public and educational uses, feral and domestic cat predation, and roadway mortality as detailed in Section 5.4. Future management may require adaptation as circumstances dictate, and could potentially include actions such as additional restrictions on public access, removal of feral cats, and/or education of the public regarding other potential impacts. The County and School Board will monitor these issues, and implement future management actions as needed.

### **7.4 Reporting**

The County and School Board will prepare and submit a monitoring and compliance report to the Service after completion of the restoration of Phases II and III, and subsequent reports will be submitted every five years until all mitigation credits are withdrawn. The reports will detail all management and maintenance activities involving the Lyonia Preserve within the previous reporting period, and projected future land management actions required in the coming reporting period, including associated funding allocations and expenditures for the reporting period. The reports will include the results of the scrub-jay occurrence monitoring, habitat assessment monitoring, and monitoring of other potential impacts performed since the previous reporting period. The reports will also contain a current Balance Statement enumerating the total number of credits available, the number of credits withdrawn to date, and the number of remaining available credits.

## LITERATURE CITED

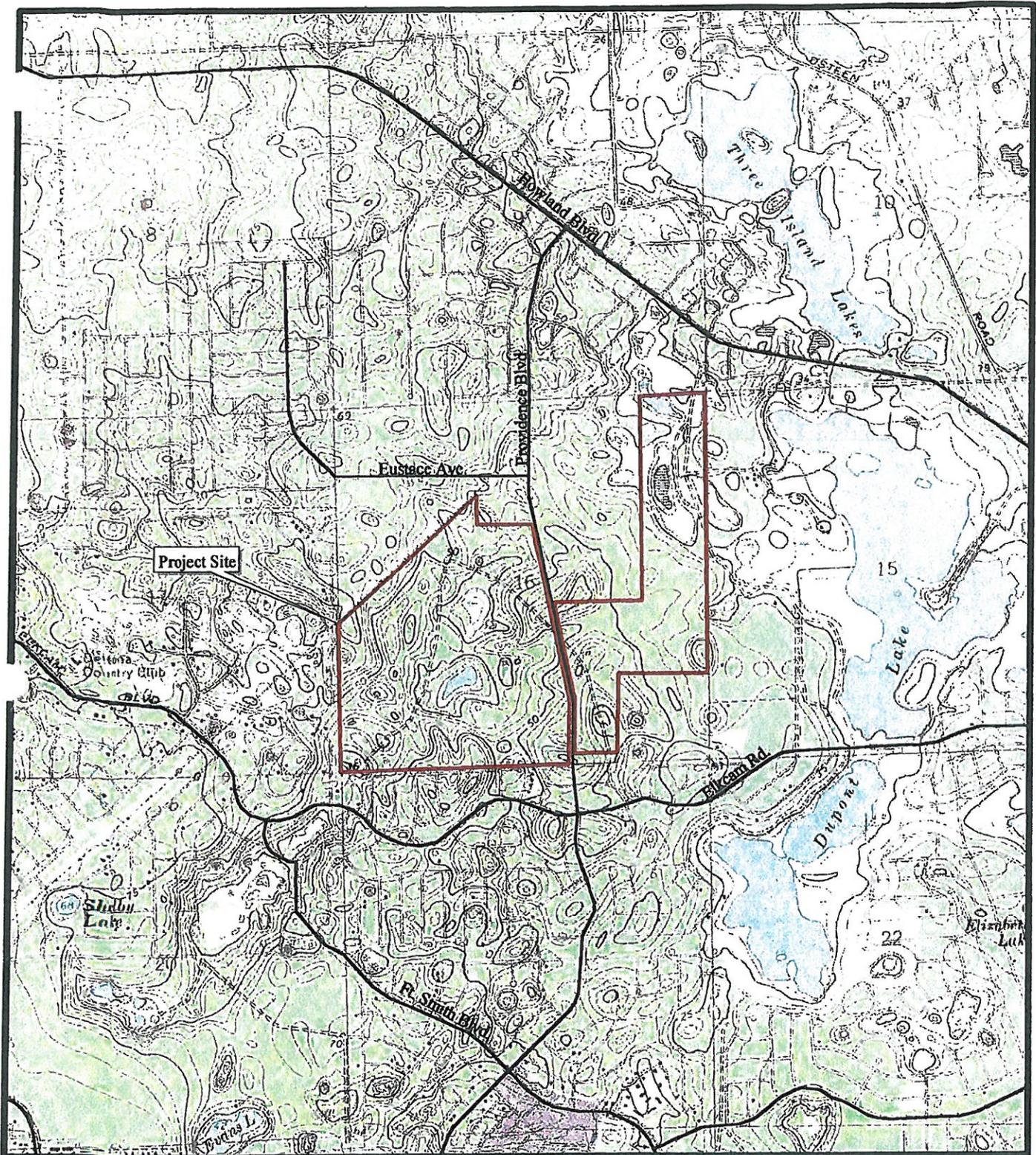
- Bowman, R. and G.E. Woolfenden. 1998. The scrub and the scrub-jay: imperiled natural treasures of Florida. *Florida Naturalist* 71(1): 10-11.
- Breining, D.R. 1999. Florida scrub-jay demography and dispersal in a fragmented landscape. *The Auk* 116(2): 520-527.
- Breining, D.R., and P.A. Schmalzer. 1990. Effects of fire and disturbance on plants and birds in a Florida oak/palmetto scrub community. *American Midland Naturalist* 123: 64-74.
- Breining, D.R., V.L. Larson, B.W. Duncan, R.B. Smith, D.M. Oddy, and M.F. Goodchild. 1995. Landscape patterns of Florida scrub-jay habitat use and demographic success. *Conservation Biology* 9(6): 1442-1453.
- Cox, J.A. 1987. Status and distribution of the Florida scrub jay. *Florida Ornithol. Soc. Spec. Pub. No. 3*, 110 pp.
- Dreschel, A.R., R.B. Smith, and D.R. Breining. 1990. Florida scrub jay mortality on roadsides. *Florida Field Naturalist* 18(4): 82-83.
- Fitzpatrick, J.W., G.E. Woolfenden, and M.T. Kopeny. 1991. Ecology and development-related habitat guidelines of the Florida Scrub-Jay (*Aphelocoma coerulescens coerulescens*). Florida Game and Fresh Water Fish Commission, Nongame Wildlife Program Technical Report No. 8. Tallahassee, FL. 49 pp.
- Florida Department of Transportation. 1985. Florida Land Use, Cover and Forms Classification System. Tallahassee, FL. 79 pp.
- Florida Department of Transportation. 1994. Memorandum of Understanding for DOT Wildlife Mitigation Park. Florida Department of Transportation, U.S. Fish and Wildlife Service and Florida Game and Fresh Water Fish Commission. 7 pp.
- MacAllister, B.A., and M.G. Harper. 1998. Management of Florida Scrub for Threatened and Endangered Species. U.S. Army Corps of Engineers Construction Engineering Research Laboratories Technical Report 99/19. 94 pp.
- Myers, R.L. 1990. Scrub and high pine. Pp. 150-193. *In* R.L. Myers and J.L. Ewel, eds. *Ecosystems of Florida*. University of Central Florida Press, Orlando, Florida.
- Peacock, M., and R. Robinson. 1989. Environmental assessment of section 16, Deltona, Florida: A sand pine scrub ecosystem. Environmental Services, Inc., Jacksonville, FL. 19 pp.

## LITERATURE CITED (Continued)

- Richardson, W.E. 1996. Section 16 scrub jay survey. Unpublished manuscript. William E. Richardson, Lake Helen, FL. 9 pp.
- Sleister, R. K. 2000, 2001, 2002 and 2003. Personal Communication. Habitat Manager, Land Management, County of Volusia, DeLand, Florida
- Stith, B.M. 1999. Metapopulation viability analysis of the Florida scrub-jay (*Aphelocoma coerulescens*): a statewide assessment. Final Report to the Endangered Species Office, U.S. Fish and Wildlife Service, Jacksonville, FL.
- Stith, B.M., J.W. Fitzpatrick, G.E. Woolfenden, and B. Pranty. 1996. Classification and conservation of metapopulations: a case study of the Florida scrub-jay. Pp. 187-215. *In* D.M. McCullough (ed.). *Metapopulations and Wildlife Conservation*. Island Press, Washington, D.C.
- Toland, B. 1999. Current status and conservation recommendations for the Florida scrub-jay in Brevard County. Report to the Brevard County Board of Commissioners. Viera, FL. 26 pp. + appendices.
- U.S.D.A. Soil Conservation Service. 1980. Soil Survey of Volusia County, Florida.
- Woolfenden, G.E., and J.W. Fitzpatrick. 1978. The inheritance of territory in group-breeding birds. *Bioscience* 28(2): 104-108.
- Woolfenden, G. E., and J. W. Fitzpatrick. 1984. The Florida Scrub Jay, Demography of a Cooperative-Breeding Bird. *Monographs in Population Biology*, No. 20. Princeton University Press, Princeton, New Jersey. 406 pp.
- Woolfenden, G.E., and J.W. Fitzpatrick. 1991. Florida Scrub Jay ecology and conservation. Pp. 542-563. *In* Perrins, C.M., J.D. Lebreton, and G.J. M. Hirons (eds.) *Bird Population studies: relevance to conservation and management*. Oxford University Press, Oxford, United Kingdom.
- Young, J.H., and J.C. Palmer. 1992. Mitigation plan for scrub jay and gopher tortoise impacts of West Volusia Beltline, Section 16. Biological Consulting Services, Inc. New Smyrna Beach, FL. 24 pp.

**Table 1. Land Use and Cover Types on the Lyonia Preserve Project Site, Section 16, Volusia County, Florida**

Cover Type	Cover Type Description	Cover Type Acreage			
		Phase I North Management Area	Phase II South Management Area	Phase III East Management Area	Lyonia Preserve Totals
310	Herbaceous	2.76	4.69		7.45
311	Managed Trail 50' Wide	6.31	0.48		6.79
312	Managed Clearing	12.43	0.23		12.66
313	Managed Fire Break 15' Wide	2.24	2.70		4.94
314	Managed Trail 8' Wide	2.46	0.05		2.51
315	Other Trails 8' Wide/ Existing, Logging, and Added Trails	1.47	1.81		3.28
316	Managed Nature Trail 4' Wide	0.69	0.78		1.47
317	Mowed Landscape/ Roadway Grassland	0.47	0.57		1.04
412	Xeric Flatwoods			11.79	11.79
413	Sand Pine	0.92	11.39	94.50	106.81
421	Xeric Oak	65.52	92.85		158.37
434	Mixed Hardwood-Conifer	2.79	6.85		9.64
641	Freshwater Marsh, Seasonally Dry	1.21	4.53	11.83	17.57
644	Emergent Aquatic Vegetation		0.39	3.25	3.64
720	Sand, Other than Beach			8.02	8.02
742	Borrow Areas	0.74		0.36	1.10
<b>TOTALS</b>		<b>100.01</b>	<b>127.32</b>	<b>129.75</b>	<b>357.08</b>



U.S.G.S. Topographic Quadrangle, LAKE HELEN, FLA., Photorevised 1980.

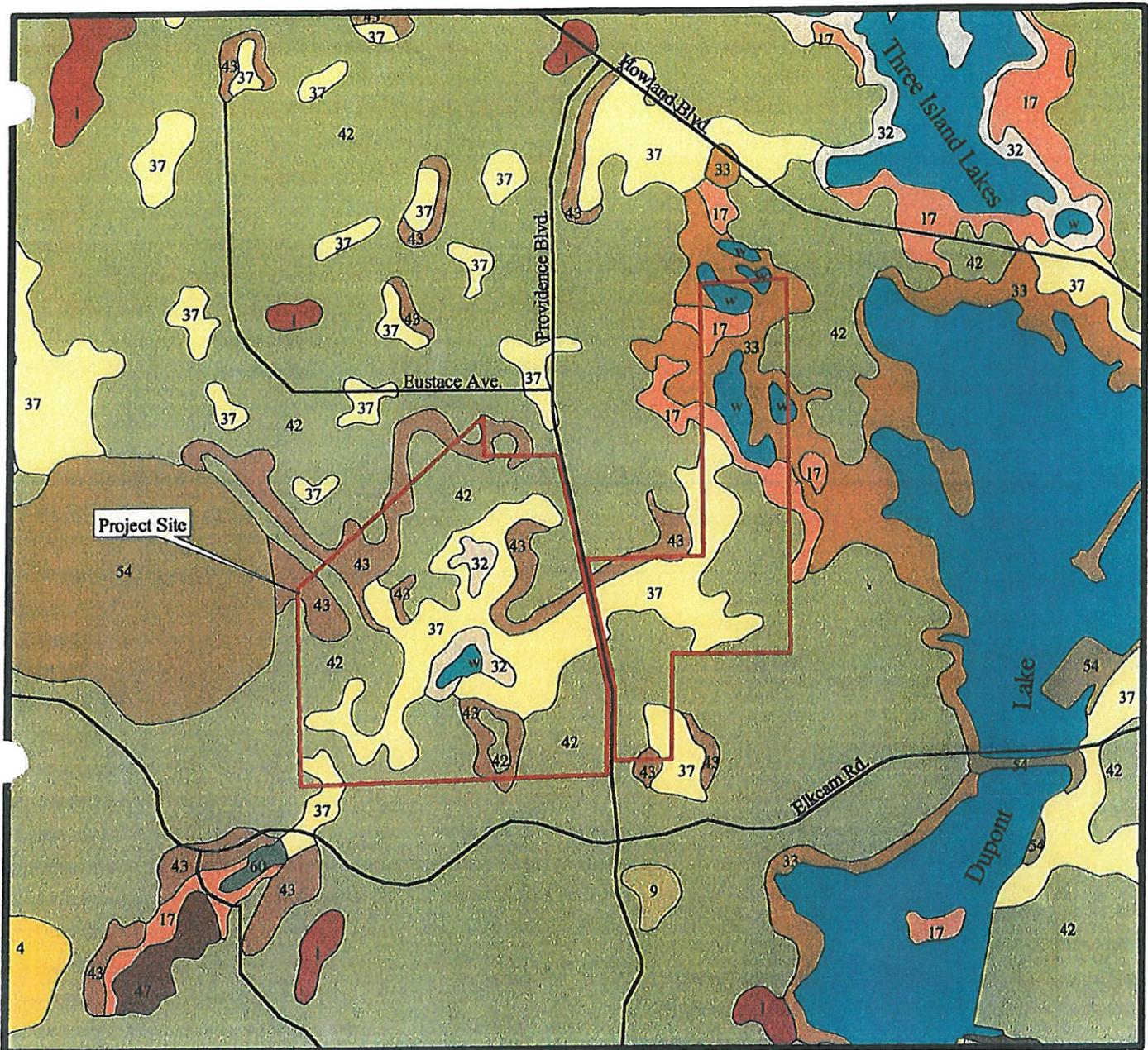
Figure 1. Location of the Lyonia Preserve Project Site, Section 16, Township 18 South, Range 31 East, Volusia County, Florida

