

APPENDIX E:
FNAI Letter Report



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www.fnai.org

February 1, 2011

Randall Sleister
Volusia County Land Acquisition and Management Division
123 W. Indiana Avenue
Deland, FL 32720

Re: Doris Leeper Spruce Creek Preserve, Volusia County

Dear Mr. Sleister,

Thank you for your request for information on Doris Leeper Spruce Creek Preserve (hereafter the Preserve) from the Florida Natural Areas Inventory (FNAI). We have compiled the following information for the property.

This site is located within a significant region of natural areas and habitat for several rare species, and is within a significant area of scrub habitat, a natural community in decline that provides important habitat for several rare species. Special consideration should be taken to avoid and/or mitigate impacts to these natural resources and to design land uses that are compatible with these resources.

Documented Element Occurrences

Attached is a Managed Area Summary for this site, which lists the rare species we have documented within the boundaries of the Preserve.

We also include a map of all Element Occurrences on and in the vicinity of the preserve (see enclosed map and Element Occurrence table). Please be advised that a lack of Element Occurrences in the FNAI database is not a sufficient indication of the absence of rare or endangered species on a site.

The map also depicts observation points from a Florida scrub-jay survey that was conducted for the U.S. Fish and Wildlife Service by staff and associates of the Archbold Biological Station from 1992 to 1996 (Pranty and Stith, 1994).

The Element Occurrences data layer includes occurrences of rare species and natural communities. The map legend indicates that some Element Occurrences occur in the general vicinity of the label point. This may be due to lack of precision of the source data, or an element that occurs over an extended area (such as a wide ranging species or large natural community). For animals and plants, Element Occurrences generally refer to more than a casual sighting; they usually indicate a viable population of the species. Note that some Element Occurrences represent historically documented observations which may no longer be extant. Extirpated Element Occurrences will be marked with an 'X' following the occurrence label on the enclosed map.

Citation: Fitzpatrick, J.W., B. Pranty, and B. Stith. 1994. Florida scrub jay statewide map, 1992-1993. U. S. Fish and Wildlife Service Report, Cooperative Agreement no. 14-16-004-91-950.



Florida Resources
and Environmental
Analysis Center

Institute of Science
and Public Affairs

The Florida State University

Tracking Florida's Biodiversity

Likely and Potential Rare Species

In addition to documented occurrences, we estimate there is over 600 acres of potential habitat for the federally threatened Florida scrub-jay (*Aphelocoma coerulescens*) on the Preserve. This estimate is based on FNAI statewide habitat models and a 2004 survey we conducted for Volusia County (NeSmith, et al. 2004). The recent land acquisition that is now included in the western portion of the Preserve supports a significant amount of good quality scrubby flatwoods, in addition to the 600 acres of scrub habitat identified in 2004. The preserve also supports about 600 acres of potential habitat buffer for the federally endangered manatee (*Trichechus manatus*); these acres are along the shores of Spruce Creek, Strickland Bay, Rose Bay, and Turnbull Bay.

FNAI habitat models indicate areas, which based on land cover type, offer suitable habitat for one or more rare species that is known to occur in the vicinity. Habitat models have been developed for approximately 300 of the rarest species tracked by the Inventory, including all federally listed species.

K. NeSmith, S. Jue, and G. Schultz. 2004. Survey for Florida Scrub-Jays and Inventory of Scrub Habitat in Volusia County. Report to Volusia County. Florida Natural Areas Inventory, Tallahassee, FL

Land Acquisition Projects

This site is within the Spruce Creek Florida Forever BOT Project, which is part of the State of Florida's Conservation and Recreation Lands land acquisition program. A description of this project is enclosed. For more information on this Florida Forever Project, contact the Florida Department of Environmental Protection, Division of State Lands.

Florida Forever Board of Trustees (BOT) projects are proposed and acquired through the Florida Department of Environmental Protection, Division of State Lands. The state has no specific land management authority over these lands until they are purchased.

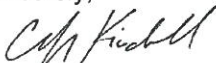
We always recommends that professionals familiar with Florida's flora and fauna should conduct a site-specific survey to determine the current presence or absence of rare, threatened, or endangered species. Please visit www.fnai.org/trackinglist.cfm for county or statewide Element Occurrence distributions and links to more element information.

The database maintained by FNAI is the single most comprehensive source of information available on the locations of rare species and other significant ecological resources. However, the data are not always based on comprehensive or site-specific field surveys. Therefore, this information should not be regarded as a final statement on the biological resources of the site being considered, nor should it be substituted for on-site surveys. Inventory data are designed for the purposes of conservation planning and scientific research, and are not intended for use as the primary criteria for regulatory decisions.