**Tierra Verde Consulting, Inc.**  
 1035 South Semoran Boulevard, Suite 1013  
 Winter Park, FL 32792 (407) 678-1881

LOCATION MAP  
 LYONIA PRESERVE



Project: 98094  
 Prepared by: MR  
 Date: 08/16/01  
 Scale: 1: 24 000



Based on digital georeferenced spatial data of the U.S.D.A. Soil Survey Geographic (SSURGO) data base

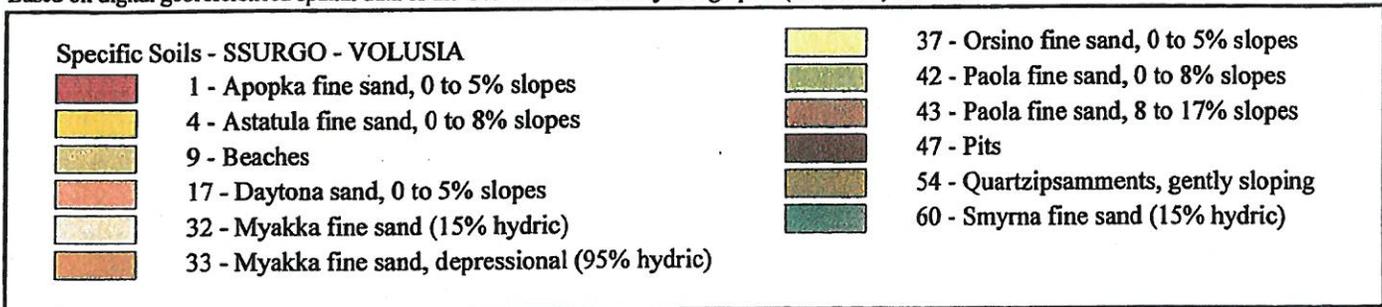


Figure 2. Soils of the Lyonia Preserve Project Site, Volusia County, Florida

 <p><b>Terra Verde Consulting, Inc.</b> 1035 South Semoran Boulevard, Suite 1013 Winter Park, FL 32792 (407) 678-1881</p>	<p>SOILS MAP</p> <p>LYONIA PRESERVE</p>	<p>N Project: 98094 Prepared by: MR Date: 08/16/01 Scale: 1:20 000</p> 
--	---	--

**FIGURE 5. ESTIMATED FLORIDA SCRUB-JAY TERRITORIES ON THE LYONIA PRESERVE PROJECT SITE, VOLUSIA COUNTY, FLORIDA, MARCH 2000**



- LEGEND**
- ⑤ FAMILY NUMBER
  - TERRITORY BOUNDARY
  - OFF-SITE TERRITORY BOUNDARY

**SUMMARY OF FLORIDA SCRUB JAY FAMILY COMPOSITION AND ESTIMATED TERRITORY SIZE**

Territory No.	Banded Scrub Jay Identification No. Based on Color Code	No. Unbanded Scrub Jays	Total No. Family Members	Estimated Territory Size (acres)
1	25	2	3	6.07
2	17	3	4	12.77
3	1, 7	1	3	12.69
4	14, 42, 43	0	3	6.63
5	6, 8, 12, 18, 32, 41, 46	1	8	12.23
6	20, 26, 27, 40	1	5	8.33
7	28, 29	2	4	7.80
8	16, 22, 30	3	6	16.25
9	10, 11, 21, 44, 45	2	7	11.02
10	4, 15, 47	1	4	11.94
11	33, 34	3	5	16.19
12	5, 13, Silver	2	5	11.38
13	2, 3	2	4	7.45
14	23, 24, 37, 38, 39	2	7	8.72
15	35, 36	2	4	10.38
16	none	2	2	17.36
17	none	4	4	21.85
18	none	3	3	18.87
19	none	4	4	17.89
20	none	3	3	14.93
<b>Totals</b>	<b>45</b>	<b>43</b>	<b>88.0</b>	<b>250.75</b>
<b>Ave. No. of Scrub Jays and Territory Size Per Family</b>				<b>4.4</b>
<b>Ave. No. of Scrub Jays and Territory Size Per Family</b>				<b>12.54</b>

File No: 98094  
 Prepared by: CS  
 Date: 06/05/00  
 Scale: 1" = 400'



**Tierra Verde Consulting, Inc.**  
**APPLIED ECOLOGICAL CONSULTANTS**  
 1035 S. Semoran Blvd., Suite 1013  
 Winter Park, FL 32792 Tel: 407.678.1881

**FIGURE 4. LOCATION OF FLORIDA SCRUB-JAY SURVEY TRANSECTS AND PLAYBACK STATIONS ON THE LYONIA PRESERVE PROJECT SITE, VOLUSIA COUNTY, FLORIDA, MARCH 2000**



File: 98094  
 Prepared by: CS  
 Date: 08/24/01  
 Scale: 1" = 600'  
 TIGTA  
 VERDE  
 CONSULTING, INC.  
 APPLIED ECOLOGICAL CONSULTANTS  
 1065 S. Seminole Blvd., Suite 1013  
 Winter Park, FL 32789 Tel: 407.678.1881

**LEGEND**

8 Territories at Least 50% within Phase I North Management Area

5 Territories Entirely in Phase I North Management Area

11 Territories at Least 50% within Phase II South Management Area

19 Territories Entirely in Phase II South Management Area

Family No. Territory Size No. of Birds

Family No.	Territory Size	No. of Birds
1	6.07	3
4	6.63	3
13	7.45	4
7	7.80	4
6	8.33	5
14	8.72	7
15	10.38	4
9	11.02	7
12	11.38	4
10	11.94	5
5	12.23	8
3	12.69	3
2	12.77	4
20	14.93	3
11	16.19	5
8	16.25	6
16	17.36	2
19	17.89	4
18	18.87	3
17	21.85	4

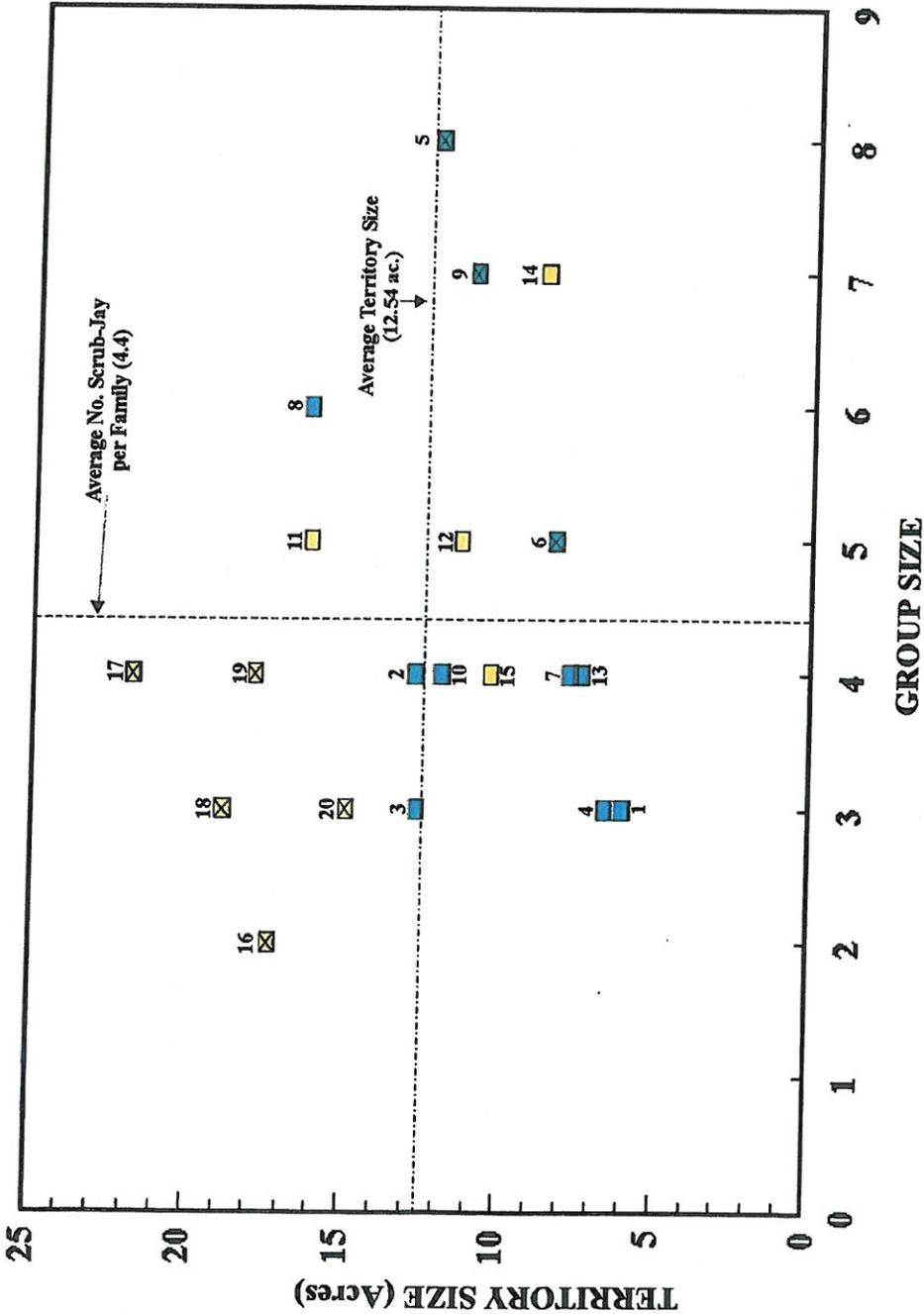


Figure 6. Florida Scrub-Jay Territory Size Relative to Group Size on the Lyonia Preserve Project Site, Volusia County, FL, March 2000

**Terra Verde Consulting, Inc.**  
 1035 South Semoran Boulevard, Suite 1013  
 Winter Park, FL 32792 (407) 678-1881

**TERRITORY SIZE RELATIVE TO GROUP SIZE LYONIA PRESERVE**



Project: 98094  
 Prepared by: CS  
 Date: 08/17/01  
 Scale: N/A

**LEGEND**

- 8 Territories at Least 50% within Phase I North Management Area
- 5 Territories Entirely in Phase I North Management Area
- 11 Territories at Least 50% within Phase II South Management Area
- 19 Territories Entirely in Phase II South Management Area

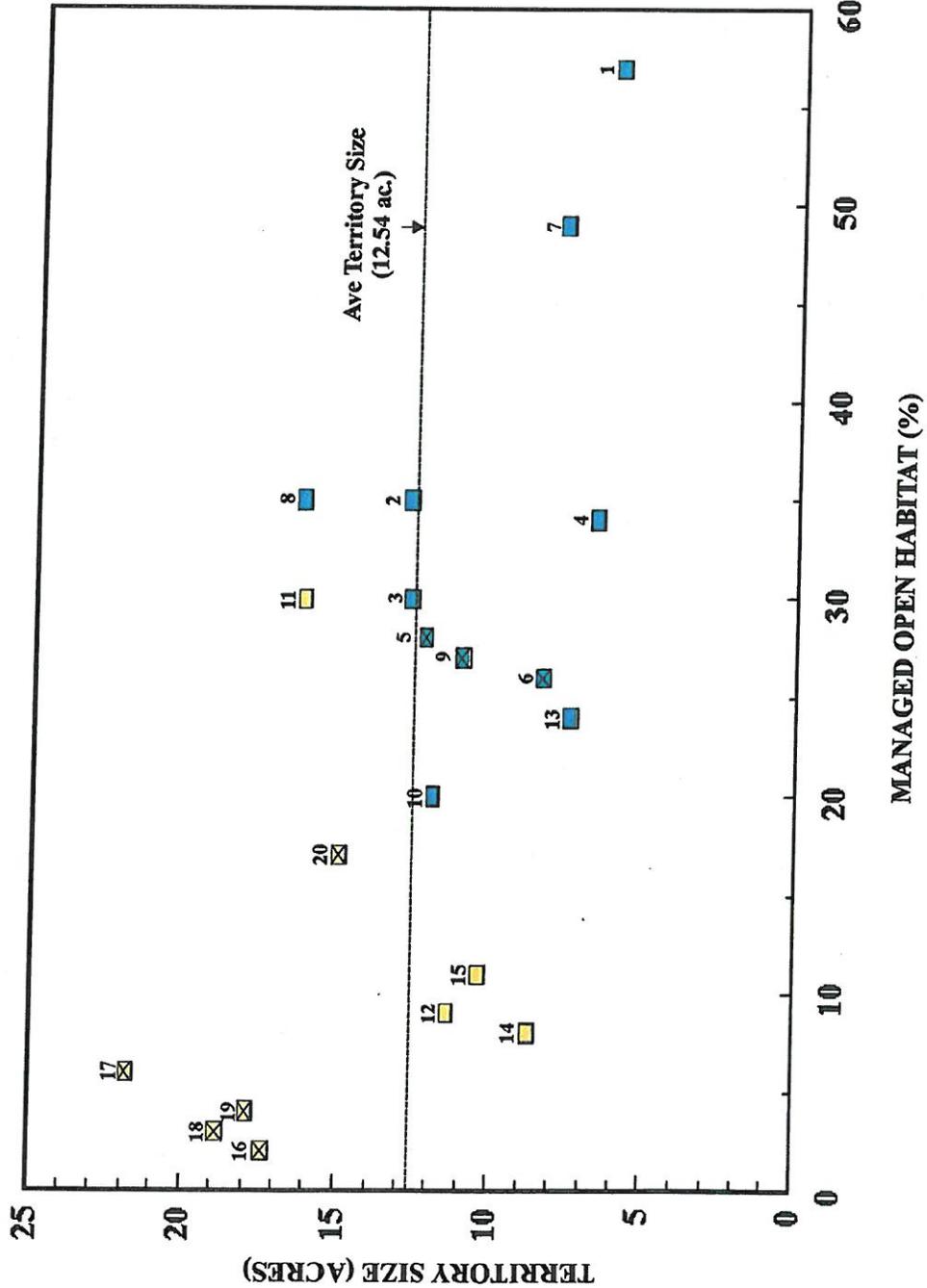


Figure 7. Florida Scrub-Jay Territory Size Relative to Percentage of Managed Open Habitat on the Lyonia Preserve Project, Volusia County, FL, March 2000

**Terra Verde Consulting, Inc.**  
 1035 South Semoran Boulevard, Suite 1013  
 Winter Park, FL 32792  
 (407) 678-1881

**TERRITORY SIZE RELATIVE TO  
 MANAGED OPEN HABITAT  
 LYONIA PRESERVE**

**N** Project: 98094  
 Prepared by: CS  
 Date: 08/17/01  
 Scale: N/A

**LEGEND**

- 8 Territories at Least 50% within Phase I North Management Area
- 5 Territories Entirely in Phase I North Management Area
- 11 Territories at Least 50% within Phase II South Management Area
- 19 Territories Entirely in Phase II South Management Area

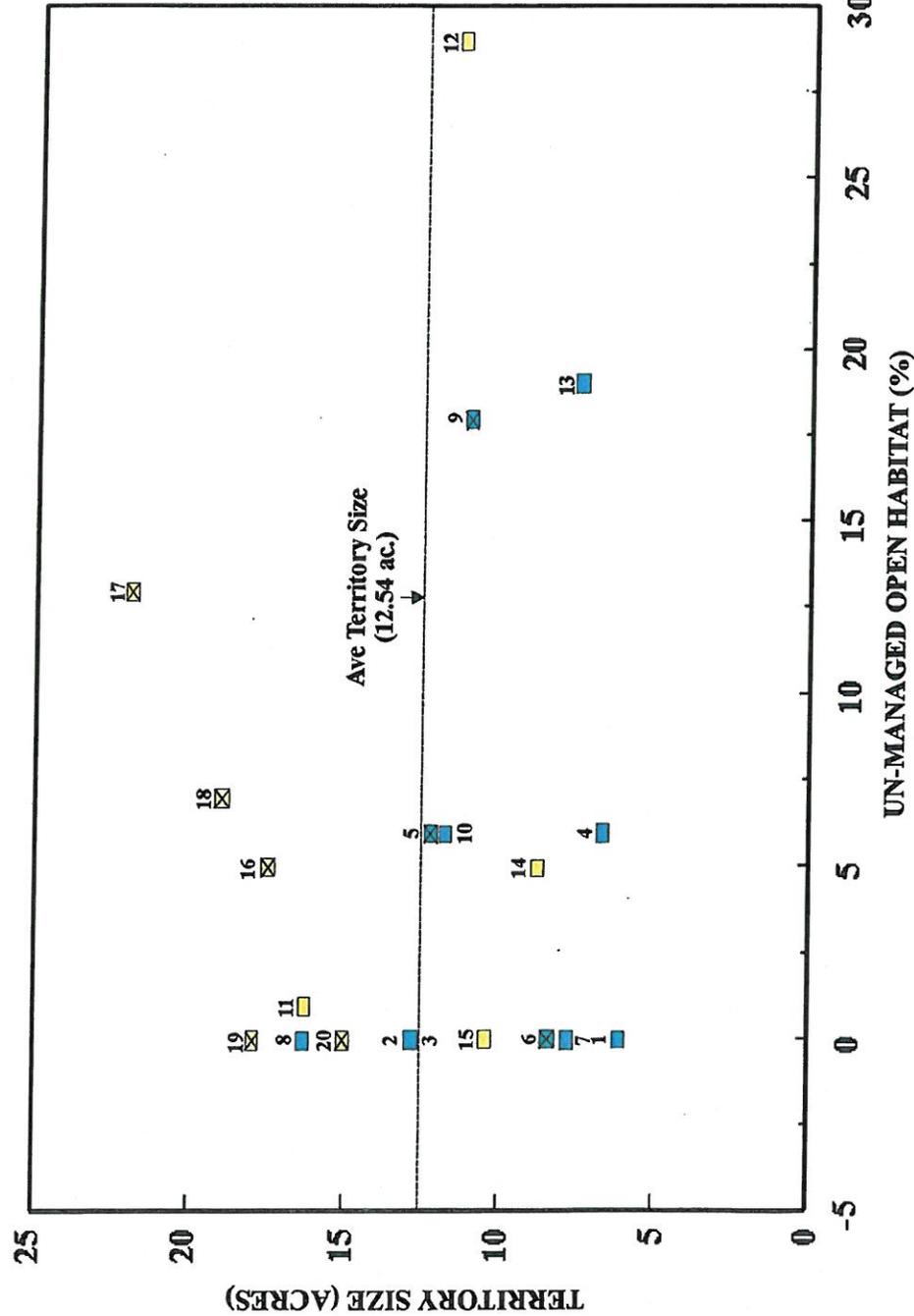


Figure 8. Florida Scrub-Jay Territory Size Relative to Percentage of Un-Managed Open Habitat on the Lyonia Preserve Project Site, Volusia County, FL, March 2000

**Terra Vercor Consulting, Inc.**  
 1035 South Semoran Boulevard, Suite 1013  
 Winter Park, FL 32792  
 (407) 678-1881

**TERRITORY SIZE RELATIVE TO UN-MANAGED OPEN HABITAT LYONIA PRESERVE**

**N** Project: 98094  
 Prepared by: CS  
 Date: 08/20/01  
 Scale: N/A

**LEGEND**

- 8 Territories at Least 50% within Phase I North Management Area
- 5 Territories Entirely in Phase I North Management Area
- 11 Territories at Least 50% within Phase II South Management Area
- 19 Territories Entirely in Phase II South Management Area

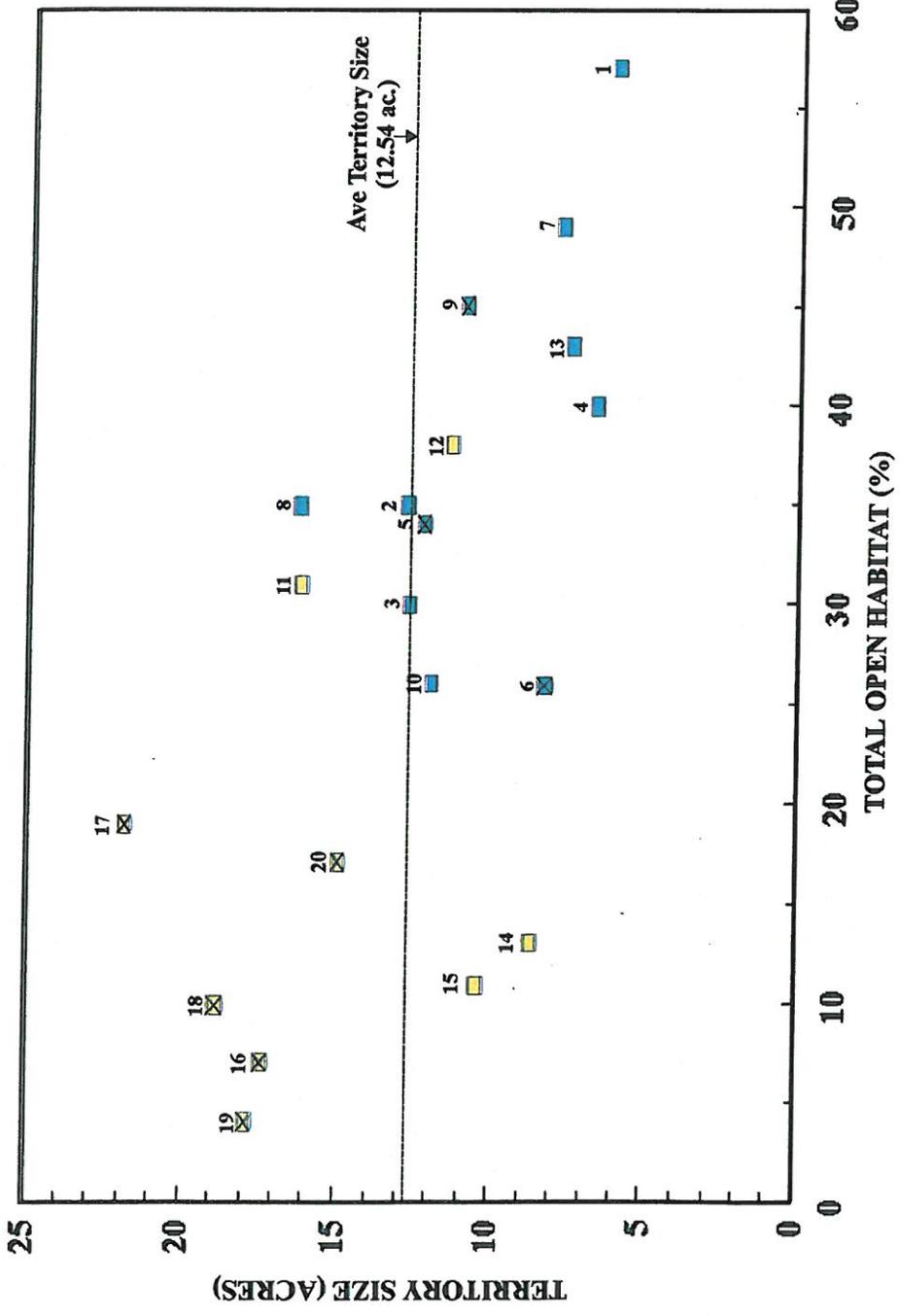


Figure 9. Florida Scrub-Jay Territory Size Relative to Percentage of Total Open Habitat on the Lyonia Preserve Project Site, Volusia County, FL, March 2000

**Terra Verde Consulting, Inc.**  
 1035 South Semoran Boulevard, Suite 1013  
 Winter Park, FL 32792 (407) 678-1881

**TERRITORY SIZE RELATIVE TO TOTAL OPEN HABITAT LYONIA PRESERVE**

**N** Project: 98094  
 Prepared by: CS  
 Date: 08/20/01  
 Scale: N/A

# LEGEND

- 8 Territories at Least 50% within Phase I North Management Area
- 5 Territories Entirely in Phase I North Management Area
- 11 Territories at Least 50% within Phase II South Management Area
- 19 Territories Entirely in Phase II South Management Area