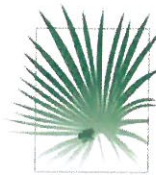
The information provided may not be published without prior written notification to the Florida Natural Areas Inventory, and the Inventory must be credited as an information source in these publications. You may include these materials in the upcoming Preserve management plan update. FNAI data may not be resold for profit.

This report is made available at no charge as a public service of the Florida Department of Environmental Protection and FNAI. Thank you for your request for FNAI information. If I can be of further assistance, please don't hesitate to give me a call at (850) 224-8207 or email me at ckindell@fnai.org.

Sincerely,



Carolyn Kindell
Managed Areas Biologist
Encl



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FLORIDA
Natural Areas
INVENTORY

Florida Natural Areas Inventory

Managed Area Element Summary Doris Leeper Spruce Creek Preserve



SCIENTIFIC NAME	COMMON NAME	Global rank	State rank	Federal status	State status
Plants and Lichens					
<i>Nolina atopocarpa</i>	Florida Beargrass	G3	S3	N	LT
Reptiles					
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	N	ST
Birds					
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N



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SCIENTIFIC NAME

COMMON NAME

Global
rank

State
rank

Federal
status

State
status

Using a ranking system developed by NatureServe and the Natural Heritage Program Network, the Florida Natural Areas Inventory assigns two ranks for each element. The global rank is based on an element's worldwide status; the state rank is based on the status of the element in Florida. Element ranks are based on many factors, the most important ones being estimated number of Element Occurrences (EOs), estimated abundance (number of individuals for species; area for natural communities), geographic range, estimated number of adequately protected EOs, relative threat of destruction, and ecological fragility.

FNAI GLOBAL ELEMENT RANK

- G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- G2 = Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- G3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
- G4 = Apparently secure globally (may be rare in parts of range).
- G5 = Demonstrably secure globally.
- GH = Of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker).
- GX = Believed to be extinct throughout range.
- GXC = Extirpated from the wild but still known from captivity or cultivation.
- G#? = Tentative rank (e.g., G2?).
- G#G# = Range of rank; insufficient data to assign specific global rank (e.g., G2G3).
- G#T# = Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1).
- G#Q = Rank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q).
- G#T#Q = Same as above, but validity as subspecies or variety is questioned.
- GU = Unrankable; due to a lack of information no rank or range can be assigned (e.g., GUT2).
- GNA = Ranking is not applicable because the element is not a suitable target for conservation (e.g. a hybrid species).
- GNR = Element not yet ranked (temporary).
- GNRTNR = Neither the element nor the taxonomic subgroup has yet been ranked.

FNAI STATE ELEMENT RANK

- S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- S3 = Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
- S4 = Apparently secure in Florida (may be rare in parts of range).
- S5 = Demonstrably secure in Florida.
- SH = Of historical occurrence in Florida, possibly extirpated, but may be rediscovered (e.g., ivory-billed woodpecker).
- SX = Believed to be extirpated throughout Florida.
- SU = Unrankable; due to a lack of information no rank or range can be assigned.
- SNA = State ranking is not applicable because the element is not a suitable target for conservation (e.g. a hybrid species).
- SNR = Element not yet ranked (temporary).

FEDERAL LEGAL STATUS

Florida Natural Areas Inventory

Managed Area Element Summary

Doris Leeper Spruce Creek Preserve



Legal status information provided by FNAI for information only. For official definitions and lists of protected species, consult the relevant federal agency.

Definitions derived from U.S. Endangered Species Act of 1973, Sec. 3. Note that the federal status given by FNAI refers only to Florida populations and that federal status may differ elsewhere.

C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.

LE = Endangered: species in danger of extinction throughout all or a significant portion of its range.

LE, LT = Species currently listed endangered in a portion of its range but only listed as threatened in other areas

LE, PDL = Species currently listed endangered but has been proposed for delisting.

LE, PT = Species currently listed endangered but has been proposed for listing as threatened.

LE, XN = Species currently listed endangered but tracked population is a non-essential experimental population.

LT = Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.

SAT = Treated as threatened due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.

SC = Not currently listed, but considered a "species of concern" to USFWS.

STATE LEGAL STATUS

Provided by FNAI for information only. For official definitions and lists of protected species, consult the relevant state agency.

Animals: Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists" published by Florida Fish and Wildlife Conservation Commission, 1 August 1997, and subsequent updates.