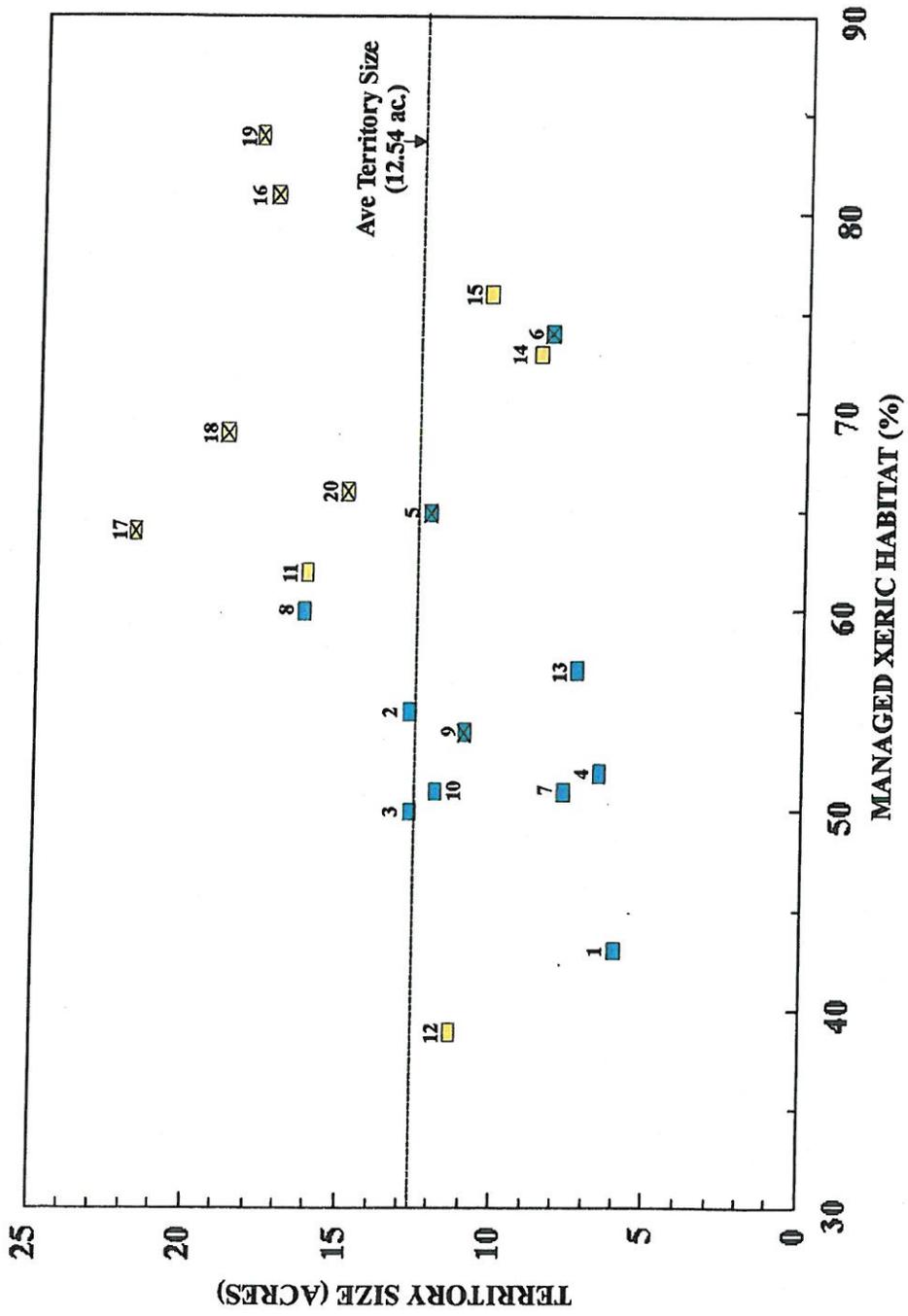


Figure 10. Florida Scrub-Jay Territory Size Relative to Percentage of Managed Xeric Habitat on the Lyonia Preserve Project Site, Volusia County, FL, March 2000

**TERRA VERDE CONSULTING, INC.**  
 1035 South Semoran Boulevard, Suite 1013  
 Winter Park, FL 32792  
 (407) 678-1881

TERRITORY SIZE RELATIVE TO  
 MANAGED XERIC HABITAT  
 LYONIA PRESERVE

**N** Project: 98094  
 Prepared by: CS  
 Date: 08/20/01  
 Scale: N/A

# LEGEND

- 8 Territories at Least 50% within Phase I North Management Area
- 5 Territories Entirely in Phase I North Management Area
- 11 Territories at Least 50% within Phase II South Management Area
- 19 Territories Entirely in Phase II South Management Area

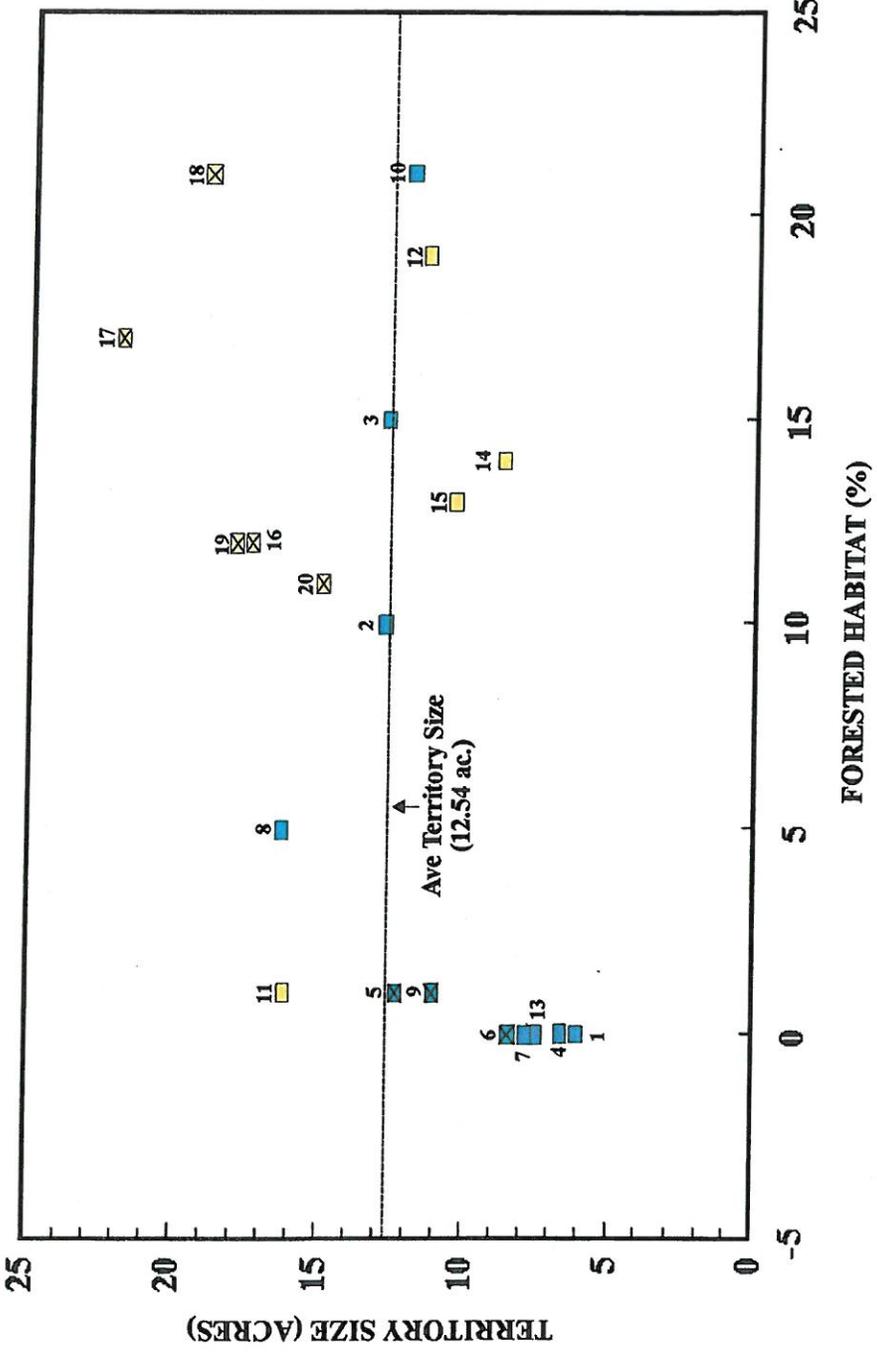


Figure 11. Florida Scrub-Jay Territory Size Relative to Percentage of Forested Habitat on the Lyonia Preserve Project Site, Volusia County, FL, March 2000

**Terra Verde Consulting, Inc.**  
 1035 South Semoran Boulevard, Suite 1013  
 Winter Park, FL 32792  
 (407) 678-1881

## TERRITORY SIZE RELATIVE TO FORESTED HABITAT LYONIA PRESERVE

**N** Project: 98094  
 Prepared by: CS  
 Date: 08/20/01  
 Scale: N/A

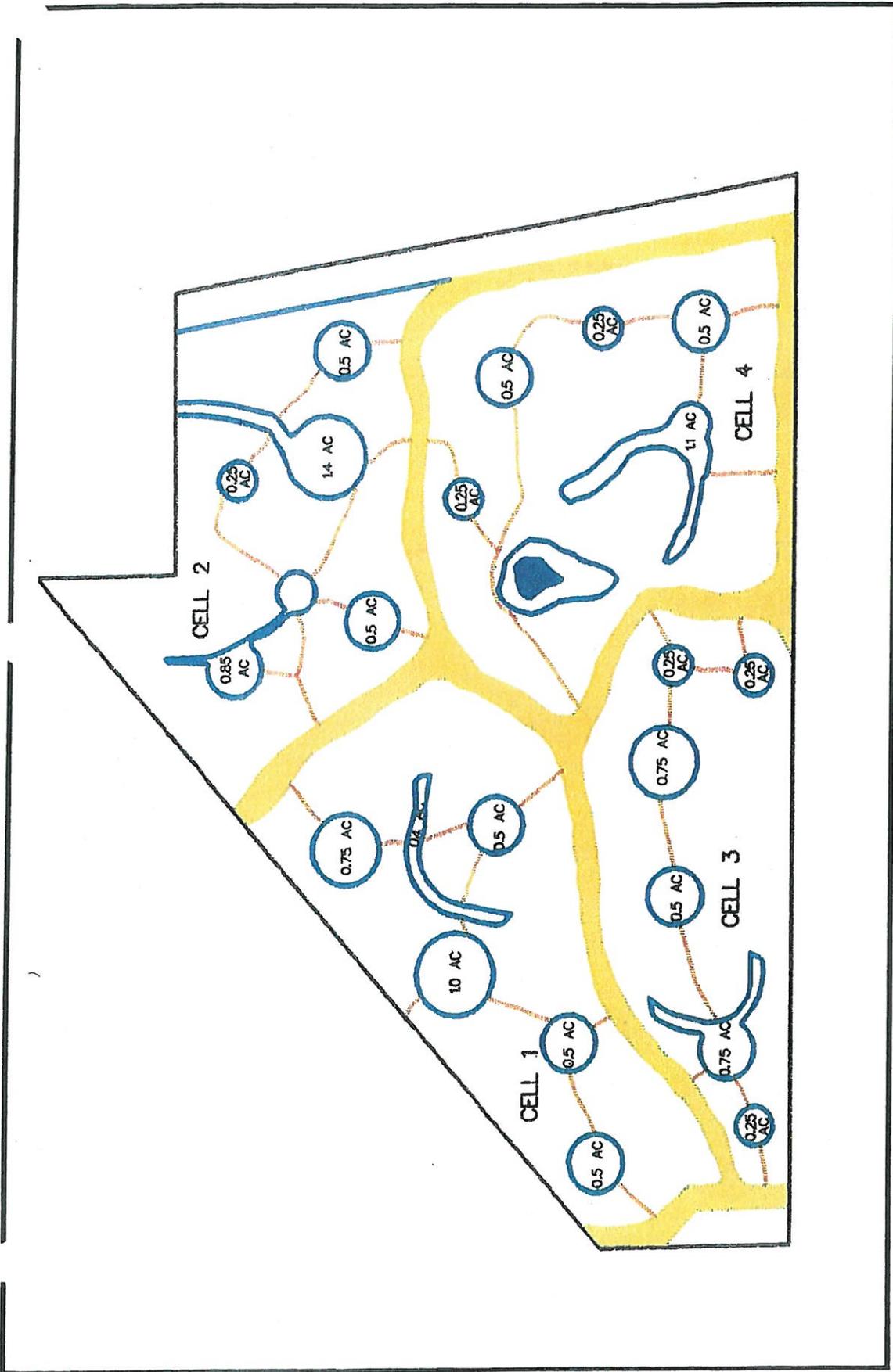


Figure 12. Typical Tract and Cell Structure of Section 16, Deltona, FL. (Taken from Young and Palmer 1992)