FE = Listed as Endangered Species at the Federal level by the U. S. Fish and Wildlife Service

FT = Listed as Threatened Species at the Federal level by the U. S. Fish and Wildlife Service

F(XN) = Federal listed as an experimental population in Florida

FT(SA) = Federal Threatened due to similarity of appearance

ST = State population listed as Threatened by the FFWCC. Defined as a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become an endangered species within the foreseeable future. (ST* for *Ursus americanus floridanus* (Florida black bear) indicates that this status does not apply in Baker and Columbia counties and in the Apalachicola National Forest. ST* for *Neovison vison* pop.1 (Southern mink, South Florida population) indicates that this status applies to the Everglades population only.)

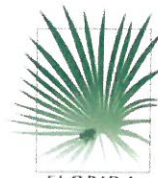
SSC = Listed as Species of Special Concern by the FFWCC. Defined as a population which warrants special protection, recognition, or consideration because it has an inherent significant vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation which, in the foreseeable future, may result in its becoming a threatened species.

(SSC* indicates that a species has SSC status only in selected portions of its range in Florida. SSC* for *Pandion haliaetus* (Osprey) indicates that this status applies in Monroe county only.)

N = Not currently listed, nor currently being considered for listing.

Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505 or see: <http://www.doacs.state.fl.us/pi/>.

LE = Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which



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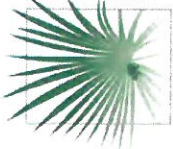
Managed Area Element Summary Doris Leeper Spruce Creek Preserve



is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.

LT = Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.

N = Not currently listed, nor currently being considered for listing.



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Element Occurrences

- Animals
- Plants
- Communities
- Other
- Data Sensitive
- Point Indicates General Vicinity of Element

U.S. Fish & Wildlife Service
Scrub Jay Survey 1992-96

Conservation Lands

- Federal
- State
- Local
- Private
- State Aquatic Preserves

Land Acquisition Projects

- Florida Forever
- Board of Trustees Projects

- FNAI Rare Species Habitat
- FNAI Biodiversity Matrix Square Mile Units

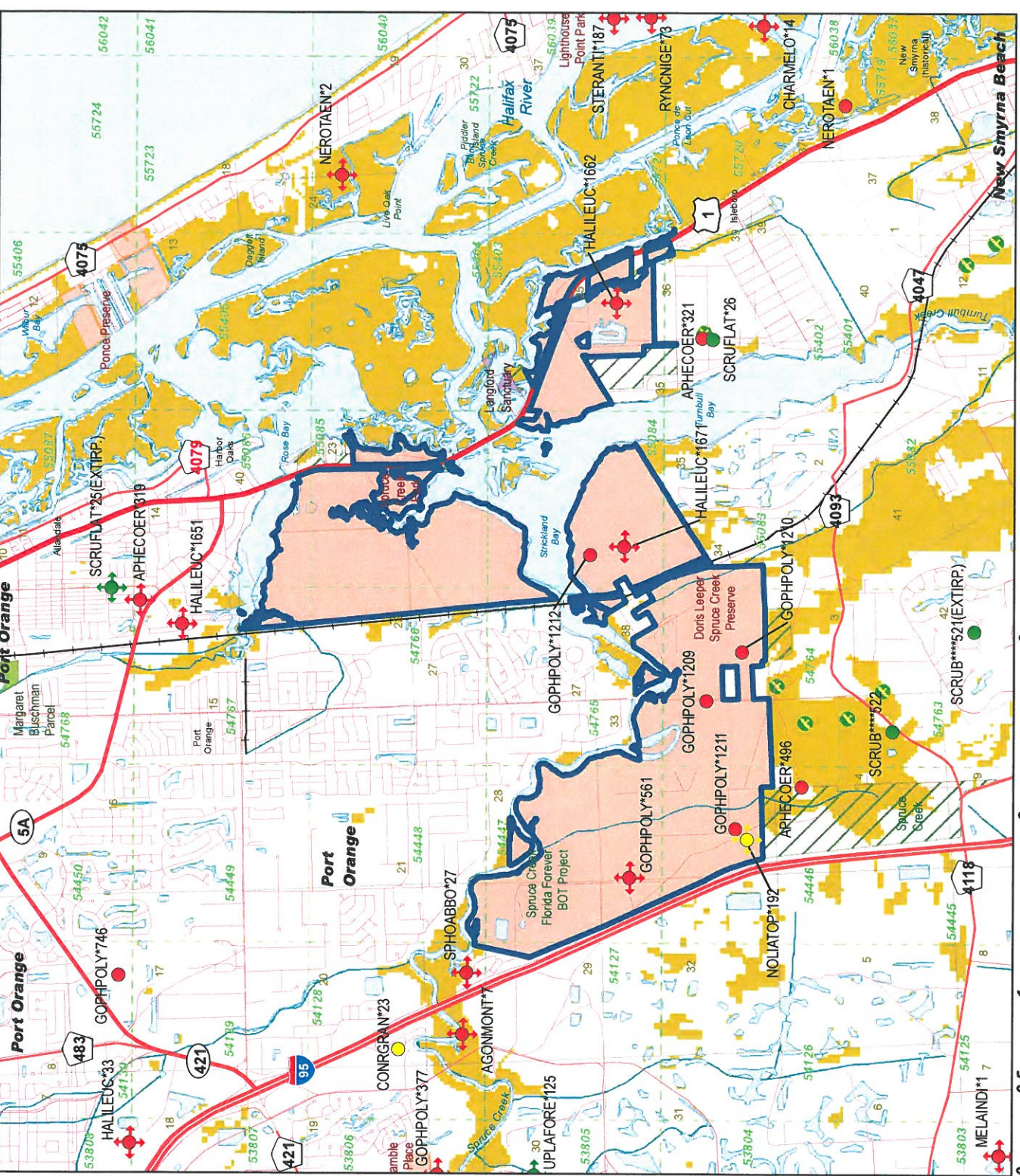
County Boundary

- Interstate
- Turnpike
- Major Highway
- Local Road
- Railroad [inactive railroads shown in Gray]
- Water

NOTE
Map should not be interpreted without accompanying documents.

Doris Leeper Spruce Creek Preserve

Volusia County



Map produced by MGO
Map Date: 25 Jan 2011



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ELEMENT OCCURRENCES DOCUMENTED ON OR NEAR Doris Leeper Spruce Creek Preserve



Map Label	Scientific Name	Common Name	Global State Rank	Federal Rank	Status	Listing	Observation Date	Description	EO Comments
AGNOMONT*7	<i>Agonostomus monticola</i>	Mountain Mullet	G5	S3	N	N	1951-11-08	No general description given	2 SPECIMENS COLLECTED ON 29 APR. 1950 (UF-007790) AND 1 SPECIMEN COLLECTED ON 11 AUG. 1951 (UF-007791).
APHECOER*319	<i>Aphelocoma coerulescens</i>	Florida Scrub-jay	G2	S2	LT	FT	1981-05-17	"OPEN SLASH PINE SCRUB, SOME HAS BEEN DEVELOPED" SCRUBBY FLATWOODS	1981-05-17 2 SCRUB JAYS.
APHECOER*321	<i>Aphelocoma coerulescens</i>	Florida Scrub-jay	G2	S2	LT	FT	1981-05-17	"DISTURBED SLASH PINE SCRUB, DEVELOPMENT TO SOUTH" SCRUBBY FLATWOODS	1981-05-17 2 SCRUB JAYS.
APHECOER*496	<i>Aphelocoma coerulescens</i>	Florida Scrub-jay	G2	S2	LT	FT	2005-02-10	2005-02-10: Rural residential with immature sand pine scrub to west and farm to east on road (PNDLYO02FLUS).	2005-02-10: Five, maybe 6, birds observed; none banded. Birds using both sides of road (PNDLYO02FLUS). 2003: found the area where jays were found in 1993 to be unsuitable, dense, 20-30' planted sand pines (PNDNES03FLUS). 1993-05-17: Six jays in 3 group
CHARMELO*14	<i>Charadrius melodus</i>	Piping Plover	G3	S2	LT	FT	1987-02-24	MARINE UNCONSOLIDATED SUBSTRATE (SAND SHOAL).	WINTERING AREA: 1986 - 10 OBSERVED AT INLET IN JAN. (U86JOH01FL), 1987 - 2 OBSERVED IN FEB. FORAGING WITH MULTI-SPECIES FLOCK ON SAND SHOAL IN BASS FLATS (U87NIC04FL).
CONRGRAN*23	<i>Conradina grandiflora</i>	Large-flowered Rosemary	G3	S3	N	LT	1987-10-26	SAND PINE SCRUB ON TRUCK PARKING SIDE OF REST AREA	10-40 PLANTS IN FULL FLOWER ON DISTURBED BANK (ALSO CONTINUING INTO THE UNDISTURBED SCRUB).
GOPHPOLY*1209	<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	N	ST	2003-08-28	2003-08-28: in powerline row in overgrown sand pine/oak scrub (U04SCH04FLUS).	2003-08-28: five burrows and 1 juvenile (approximately 5 inches in length) observed. Sizes of burrows: 3 juvenile, 2 adult (U04SCH04FLUS).
GOPHPOLY*1210	<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	N	ST	2003-08-28	2003-08-28: in xeric hammock, historically scrub (U04SCH04FLUS).	2003-08-28: two burrows approximately 70 meters apart. At northernmost burrow, 1 adult female observed (U04SCH04FLUS).
GOPHPOLY*1211	<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	N	ST	2004-07-06	2004-07-06: along ORV trail/sand road in overgrown scrub (U04SCH04FLUS).	2004-07-06: three active burrows at two locations along a 0.1 mile stretch of sand road, at least one of them is adult (12" at burrow opening) (U04SCH04FLUS).