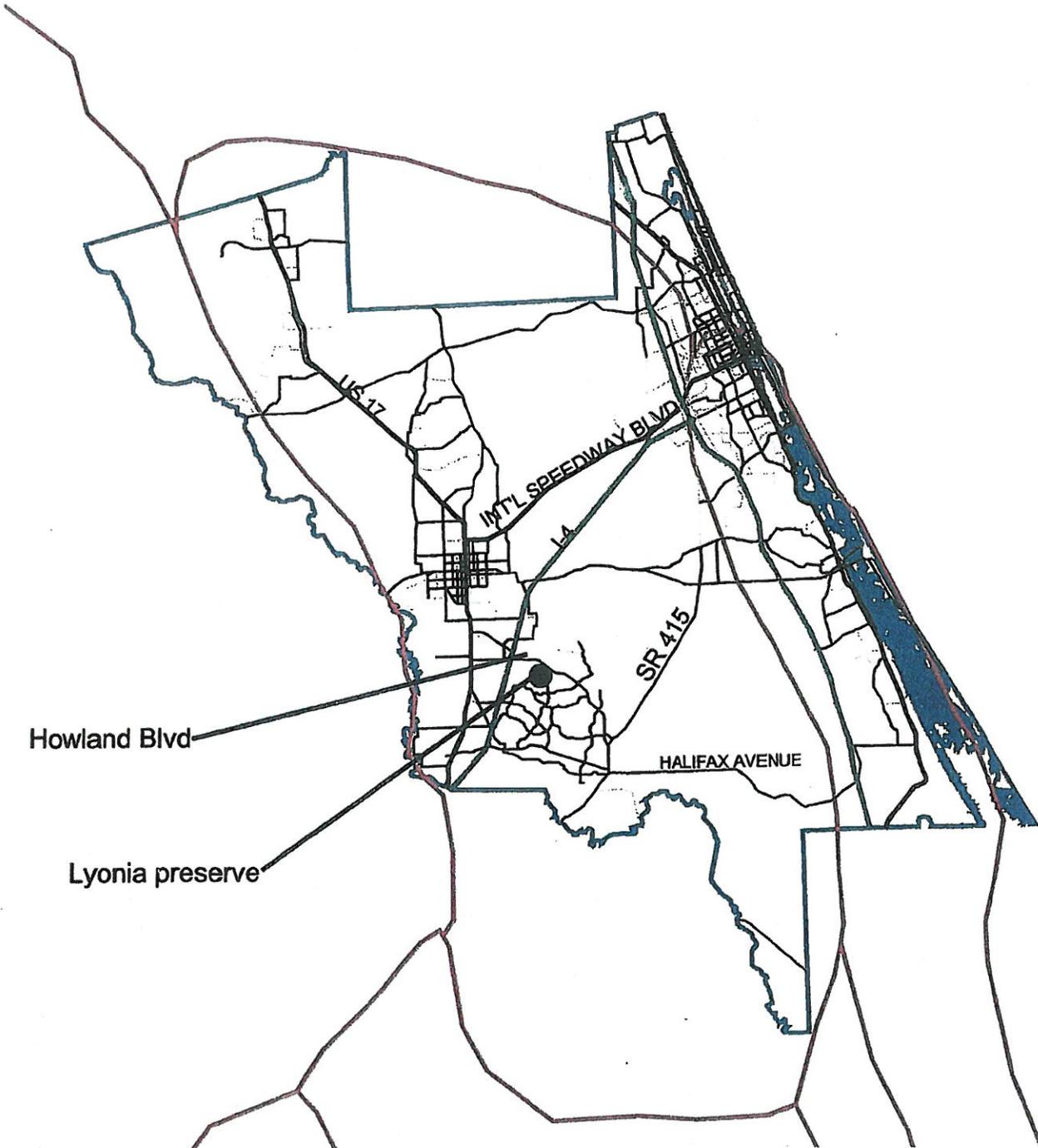
**Tigre Verde Consulting, Inc.**  
 1035 South Semoran Boulevard, Suite 1013  
 Winter Park, FL 32792 (407) 678-1881

**TYPICAL TRACT & CELL STRUCTURE  
 LYONIA PRESERVE**

**N**   
 Project: 98094  
 Prepared by: CS  
 Date: 08/24/01  
 Scale: NTS

# Florida Scrub-Jay Mitigation Service Area For The Lyonia Preserve

Figure 14



4 0 4 8 Miles

- FDOT Major Roads - 1998 - VOLUSIA
-  Interstate
  -  U.S. Road
  -  State Road
  -  County Road
  -  Local Road
  -  Roadway Feature
  -  FSJ Mitigation Service Area Polygon



**Table 2. Florida Scrub-Jay Numbers and Family Composition for the Lyonia Preserve Project Site, Section 16, Volusia County, Florida, March 2000**

<b>Territory No.</b>	<b>Banded Scrub Jay Identification No. Based on Color Code</b>	<b>No. Banded Scrub Jays</b>	<b>No. Unbanded Scrub Jays</b>	<b>Total No. Family Members</b>
1	25	1	2	3
2	17	1	3	4
3	1, 7	2	1	3
4	14, 42, 43	3	0	3
5	6, 8, 12, 18, 32, 41, 46	7 <sup>1</sup>	1	8
6	20, 26, 27, 40	4	1	5
7	28, 29	2	2	4
8	16, 22, 30	3	3	6
9	10, 11, 21 <sup>2</sup> , 44, 45	5	2	7
10	4, 15, 47	3	1	4
11	33, 34	2	3	5
12	5, 13, Silver <sup>3</sup>	3	2	5
13	2, 3	2	2	4
14	23, 24, 37, 38, 39	5	2	7
15	35, 36	2	2	4
16	none	0	2	2
17	none	0	4	4
18	none	0	3	3
19	none	0	4	4
20	none	0	3	3
<b>Totals</b>		<b>45</b>	<b>43</b>	<b>88</b>
<b>Average Number of Scrub Jays Per Family</b>				<b>4.4</b>

<sup>1</sup> Territory may be shared by dual family group with Nos. 6, 12, and 32 as one sub-group and Nos. 8, 18, and 41 as another sub-group, with No. 46 associating with both sub-groups.

<sup>2</sup> No. 21 is missing white band from left leg.

<sup>3</sup> "Silver" has U.S. Fish and Wildlife Service band, only; no color coded bands.

**Table 3. Estimated Florida Scrub-Jay Territory Size and Number of Family Members for the Lyonia Preserve Project Site, Volusia County, Florida, March 2000**

<b>Territory No.</b>	<b>Estimated Territory Size for Management Area (acres)</b>	<b>Estimated Off-site Territory Size (acres)<sup>1</sup></b>	<b>Total Estimated Territory Size (acres)</b>	<b>No. Family Members</b>
1	3.86	2.21	6.07	3
2	8.14	4.63	12.77	4
3	8.52	4.17	12.69	3
4	4.81	1.82	6.63	3
5	12.23	n/a	12.23	8
6	8.33	n/a	8.33	5
7	5.41	2.39	7.80	4
8	14.24	2.01	16.25	6
9	11.02	n/a	11.02	7
10	11.25	0.69	11.94	4
11	13.14	3.05	16.19	5
12	11.38	n/a	11.38	5
13	7.45	n/a	7.45	4
14	8.72	n/a	8.72	7
15	10.38	n/a	10.38	4
16	17.36	n/a	17.36	2
17	21.85	n/a	21.85	4
18	18.87	n/a	18.87	3
19	17.89	n/a	17.89	4
20	12.48	2.45	14.93	3
<b>Totals</b>	<b>227.33</b>	<b>23.42</b>	<b>250.75</b>	<b>88</b>
<b>Averages</b>	<b>11.37</b>	<b>1.17</b>	<b>12.54</b>	<b>4.4</b>

<sup>1</sup> Territory Nos. 1, 2, 3, 4, 7, 8, 10, 11, and 20 extend off-site of the Lyonia Preserve.

Table 4. Summary of Habitat Types for the Florida Scrub-Jay Territories on the Lyonia Preserve Project Site, Volusia County, Florida, March 2000

Habitat Type (Cover Types Included in Habitat Type <sup>1</sup> )	Florida Scrub-Jay Territory Acreage by Habitat Type and Percentage of Total Territory Acreage									
	1	2	3	4	5	6	7	8	9	10
Managed Open Habitat (311, 312, 313, 314, 315, 316, 317, and 832)	3.49 57%	4.48 35%	3.76 30%	2.25 34%	3.38 28%	2.16 26%	3.84 49%	5.74 35%	2.95 27%	2.38 20%
Un-managed Open Habitat (310, 641, and 742)				0.40 6%	0.84 6%				2.02 18%	0.76 6%
Managed Xeric Oak Habitat (421)	2.58 43%	6.99 55%	6.41 50%	3.42 52%	7.91 65%	6.17 74%	3.96 51%	9.65 60%	5.97 54%	6.08 51%
Forested Habitat (413 and 434)		1.30 10%	1.88 15%		0.10 1%			0.86 5%	0.08 1%	2.53 21%
<b>Sub-total Suitable Habitat</b>	<b>6.07 100%</b>	<b>12.77 100%</b>	<b>12.05 95%</b>	<b>6.07 92%</b>	<b>12.23 100%</b>	<b>8.33 100%</b>	<b>7.80 100%</b>	<b>16.25 100%</b>	<b>11.02 100%</b>	<b>11.75 98%</b>
Unsuitable Habitat (644 and 814)			0.64 5%	0.56 8%						0.19 2%
<b>Total Territory Acreage</b>	<b>6.07</b>	<b>12.77</b>	<b>12.69</b>	<b>6.63</b>	<b>12.23</b>	<b>8.33</b>	<b>7.80</b>	<b>16.25</b>	<b>11.02</b>	<b>11.94</b>

Table 4. Summary of Habitat Types for the Florida Scrub-Jay Territories on the Lyonia Preserve Project Site, Volusia County, Florida, March 2000 (Continued)

Habitat Type (Cover Types Included in Habitat Type <sup>1</sup> )	Florida Scrub-Jay Territory Acreage by Habitat Type and Percentage of Total Territory Acreage									
	11	12	13	14	15	16	17	18	19	20
Managed Open Habitat (311, 312, 313, 314, 315, 316, 317, and 832)	4.91 30%	1.07 9%	1.81 24%	0.68 8%	1.11 11%	0.33 2%	1.22 6%	0.57 3%	0.63 4%	2.65 17%
Un-managed Open Habitat (310, 641, and 742)	0.05 1%	3.34 29%	1.40 19%	0.46 5%		0.83 5%	2.84 13%	1.31 7%		
Managed Xeric Oak Habitat (421)	10.10 62%	4.45 39%	4.24 57%	6.38 73%	7.92 76%	14.16 81%	14.02 64%	13.08 69%	15.12 84%	9.83 66%
Forested Habitat (413 and 434)	0.22 1%	2.13 19%		1.20 14%	1.35 13%	2.04 12%	3.77 17%	3.91 21%	2.14 12%	1.62 11%
<b>Sub-total Suitable Habitat</b>	<b>15.28 94%</b>	<b>10.99 96%</b>	<b>7.45 100%</b>	<b>8.72 100%</b>	<b>10.38 100%</b>	<b>17.36 100%</b>	<b>21.85 100%</b>	<b>18.87 100%</b>	<b>17.89 100%</b>	<b>14.10 94%</b>
Sub-total Unsuitable Habitat (644 and 814)	0.91 6%	0.39 4%								0.83 6%
<b>Total Territory Acreage</b>	<b>16.19</b>	<b>11.38</b>	<b>7.45</b>	<b>8.72</b>	<b>10.38</b>	<b>17.36</b>	<b>21.85</b>	<b>18.87</b>	<b>17.89</b>	<b>14.93</b>

**Table 4. Summary of Habitat Types for the Florida Scrub-Jay Territories on the Lyonia Preserve Project Site, Volusia County, Florida, March 2000 (Continued)**

<sup>1</sup> Cover Types are as follows:

310	Herbaceous
311	Managed Trail 50' Wide
312	Managed Clearing
313	Managed Fire Break 15' Wide
314	Managed Trail 8' Wide
315	Other Trails 8' Wide/Existing, Logging, and Added Trails
316	Managed Nature Trail 4' Wide
317	Mowed Landscape/Roadway Grassland
413	Sand Pine
421	Xeric Oak
434	Mixed Hardwood-Conifer
641	Freshwater Marsh, Seasonally Dry
644	Emergent Aquatic Vegetation
742	Borrow Areas
814	Roadway Pavement
832	Electrical Power Transmission Line

**Table 5. Florida Scrub-Jay Habitat Management Recommendations for the Lyonia Preserve Project Site, Volusia County, Florida**

Habitat Type	Basis for Management: Habitat Type Percent Occurrences for Selected Scrub-Jay Territories					Recommended Habitat Management for Phase II and III	
	Territory No. 5	Territory No. 6	Territory No. 9	Average for Territories	Target Management Percentage	Targeted Range for Habitat Management	
Managed Open Habitat	28%	26%	27%	27%	25%	15% to 45%	
Un-managed Open Habitat	6%	0%	18%	8%	10%	0% to 25%	
Total Open Habitat	34%	26%	45%	35%	35%	25% to 50%	
Managed Xeric Habitat	65%	74%	54%	64%	65%	40% to 75%	
Forested Habitat	1%	0%	1%	1%	<1%	0% to 20%	
Total Suitable Habitat	100%	100%	100%	100%	100%	n/a	

**Table 6. Summary of Habitat Types by Management Cell for the Phase II South Management Area on the Lyonia Preserve Project Site, Volusia County, Florida**