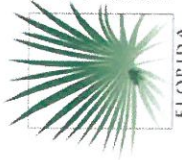
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GOPHPOLY*1212	<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	N	ST	2004-05-19	2004-05-19: scrubby flatwoods (U04SCH04FLUS)
GOPHPOLY*377	<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	N	ST	1983-02-18	Sandhills and scrubby flatwoods variants; very old growth longleaf pine forest (understory mowed but not burned); sand pine-turkey oak and saw palmetto understories; <i>Aristida stricta</i> present.
GOPHPOLY*561	<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	N	ST	1989-10-24	2007-02-20: small area of old pasture/bahia within overgrown oak scrub. (PNDKIN02FLUS). 1989-10-24: Ruderal, improved pasture-bahia grass (U90MAC05FLUS).
GOPHPOLY*746	<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	N	ST	1991-07-03	SCRUB-SANDPINE; PRIMARILY OAKS AND PINES WITH SCATTERED PALMETTO AND ROSEMARY UNDERSTORY. SANDY SOIL.
HALILEUC*1651	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2003	Nest status: Active, 2003, 2002, 2001, 2000, 1999;(U03FWC01FLUS)
HALILEUC*1662	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2003	Nest status: Active, 2003, 2002, 2001; Unknown status or not assessed, 2000, 1999;(U03FWC01FLUS)
HALILEUC*1671	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2006	2006: continuously active 2003 - 2006 (W06FWC01FLUS). 2003: Nest status: Active, 2003, 2002; Unknown status or not assessed, 2001, 2000, 1999;(U03FWC01FLUS)
HALILEUC*33	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	1983	Nest status 1999-2003: Inactive - 2003; Unknown/not assessed - 2002, 2001, 2000, 1999; Status 1995-98: Inactive - 1998, 1997, 1996, 1995; (U03FWC01FLUS). Previous data (note different format) NEST; 1995-93: GONE; 1992-89: NO DATA; 1988-86: GONE; 1985: US
MELAINDI*1	<i>Melanoplus indicifer</i>	East Coast Scrub Grasshopper	G1G2	S1S2	N ^E	10 ^N	1938-08-31	1938-08-31: No description given (U08ALM01FLUS).



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NEROTAEN*1	<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	LT	FT		1987-05-20	No general description given	ONE DOR JUVENILE ON ROAD; ONE ADULT FEMALE COLLECTED IN MARSH. THE FEMALE GAVE BIRTH TO 3 YOUNG ON 15 OCT. 1987.
NEROTAEN*2	<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	LT	FT		1979-10-04	No general description given	SNAKE(S) OBSERVED BY MOLER AND KOCHMAN.
NOLIATOP*192	<i>Nolina atopocarpa</i>	Florida Beargrass	G3	S3	N	LT		2004-07-06	2004-07-06: scrubby flatwoods, moderately fire-excluded, with some ORV trails (U04SCH04FLUS)	2004-07-06: 100-1000 plants scattered in a wide area, most in flower, few in fruit. Plants in clusters, to 3' tall (U04SCH04FLUS).
RYNCNIGE*73	<i>Rhynchos niger</i>	Black Skimmer	G5	S3	N	SSC		1990-05-24	Beach dune	1990/05/24: J.A. Hovis, GFC, observed 9 adults. No evidence of breeding activity.
SCRUB***521	Scrub		G2	S2	N	N		1984-01-28	SCRUB SITE IS RELATIVELY LEVEL. LARGE AND NUMEROUS SERENOA REPENS. DOMINANT SHRUBS ARE CHAPMAN, MYRTLE AND LIVE OAK (U88CHR01). F84STO09 REPORTS ARISTIDA STRICTA IN OCCASIONAL OPENINGS, BUT GENERALLY, THERE IS LITTLE GROUND VEGETATION.	SOME TREES ARE 40 CM D6H.
SCRUB***522	Scrub		G2	S2	N	N		2004	SAND PINE SCRUB LOCATED ON OLD DUNE LINE. SHRUB LAYER DENSITY AND HEIGHT VARIES FROM E TO W ACROSS DUNE. UNDERSTORY DOMINATED BY OAKS, LYONIA FERRUGINEA, XIMENIA AND SERENOA REPENS.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1984-01-28) (U05FNA02FLUS). AN OLD STAND OF SAND PINE ON SITE. NUMEROUS SAND PINE SEEDLINGS PRESENT.
SCRUFLAT*25	Scrubby flatwoods		G2	S2?	N	N		1981-05-17	"OPEN SLASH PINE SCRUB, SOME HAS BEEN DEVELOPED" SCRUBBY FLATWOODS	No EO data given
SCRUFLAT*26	Scrubby flatwoods		G2	S2?	N	N		2004	"DISTURBED SLASH PINE SCRUB, DEVELOPMENT TO SOUTH" SCRUBBY FLATWOODS	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1981-05-17) (U05FNA02FLUS).