Habitat Type (Cover Types Included in Habitat Type <sup>1</sup> )		Management Cell Acreage by Habitat Type and Percentage of Total Territory Acreage						
		5	6	7	8	9	10	11
Managed Open Habitat	311	1.55	1.26	2.51	2.86	1.35	2.41	2.01
	312	1.90	1.41	0.88	3.05	1.30	2.27	3.25
	313	0.30		0.92	0.21		0.34	0.93
	315			0.27	0.04			
	316		0.06		0.16	0.14	0.10	0.10
	317							0.57
	Total Acreage	3.75	2.73	4.58	6.32	2.79	5.12	6.86
	% of Total Cell Acreage	32.64	27.25	20.94	19.05	25.79	35.63	32.70
Un-managed Open Habitat	310			2.95	1.74			
	641				4.42	0.11		
	Total Acreage			2.95	6.16	0.11		
	% of Total Cell Acreage			13.49	18.56	1.02		
Total Open Habitat	Total Acreage	3.75	2.73	7.53	12.48	2.90	5.12	6.86
	% of Total Cell Acreage	32.64	27.25	34.43	37.61	26.81	35.63	32.70
Managed Xeric Habitat	413	2.11		3.32	0.33		0.65	0.82
	421	5.63	7.29	11.02	14.30	6.75	8.60	13.30
	Total Acreage	7.74	7.29	14.34	14.63	6.75	9.25	14.12
	% of Total Cell Acreage	67.36	72.75	65.57	44.09	62.38	64.37	67.30
Forested Habitat (434)	Total Acreage				5.68	1.17		
	% of Total Cell Acreage				17.12	10.81		

**Table 6. Summary of Habitat Types by Management Cell for the Phase II South Management Area on the Lyonia Preserve Project Site, Volusia County, Florida (Continued)**

Habitat Type (Cover Types Included in Habitat Type <sup>1</sup> )		Management Cell Acreage by Habitat Type and Percentage of Total Territory Acreage						
		5	6	7	8	9	10	11
Sub-total Suitable Habitat	Total Acreage	11.49	10.02	21.87	32.79	10.82	14.37	20.98
	% of Total Cell Acreage	100.00	100.00	100.00	98.82	100.00	100.00	100.00
Unsuitable Habitat (644)	Total Acreage				0.39			
	% of Total Cell Acreage				1.18			
<b>Total Management Cell Acreage</b>		<b>11.49</b>	<b>10.02</b>	<b>21.87</b>	<b>33.18</b>	<b>10.82</b>	<b>14.37</b>	<b>20.98</b>

<sup>1</sup> Cover types are as follows:

- 310 Herbaceous
- 311 Managed Trail 50' Wide
- 312 Managed Clearing
- 313 Managed Fire Break 15' Wide
- 315 Other Trails 8' Wide/Existing, Logging, and Added Trails
- 316 Managed Nature Trail 4' Wide
- 317 Mowed Landscape/Roadway Grassland
  
- 413 Sand Pine
- 421 Xeric Oak
- 434 Mixed Hardwood-Conifer
  
- 641 Freshwater Marsh, Seasonally Dry
- 644 Emergent Aquatic Vegetation



**Table 7. Summary of Habitat Types by Management Cell for the Phase III East Management Area on the Lyonia Preserve Project Site, Volusia County, Florida (Continued)**

Habitat Type (Cover Types Included in Habitat Type <sup>1</sup> )		Management Cell Acreage by Habitat Type and Percentage of Total Territory Acreage						
		12	13	14	15	16	17	18
Unsuitable Habitat (644)	Total Acreage							3.25
	% of Total Cell Acreage							7.24
<b>Total Management Cell Acreage</b>		<b>18.33</b>	<b>15.21</b>	<b>8.65</b>	<b>11.72</b>	<b>15.89</b>	<b>15.09</b>	<b>44.86</b>

<sup>1</sup> Cover types are as follows:

- 311 Managed Trail 50' Wide
- 312 Managed Clearing
- 313 Managed Fire Break 15' Wide
- 314 Managed Trail 8' Wide
  
- 412 Xeric Flatwoods
- 413 Sand Pine
  
- 641 Freshwater Marsh, Seasonally Dry
- 644 Emergent Aquatic Vegetation
  
- 720 Sand, other than Beach
- 742 Borrow Areas

**Table 8. Schedule of Management and Maintenance Activities for the Lyonia Preserve Project Site, Volusia County, Florida**

Management Area		Management Activity  Initial Management/Date Conducted and Future Restoration/Date Scheduled	Maintenance Activity by Cover Type Date Completed/Date Scheduled	
Management Phase	Cell No.		Trails	Xeric Oak/ Open Habitat <sup>1</sup>
Phase I  North Management Area	1	Initial harvest occurred February to March 1994. Managed Open Area Clearings occurred March to August 1994. <i>Buffer fuel wood harvest February to March 2004.</i>	Annual mowing as needed; began 1995.	Cell roller chopped in March 2003. <i>Future, per habitat assessment, as needed.</i>
	2	Initial harvest occurred February to March 1994. Managed Open Area Clearings, and Strip Roller Chop occurred March to August 1994.	Annual mowing as needed; began 1995.	<i>Future, per habitat assessment, as needed.</i>
	3	Initial harvest occurred February to March 1994. Managed Open Area Clearings occurred March to August 1994. <i>Buffer fuel wood harvest February to March 2004.</i>	Annual mowing as needed; began 1995.	Brush cutter removal sand pine, Dec. 2003. <i>Future, per habitat assessment, as needed.</i>
	4	Initial harvest occurred February to March 1994. Prescribed Fire occurred March 1994. Managed Open Area Clearings occurred March to August 1994.	Annual mowing as needed; began 1995.	<i>Future, per habitat assessment, as needed.</i>
Phase II  South Management Area	5	Initial harvest occurred February to March 1994. <i>Buffer fuel wood harvest and Managed Open Area Clearings February to March 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	6	Initial harvest occurred February to March 1994. <i>Managed Open Area Clearings, February to March 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	7	Initial harvest occurred February to March 1994. <i>Buffer fuel wood harvest and Managed Open Area Clearings February to March 2004. Prescribed Fire March to April 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	8	Initial harvest occurred February to March 1994. <i>Buffer fuel wood harvest and Managed Open Area Clearings February to March 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>

<sup>1</sup> The schedule for mechanical maintenance and/or prescribed fire will be based on habitat assessment, and performed if average canopy coverage of sand pine exceeds 10%, and/or the average canopy height exceeds 10 feet.

**Table 8. Schedule of Management and Maintenance Activities for the Lyonia Preserve Project Site, Volusia County, Florida (Continued)**

Management Area		Management Activity  Initial Management/Date Conducted and Future Restoration/Date Scheduled	Maintenance Activity by Cover Type Date Completed/Date Scheduled	
Management Phase	Cell No.		Trails	Xeric Oak/ Open Habitat <sup>1</sup>
Phase II  South Management Area (Continued)	9	Initial harvest occurred February to March 1994. <i>Managed Open Area Clearings, February to March 2004. Prescribed fire March to April 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	10	Initial harvest occurred February to March 1994. <i>Buffer fuel wood harvest Feb.-Mar. 2004. Managed Open Area Clearings, February to March 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	11	Initial harvest occurred February to March 1994. <i>Buffer fuel wood harvest Feb.-Mar. 2004. Managed Open Area Clearings, February to March 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
Phase III  East Management Area	12	<i>Fuel wood harvest February to March 2004. Managed Open Area Clearings, February to March 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	13	<i>Fuel wood harvest February to March 2004. Managed Open Area Clearings, February to March 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	14	<i>Fuel wood harvest February to March 2004. Managed Open Area Clearings, February to March 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	15	<i>Fuel wood harvest February to March 2004. Managed Open Area Clearings, February to March 2004. Prescribed fire March to April 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	16	<i>Fuel wood harvest February to March 2004. Managed Open Area Clearings, February to March 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	17	<i>Fuel wood harvest February to March 2004. Managed Open Area Clearings, February to March 2004. Prescribed fire March to April 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>
	18	<i>Fuel wood harvest February to March 2004. Managed Open Area Clearings, February to March 2004.</i>	<i>Annual mowing as needed; begin 2005.</i>	<i>Future, per habitat assessment, as needed.</i>

<sup>1</sup> The schedule for mechanical maintenance and/or prescribed fire will be based on habitat assessment, and performed if average canopy coverage of sand pine exceeds 10%, and/or the average canopy height exceeds 10 feet.

**APPENDIX**

**Section 16 School Board Lease**

BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

---

LEASE AGREEMENT

No. 3403

WHEREAS, the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida holds title to certain lands and property being utilized by the State of Florida for public purposes, and

WHEREAS, the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida is authorized in Section 253.03, Florida Statutes, to enter into leases for the use, benefit and possession of public lands by State agencies which may properly use and possess them for the benefit of the State;

NOW, THEREFORE, this agreement made between the BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND of the State of Florida, as Lessor, and the School Board of Volusia County as lessee and

WITNESSETH:

The parties, for and in consideration of mutual covenants and agreements hereinafter contained, hereby covenant and agree as follows:

1. The lessor does hereby lease to the lessee the following described premises in the County of Volusia, State of Florida, together with the improvements thereon (if applicable), viz:

(Exhibit A - attached)

TO HAVE AND TO HOLD the above described land for a period of 50 years for public school purposes.

2. The lessee shall have the right to enter upon said land for all purposes necessary to the full enjoyment by said lessee of the rights herein conveyed to it.

3. The lessee shall through its agents and employees prevent the unauthorized use of said land or any use thereof not in conformity with this lease.

EXHIBIT 'C'

4. This lease shall terminate at the sole option of the lessor, and the lessee shall surrender up the premises to the lessor, when and if said premises, including lands and improvements, shall cease to be used for school purposes. Any costs arising out of the enforcement of the terms of this lease agreement shall be the exclusive obligation of the lessee, payable upon demand of the lessor.

5. The lessee hereby covenants and agrees to investigate all claims of every nature at its own expense and to indemnify, protect, defend, hold and save harmless the lessor from any and all claims, actions, lawsuits and demands of any kind or nature arising out of this agreement to the extent allowable by law.

6. The lessor does not warrant or guarantee title, right or interest in the hereinabove described property.

7. The lessor or its duly authorized agents shall have the right at any time to inspect the said land and the works and operations thereon of the lessee in any matter pertaining to this agreement.

8. The lessee agrees to assume all responsibility for liabilities that accrue to the subject property or to the improvements thereon, including any and all drainage or special assessments or taxes of every kind and description which are now or may be hereafter lawfully assessed and levied against the subject property during the effective period of this lease.

9. The lessee is hereby authorized to grant utility and road easements which will be necessary to service authorized facilities located within the leased premises. Copies of any such easements granted shall be filed timely with the lessor.

10. This agreement is for the purposes specified herein, and subleases of any nature, excepting utility and road easements incident to authorized facilities, (Provision 9), are prohibited, unless previously authorized by the lessor.

11. A Management Plan for this tract shall be prepared by the lessee, in accordance with Section 253.034, Florida Statutes, within 12 months of the execution date of this Lease and shall be submitted to the Board for approval through State Lands, acting as agent for the Board. The approved Management Plan shall provide the basic guidance for all management activities and shall be reviewed jointly by the lessee and the Board at least every five (5) years. The lessee shall not use or alter the property except as provided for in the approved Management Plan without the advance written approval of State Lands, as agent for the Board. The land management plan prepared under this lease shall identify management strategies for exotic species, if present. The introduction of exotic species is prohibited, except when specifically authorized by the approved land management plan.

12. Upon cessation of occupation of said property, the lessee agrees to leave all fixed improvements for the use of the lessor and to put no claim upon said fixed improvements; or, at the option of the lessor, the lessee agrees to remove any or all improvements on the property at the lessee's expense.

13. Execution of this agreement in no way affects the lessee's obligations pursuant to Chapter 267, Florida Statutes.

14. The lessee hereby agrees that annual evidence of insurance will be submitted to the following: Bureau of State Lands Management, 3900 Commonwealth Boulevard, Tallahassee, Florida 32303.

15. The lessee hereby agrees that in the event no further use of this parcel or any part thereof is needed, notification will be given to the Bureau of State Lands Management, 3900 Commonwealth Boulevard, Tallahassee, Florida 32303, at least six months prior to the release of any or all of the premises. Notification will include a legal description, the

lease number, and an explanation of the release. The release will only be valid if approved by the Board of Trustees.

16. The lessee further agrees that any buildings on the premises will meet the following conditions upon release:

(a) The premises shall meet the building and safety codes in the location situated.

(b) The lessee shall properly dispose of utility fees, including having utilities turned off.

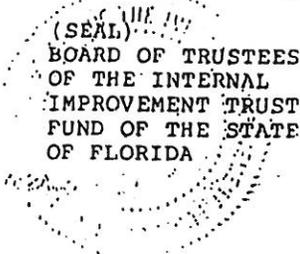
(c) The lessee shall not commit waste; fair wear and tear is acceptable.

(d) Prior to formal release a representative of the Bureau of State Lands Management shall perform an on-site inspection and the keys to any buildings on the premises shall be turned over to that Bureau.

(e) If the premises does not meet all conditions agreed upon, the lessee shall reimburse the Board for any expenses incurred in meeting the prescribed conditions.

(f) Any structures erected shall inure to the benefit of the State of Florida.

IN TESTIMONY WHEREOF, the lawfully designated agent of the Board of Trustees of the Internal Improvement Trust Fund has hereunto subscribed his name and has caused the official seal of said Board to be hereunto affixed, in the City of Tallahassee, Florida, on the 15 day of June, A.D. 1982.



BOARD OF TRUSTEES OF THE  
INTERNAL IMPROVEMENT TRUST  
FUND OF THE STATE OF FLORIDA

By: [Signature]  
EXECUTIVE DIRECTOR, AGENT FOR  
THE BOARD OF TRUSTEES OF THE  
INTERNAL IMPROVEMENT TRUST  
FUND OF THE STATE OF FLORIDA

APPROVED AS TO FORM AND  
LEGALITY

By: Dary L. Hester

THIS INSTRUMENT PREPARED  
AND REVIEWED

By: Catherine Daniels

SCHOOL BOARD OF VOLUSIA COUNTY

By: Beebe J. White

DATE November 18, 1986

VOLUSIA COUNTY SCHOOL BOARD  
PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF THE VOCATIONAL, AGRICULTURE AND FOREST LAB LANDS

BEGINNING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE RUN N 89° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 597.05 FT.; THENCE N 00° 54' 02" W A DISTANCE OF 639.628 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 08° 24' 02", A RADIUS OF 2,814.79 FT. AND A CHORD BEARING OF N 05° 06' 03" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 412.70 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 09° 16' 04" W A DISTANCE OF 2,823.97 FT. TO THE P.C. OF A CURVE CONCAVE TO THE EAST HAVING A CENTRAL ANGLE OF 08° 21' 55", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF N 05° 07' 06" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 425.57 FT. TO THE P.T.; THENCE N 00° 56' 08" W A DISTANCE OF 991.65 FT. TO THE NORTH LINE OF THE NE 1/4 OF SAID SECTION 16 AT A POINT 50.00 FT. WESTERLY OF THE CENTERLINE OF IDLEWEISE DR. AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE, AS RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, AFORESAID PUBLIC RECORDS; THENCE S 88° 58' 33" W ALONG SAID NORTH LINE 11.89 FT. TO THE NORTH 1/4 CORNER OF SAID SECTION 16; THENCE S 88° 58' 07" W ALONG THE NORTH LINE OF THE NW 1/4 OF SAID SECTION 16 A DISTANCE OF 1,876.76 FT. TO THE WEST LINE OF THE EAST 530 FT. OF THE WEST 1/2 OF THE SAID NW 1/4; THENCE S 00° 10' 47" W ALONG THE SAID WEST LINE 1,072.34 FT.; THENCE N 88° 58' 07" E PARALLEL WITH THE NORTH LINE OF THE SAID NW 1/4 A DISTANCE OF 165 FT. TO THE WEST LINE OF THE EAST 365 FT. OF THE WEST 1/2 OF THE SAID NW 1/4; THENCE S 00° 10' 47" W ALONG THE SAID WEST LINE 943.11 FT. TO THE NORTHERLY LINE OF FLORIDA POWER & LIGHT COMPANY'S EASEMENT AS RECORDED IN OFFICIAL RECORDS BOOK 211, PAGE 143, AND OFFICIAL RECORDS BOOK 1294, PAGE 494, AFORESAID PUBLIC RECORDS; THENCE S 47° 52' 07" W A DISTANCE OF 927.04 FT. TO THE SOUTH LINE OF THE NW 1/4 OF SAID SECTION 16; THENCE S 89° 04' 33" W ALONG SAID SOUTH LINE 290.27 FT. TO THE WEST 1/4 CORNER OF SAID SECTION 16; THENCE S 00° 01' 03" W ALONG THE WEST LINE OF THE SW 1/4 OF SAID SECTION 16 A DISTANCE OF 2,631.05 FT. TO THE SW CORNER OF SAID SECTION 16; THENCE N 89° 05' 21" E ALONG THE SOUTH LINE OF SAID SECTION 16 A DISTANCE 2,668.96 FT. TO THE POINT OF BEGINNING; EXCEPT THE FOLLOWING DESCRIBED PARCEL:

COMMENCING AT THE INTERSECTION OF THE CENTERLINE OF IDLEWEISE DRIVE AND THE NORTH LINE OF THE NE 1/4 OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE, RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE S 88° 58' 33" W ALONG THE SAID NORTH LINE 50.00 FT.; THENCE S 00° 56' 08" E A DISTANCE OF 991.65 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 00° 06' 29", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF S 00° 59' 23" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 5.50 FT. TO THE POINT OF BEGINNING;

THENCE CONTINUE ALONG THE ARC OF SAID CURVE 148.79 FT. THROUGH A CENTRAL ANGLE OF 02° 55' 29" AND A CHORD BEARING OF S 02° 30' 21" E TO THE POINT OF REVERSE CURVE (P.R.C.) OF A CURVE CONCAVE TO THE SOUTHWEST HAVING A CENTRAL ANGLE OF 87° 03' 46", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF N 47° 30' 00" W; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE 37.99 FT. TO THE POINT OF TANGENCY (P.T.); THENCE S 88° 58' 07" W, PARALLEL WITH THE NORTH LINE OF THE NW 1/4 OF SAID SECTION 16 A DISTANCE OF 1,724.63 FT. TO THE WEST LINE OF THE EAST 365 FT. OF THE WEST 1/2 OF THE NW 1/4 OF SAID SECTION 16; THENCE N 00° 10' 47" E ALONG SAID WEST LINE 50.01 FT. TO THE SOUTH LINE OF THE NORTH 1072.34 FT. OF THE SAID NW 1/4; THENCE S 88° 58' 07" W ALONG SAID SOUTH LINE 165.00 FT. TO THE WEST LINE OF THE EAST 530 FT. OF THE SAID WEST 1/2 OF THE NW 1/4; THENCE N 00° 10' 47" E ALONG SAID WEST LINE 50.01 FT.; THENCE N 88° 58' 07" E PARALLEL WITH THE NORTH LINE OF THE SAID NW 1/4 A DISTANCE OF 1,883.65 FT. TO THE P.C. OF A CURVE CONCAVE TO THE NORTHWEST HAVING A CENTRAL ANGLE OF 90° 00' 44", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF N 43° 57' 45" E; THENCE NORTHEASTERLY ALONG THE ARC OF SAID CURVE 39.27 FT. TO THE P.T. AND THE POINT OF BEGINNING OF THE HEREIN DESCRIBED EXCEPTION; CONTAINING 290.49 ACRES, MORE OR LESS; SUBJECT TO A FLORIDA POWER AND LIGHT COMPANY EASEMENT AS RECORDED IN O.R. BK. 211, PG. 143, AND O.R. BK. 1294, PG. 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; AND BEING SUBJECT TO A UTILITY EASEMENT OVER THE WEST 20 FT. THEREOF AND THE SOUTH 20 FT. THEREOF.

VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF ENVIRONMENTAL STUDY AREA:

COMMENCING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA AS SHOWN ON THE PLAT OF DELTONA LAKES UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE N 09° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 697.052 FT. TO THE POINT OF BEGINNING; THENCE N 00° 54' 02" W A DISTANCE OF 639.59 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 08° 24' 02", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF N 05° 06' 03" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 427.36 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 09° 18' 04" W A DISTANCE OF 2,823.97 FT. TO THE P.C. OF A CURVE CONCAVE TO THE EAST HAVING A CENTRAL ANGLE OF 08° 21' 55", A RADIUS OF 2,814.79 FT. AND A CHORD BEARING OF N 05° 07' 06" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 410.97 FT. TO THE P.T.; THENCE N 00° 56' 09" W A DISTANCE OF 991.801 FT. TO THE NORTH LINE OF THE NE 1/4 OF SAID SECTION 16 AT A POINT 50.00 FT. EASTERLY OF THE CENTERLINE OF IDLEWEISE DRIVE AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE AS RECORDED IN MAP BOOK 20, PAGES 32 THROUGH 42, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE N 88° 58' 33" E ALONG SAID NORTH LINE 2,556.79 FT. TO THE NE CORNER OF SAID NE 1/4; THENCE S 00° 19' 53" W ALONG THE EAST LINE OF THE SAID NE 1/4 A DISTANCE OF 2,634.33 FT. TO THE EAST 1/4 CORNER OF SAID SECTION 16; THENCE S 00° 42' 14" W ALONG THE EAST LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 1312.45 FT. TO THE NORTH LINE OF THE SOUTH 1320 FT. OF THE SAID SE 1/4; THENCE S 89° 04' 39" W ALONG SAID NORTH LINE 1320 FT. TO THE WEST LINE OF THE EAST 1320 FT. OF THE SAID SE 1/4; THENCE S 00° 42' 14" W ALONG SAID WEST LINE 1320 FT. TO THE SOUTH LINE OF SAID SE 1/4; THENCE S 89° 04' 36" W ALONG THE SAID SOUTH LINE 631.81 FT. TO THE POINT OF BEGINNING; EXCEPT THE FOLLOWING DESCRIBED PARCEL:

COMMENCING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA AS SHOWN ON THE PLAT OF DELTONA LAKES UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; RUN THENCE N 89° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 697.05 FT.; THENCE N 00° 54' 02" W A DISTANCE OF 25.00 FT. TO THE POINT OF BEGINNING OF THE HEREIN DESCRIBED EXCEPTION; THENCE CONTINUE N 00° 54' 02" W A DISTANCE OF 150.00 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE NORTHEAST HAVING A CENTRAL ANGLE OF 90° 01' 19", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF S 45° 54' 41" E; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE 39.28 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 89° 04' 39" E PARALLEL WITH THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 611.00 FT. TO THE WEST LINE OF THE EAST 1320.00 FT. OF THE SAID SE 1/4; THENCE S 00° 42' 14" W ALONG SAID WEST LINE 100.04 FT.; THENCE S 89° 04' 39" W PARALLEL WITH THE SOUTH LINE OF THE SAID SE 1/4 A DISTANCE OF 608.222 FT. TO THE P.C. OF A CURVE CONCAVE TO THE SOUTHEAST HAVING A CENTRAL ANGLE OF 89° 58' 41", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF S 44° 05' 18" W; THENCE SOUTHWESTERLY ALONG THE ARC OF SAID CURVE 39.26 FT. TO THE P.T. AND THE POINT OF BEGINNING OF THE HEREIN DESCRIBED EXCEPTION; SAID ENVIRONMENTAL AND STUDY AREA CONTAINING 230.31 ACRES, MORE OR LESS.

SUBJECT TO A FLORIDA POWER AND LIGHT COMPANY EASEMENT AS RECORDED IN OFFICIAL RECORDS BOOK 211, PAGE 143, AND OFFICIAL RECORDS BOOK 1294, PAGE 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; AND SUBJECT TO A UTILITY EASEMENT OVER THE SOUTH 20 FT. THEREOF.

Prepared By: ARTHUR W. STEINMAN & ASSOCIATES, INC., Deland, Florida

EXHIBIT "C"

6 OF 12

NO. 3403

EXHIBIT A

PAGE 2 OF 6

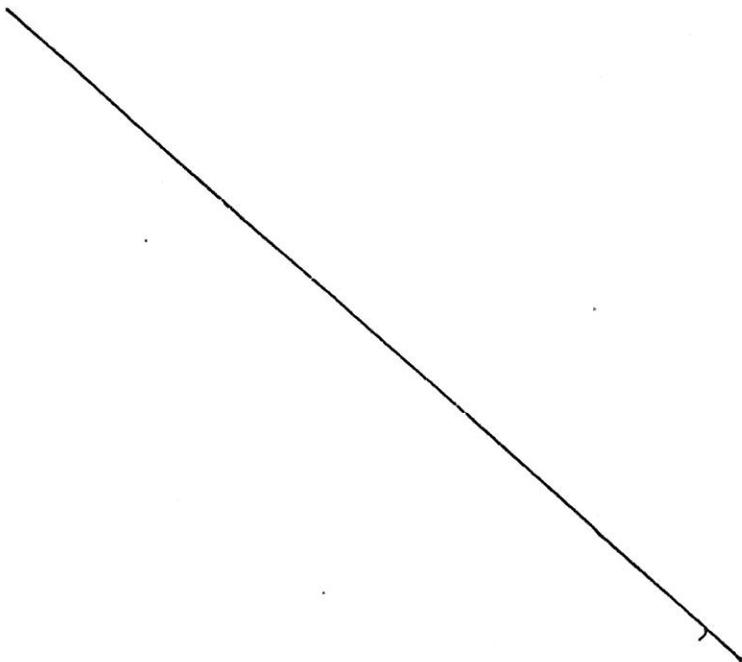
VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF ROAD "A":

COMMENCING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE RUN N 89° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 597.05 FT. TO THE POINT OF BEGINNING; THENCE N 00° 54' 02" W A DISTANCE OF 639.63 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 08° 24' 02" AND A RADIUS OF 2,814.79 FT. AND A CHORD BEARING OF N 05° 06' 03" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 412.70 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 03° 18' 04" W A DISTANCE OF 2,823.97 FT. TO THE P.C. OF A CURVE CONCAVE TO THE EAST HAVING A CENTRAL ANGLE OF 08° 21' 55", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF N 05° 07' 06" W; THENCE NORTHERLY ALONG THE ARC OF SAID CURVE 425.57 FT. TO THE P.T.; THENCE N 00° 56' 08" W A DISTANCE OF 991.65 FT. TO THE NORTH LINE OF THE NE 1/4 OF SAID SECTION 16 AT A POINT 50.00 FT. WESTERLY OF THE CENTERLINE OF IDLEWISSE DR. AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE, AS RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, AFORESAID PUBLIC RECORDS; THENCE N 88° 58' 33" E ALONG SAID NORTH LINE 100.00 FT.; THENCE S 00° 56' 08" E A DISTANCE OF 991.80 FT. TO THE P.C. OF A CURVE CONCAVE TO THE EAST, HAVING A CENTRAL ANGLE OF 08° 21' 55", A RADIUS OF 2,814.79 FT. AND A CHORD BEARING OF S 05° 07' 06" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 410.97 FT. TO THE P.T.; THENCE S 09° 18' 04" E A DISTANCE OF 2,823.97 FT. TO THE P.C. OF A CURVE CONCAVE TO THE WEST, HAVING A CENTRAL ANGLE OF 08° 24' 02", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF S 05° 06' 03" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 427.36 FT. TO THE P.T.; THENCE S 00° 54' 02" E A DISTANCE OF 639.59 FT. TO THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16; THENCE S 89° 04' 39" W ALONG THE SAID SOUTH LINE 100.00 FT. TO THE POINT OF BEGINNING; CONTAINING 12.152 ACRES, MORE OR LESS.