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			Rank	Status	Federal Listing			
SPHOABBO*27	<i>Sphodros abbotti</i>	Blue Purse-web Spider	G4G5	N	N	1998-05-19	1998-05-19: webs found at the bases of trees (U98MOL02FLUS).	1998-05-19: Species was collected on site by P.E. Moler (U98MOL02FLUS).
STERANTI*187	<i>Sternula antillarum</i>	Least Tern	G4	N	ST	1988	No general description given	1991/07/05: J.A. Hovis, GFC, no terns or nests observed (U97GFC02FLUS). 1990/05/24: J.A. Hovis, GFC, no nesting activity observed (U97GFC02FLUS). 1988: nesting began on 24 May and ended on 26 July; 40 nests observed (U97GFC02FLUS). 1987/05/08: T.E. O'Meara
UPLAFORE*125	Upland hardwood forest		G5	N	N	2004	TRANSITION FROM SCRUB UPLANDS TO CYPRESS/RED MAPLE FLOODPLAIN. WATER SEEPS FROM BASE OF SLOPE AT SEVERAL POINTS	2010: Prior to the 2010 natural community reclassification effort this EO had been known as Slope forest EO number 1 (see U10FNA01FLUS for updated community descriptions). 2004: Update to last obs date was based on interpretation of aerial photography (p

Spruce Creek

Volusia County

Substantially Complete

Purpose for State Acquisition

Natural areas along the coast of Volusia County are becoming scarce as residential developments expand from Daytona Beach and New Smyrna Beach. The Spruce Creek project protects one of the largest tracts of undeveloped land left in this region along the estuary of Spruce Creek and helps to maintain the water quality of the creeks and bays here, thus protecting a fishery. Additionally, this project will conserve what may be the site of Andrew Turnbull's 18th-century plantation and provide a recreational area where people can do anything from hiking and fishing to simply learning about the plants and animals of this scenic landscape.

Manager

Volusia County.

General Description

The original Spruce Creek project area, north and west of Strickland Bay, contains good estuarine tidal swamps, hammocks, scrub, and flatwoods. It protects habitat for such endangered or threatened species as bald eagles, wood storks and manatees. The addition, between U.S. 1 and Turnbull Bay, contains good Maritime or Xeric Hammock, with live oaks, cabbage palms, and several tropical shrubs near their northern limits. Flatwoods also cover a large part of the addition, and tidal marsh with remnants of black mangrove fringes it. Disturbed areas include an historic house at the north end and the remains of a fish camp and marina east of U.S. 1. No FNAI-listed plants are known from the addition; of FNAI-listed animals, gopher tortoises have been found. The area is adjacent to several Outstanding

Florida Waters, and the aquatic resources are important to both recreational and commercial fisheries. There are two archaeological sites recorded within the project area: Spruce Creek Mound site, a prehistoric and historic burial mound; and J. D. site, a prehistoric and historic shell midden and burial site. The project may also contain historic archaeological sites related to the British Colonial Period occupation in this area of NE Florida (ca. 1763–1783 AD). The area is experiencing significant growth, so developable acreage is likely to be lost relatively soon.

Public Use

This project is designated as a recreation area with uses such as cultural and environmental education, hiking, fishing, camping and picnicking.