SUBJECT TO A FLORIDA POWER AND LIGHT COMPANY EASEMENT AS RECORDED IN OFFICIAL RECORDS BOOK 211, PAGE 143, AND OFFICIAL RECORDS BOOK 1294, PAGE 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.



Prepared By: ARTHUR W. STEINMAN & ASSOCIATES, INC., DeLand, Florida

EXHIBIT "C"

7 OF 12

NO. 3403  
EXHIBIT "A"  
PAGE 3 OF 6

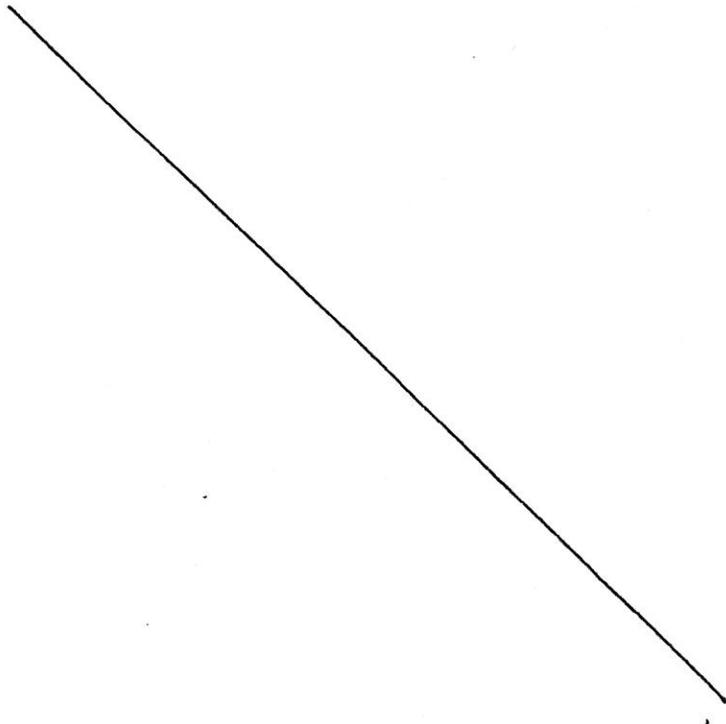
VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF ROAD "B":

COMMENCING AT THE INTERSECTION OF THE CENTERLINE OF IOLEWEISE DRIVE AND THE NORTH LINE OF THE NE 1/4 OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, AS SHOWN ON THE PLAT OF DELTONA LAKES, UNIT FIFTY-THREE, RECORDED IN MAP BOOK 28, PAGES 32 THROUGH 42, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; THENCE S 88° 58' 33" W ALONG THE SAID NORTH LINE 50.00 FT.; THENCE S 00° 56' 08" E A DISTANCE OF 991.65 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE WEST HAVING A CENTRAL ANGLE OF 00° 06' 29", A RADIUS OF 2,914.79 FT. AND A CHORD BEARING OF S 00° 59' 23" E; THENCE SOUTHERLY ALONG THE ARC OF SAID CURVE 5.50 FT. TO THE POINT OF BEGINNING;

THENCE CONTINUE ALONG THE ARC OF SAID CURVE 140.79 FT. THROUGH A CENTRAL ANGLE OF 02° 55' 29" AND A CHORD BEARING OF S 02° 30' 21" E TO THE POINT OF REVERSE CURVE (P.R.C.) OF A CURVE CONCAVE TO THE SOUTHWEST HAVING A CENTRAL ANGLE OF 87° 03' 46", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF N 47° 30' 00" W; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE 37.99 FT. TO THE POINT OF TANGENCY (P.T.); THENCE S 80° 58' 07" W, PARALLEL WITH THE NORTH LINE OF THE NW 1/4 OF SAID SECTION 16 A DISTANCE OF 1,724.63 FT. TO THE WEST LINE OF THE EAST 365 FT. OF THE WEST 1/2 OF THE NW 1/4 OF SAID SECTION 16; THENCE N 00° 10' 47" E ALONG SAID WEST LINE 50.01 FT. TO THE SOUTH LINE OF THE NORTH 1072.34 FT. OF THE SAID NW 1/4; THENCE S 88° 58' 07" W ALONG SAID SOUTH LINE 165.00 FT. TO THE WEST LINE OF THE EAST 530 FT. OF THE SAID WEST 1/2 OF THE NW 1/4; THENCE N 00° 10' 47" E ALONG SAID WEST LINE 50.01 FT.; THENCE N 88° 58' 07" E PARALLEL WITH THE NORTH LINE OF THE SAID NW 1/4 A DISTANCE OF 1,883.65 FT. TO THE P.C. OF A CURVE CONCAVE TO THE NORTHWEST HAVING A CENTRAL ANGLE OF 90° 00' 44", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF N 43° 57' 45" E; THENCE NORTHEASTERLY ALONG THE ARC OF SAID CURVE 39.27 FT. TO THE P.T. AND THE POINT OF BEGINNING; CONTAINING 4.20 ACRES, MORE OR LESS; SUBJECT TO A FLORIDA POWER AND LIGHT COMPANY EASEMENT AS RECORDED IN O.R. BK. 211, PG. 143, AND O.R. BK. 1294, PG. 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA;



Prepared By: ARTHUR W. STEINMAN & ASSOCIATES, INC., Deland, Florida

EXHIBIT "C"

8 OF 12

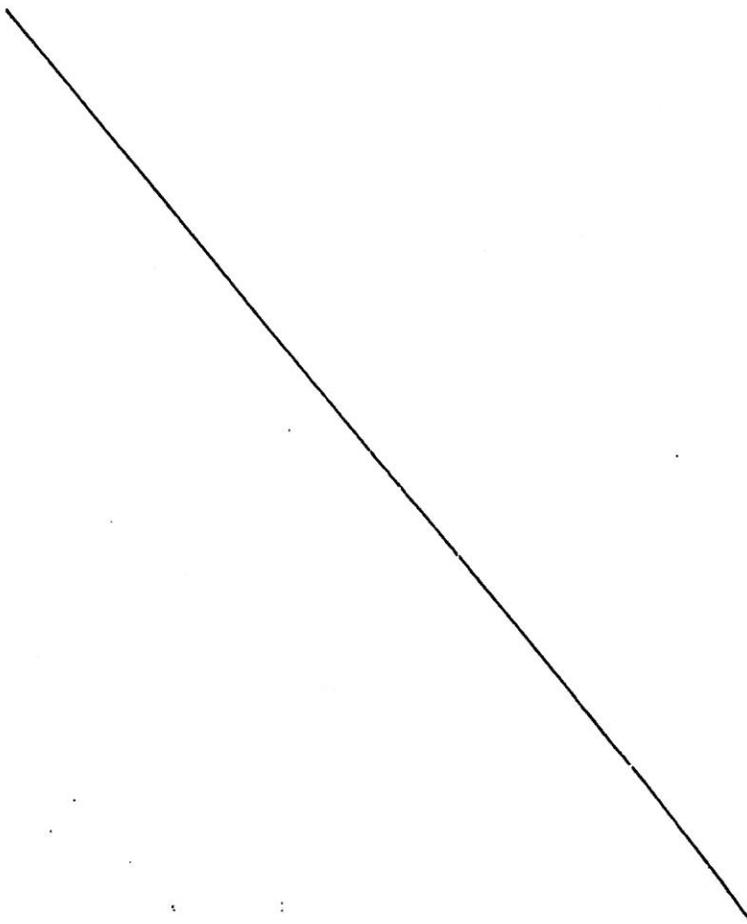
NO. 3403  
EXHIBIT "A"  
PAGE 4 OF 6

VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF ROAD "C":

COMMENCING AT THE SOUTH 1/4 CORNER OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA AS SHOWN ON THE PLAT OF DELTONA LAKES UNIT FIFTEEN, AS RECORDED IN MAP BOOK 25, PAGES 230 THROUGH 233, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; RUN THENCE N 89° 04' 39" E ALONG THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 697.05 FT.; THENCE N 00° 54' 02" W A DISTANCE OF 25.00 FT. TO THE POINT OF BEGINNING; THENCE CONTINUE N 00° 54' 02" W A DISTANCE OF 150.00 FT. TO THE POINT OF CURVATURE (P.C.) OF A CURVE CONCAVE TO THE NORTHEAST HAVING A CENTRAL ANGLE OF 90° 01' 19", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF S 45° 54' 41" E; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE 39.28 FT. TO THE POINT OF TANGENCY (P.T.); THENCE N 89° 04' 39" E PARALLEL WITH THE SOUTH LINE OF THE SE 1/4 OF SAID SECTION 16 A DISTANCE OF 611.00 FT. TO THE WEST LINE OF THE EAST 1320.00 FT. OF THE SAID SE 1/4; THENCE S 00° 42' 14" W ALONG SAID WEST LINE 100.04 FT.; THENCE S 89° 04' 39" W PARALLEL WITH THE SOUTH LINE OF THE SAID SE 1/4 A DISTANCE OF 608.22 FT. TO THE P.C. OF A CURVE CONCAVE TO THE SOUTHEAST HAVING A CENTRAL ANGLE OF 89° 58' 41", A RADIUS OF 25.00 FT. AND A CHORD BEARING OF S 44° 05' 18" W; THENCE SOUTHWESTERLY ALONG THE ARC OF SAID CURVE 39.26 FT. TO THE P.T. AND THE POINT OF BEGINNING; CONTAINING 1.463 ACRES, MORE OR LESS.



Prepared By: ARTHUR W. STEINMAN & ASSOCIATES, INC., DeLand, Florida

EXHIBIT "C"

NO. 3403 -  
EXHIBIT "A" -  
PAGE 5 OF 6 -

VOLUSIA COUNTY SCHOOL BOARD

PROPERTY IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST

DESCRIPTION OF 20 FT. UTILITY EASEMENT

THE WEST 20 FT. AND THE SOUTH 20 FT. OF SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, EXCEPT THE EAST 1320 FT. THEREOF; CONTAINING 4.239 ACRES, MORE OR LESS.

DESCRIPTION OF FUTURE ELEMENTARY SCHOOL:

THE NORTH 1072.34 FT. OF THE WEST 1/2 OF THE NW 1/4; EXCEPT THE EAST 530 FT. THEREOF, SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, CONTAINING 20.07 ACRES, MORE OR LESS, AND BEING SUBJECT TO A UTILITY EASEMENT OVER THE WEST 20 FT. THEREOF.

DESCRIPTION OF FUTURE MIDDLE SCHOOL

THE WEST 1/2 OF THE NW 1/4 LYING NORTH OF FLORIDA POWER & LIGHT COMPANY'S RIGHT-OF-WAY EASEMENT PER D.R. BK. 211, PAGE 143 AND D.R. BK. 1294, PAGE 494, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; EXCEPT THE NORTH 1072.34 FT. THEREOF AND EXCEPT THE EAST 365 FT. THEREOF; ALL IN SECTION 16, TOWNSHIP 18 SOUTH, RANGE 31 EAST, VOLUSIA COUNTY, FLORIDA, CONTAINING 30.04 ACRES, MORE OR LESS, AND BEING SUBJECT TO A UTILITY EASEMENT OVER THE WEST 20 FT. THEREOF.

Prepared By: ARTHUR W. STEINMAN & ASSOCIATES, INC., DeLand, Florida

EXHIBIT 'C'

10 OF 12

NO. 3403

EXHIBIT "A"

PAGE 6 OF 6

**Exhibit D**

Florida Scrub-Jay Mitigation Service Area for the Lyonia Preserve (figure)

# Florida Scrub-Jay Mitigation Service Area For The Lyonia Preserve

Figure 14