Acquisition Planning

On December 1, 1989, the Land Acquisition Advisory Council (LAAC) added the original Spruce Creek project to the CARL Priority list. This fee-simple acquisition, sponsored by Volusia County, consisted of approximately 1,718 acres, nine owners, and a 1989 taxable value of \$2,675,000. On December 7, 1990, an owner sponsored 54-acre parcel was added to the boundary. The project was removed on December 10, 1992 due to unwilling sellers. At that time, it was less than 90% complete.

On December 6, 1994, LAAC added the current Spruce Creek project to the 1995 CARL Priority list. This

Placed on List	1990*
Project Area (Acres)	2,831
Acres Acquired	2,289**
at a Cost of	\$19,118,050**
Acres Remaining	542
with Estimated (Tax Assessed) Value of \$10,068,445	

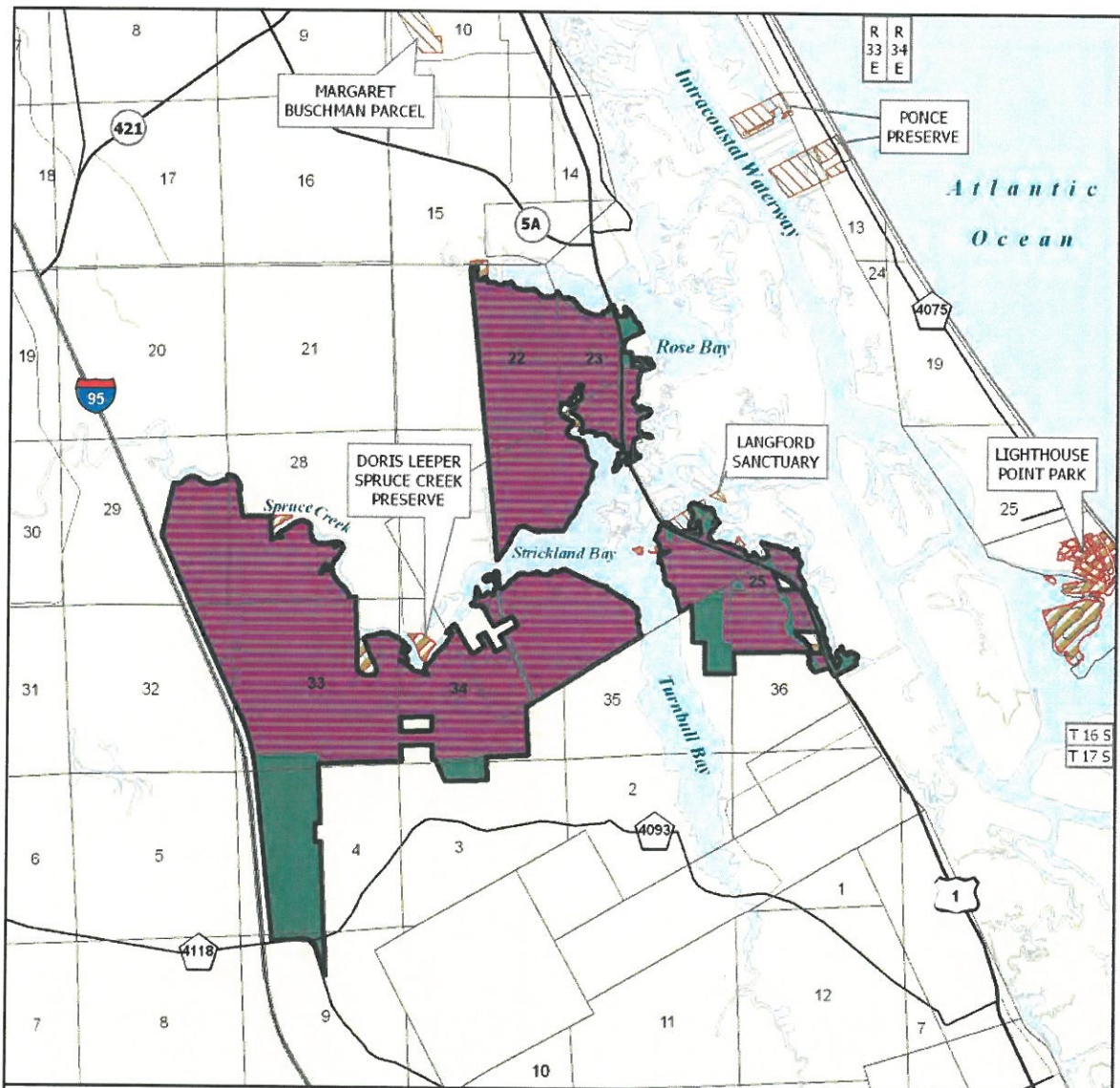
* Combined with Spruce Creek Addition in 1994

**includes funds spent and acreage acquired by BOT, SJRWMD, Volusia County, and the City of Port Orange.

Note: 97 acres removed 10/2009 due to residential/commercial/infrastructure development.

Spruce Creek FNAI Elements	
Florida Scrub-jay	G2/S2
Gopher Tortoise	G3/S3
Florida Beargrass	G3/S3
Bald Eagle	G5/S3
4 rare species are associated with the project	

Spruce Creek



SPRUCE CREEK

VOLUSIA COUNTY

-  Florida Forever BOT Project Boundary
-  Acquired for Conservation (Fee Simple)
-  Essential Parcel(s) Remaining
-  State Owned Lands
-  Other Conservation Lands



OCTOBER 2009

Spruce Creek

fee-simple acquisition, sponsored by Volusia County, consisted of a 208-acre portion of the original project and a 316-acre addition totaling 524 acres, multiple owners, and a 1993 taxable value of \$2,124,141. The project boundary, however, included the portions of the project that had already been acquired. The resulting project acreage equaled 1,593 acres with a taxable value of \$3,406,991.

On October 24, 2002, the Acquisition & Restoration Council (ARC) approved a fee-simple 648-acre addition to the project boundary. It was sponsored by Volusia County, consisted of five owners, and a 2002 taxable value of \$1,297,592.

On October 10, 2006, the St. Johns River Water Management District (SJRWMD), in partnership with Volusia County, closed on a 40-acre parcel known as the Eubank/Rosier tract. The total purchase price was \$915,535.

In August 2007, Volusia County acquired 7.08 acres from the Blanchette family.

In December 2007, the City of Port Orange acquired 225 acres on the western boundary from ICI.

On September 19, 2008, the SJRWMD acquired 58.02 acres from the Ford family.

On October 9, 2009, ARC voted to remove 6 sites with 54 individual parcels (97 acres) containing residential and commercial buildings or infrastructure. The total acreage has a just tax-assessed value of \$9,166,381.

Coordination

Volusia County is a partner in the acquisition of this project as well as the manager. SJRWMD and City of Port Orange are acquisition partners also.

Management Policy Statement

The primary goals of management of the Spruce Creek project are to conserve, protect, manage, or restore important ecosystems, landscapes, and forests, in order to enhance or protect significant surface water, coastal, recreational, timber, fish or wildlife resources which local or state regulatory programs cannot adequately protect; to provide areas, including recreational trails, for natural-resource-based recreation; and to preserve significant archaeological or historical sites.

Management Prospectus

Qualifications for state designation The Spruce Creek Recreation Area has the size, natural, cultural, and recreational resources, and surrounding population density to qualify as a State Recreation Area.

Manager Volusia County in cooperation with the State of Florida.

Conditions affecting intensity of management The project includes moderate-need tracts requiring more than basic resource management and protection. These lands will contain more highly developed resource-related recreation facilities. Large portions of the property, however, would be considered low-need tracts requiring only basic resource management and protection. Recreation use will be incorporated but in a more dispersed and less intensive manner.

Timetable for implementing management and provisions for security and protection of infrastructure

Within the first year after acquisition, management activities will concentrate on site security and resource inventory. Volusia County will provide appropriate access to the site to maintain existing and historic uses while protecting sensitive resources on the site. The site's natural resources and listed plants and animals will be inventoried, recreational opportunities and uses identified, and a management plan formulated.

Long-range plans for Spruce Creek will be specified in the management plan and will generally be directed as follows: Development of recreational facilities, a comprehensive trail management program, a comprehensive educational and interpretive program, and a comprehensive historic resource management program; restoration of disturbed areas; maintenance of natural communities through a program of selected harvest and fire management; and habitat enhancement for listed species.

Revenue-generating potential will be determined by the concepts in the Management Plan. Some revenues will probably be generated by user and concession fees at recreation sites. Some revenues may be generated through sale of forest products, but any such revenues will be minimal. Use of small portions of the area as mitigation for development elsewhere would not only restore damaged areas on-site, but would yield revenue as well. It will be several years before potential revenue sources could be fully developed.

Cooperators in management activities Port Orange and New Smyrna Beach both will be involved in the planning of the project.

Spruce Creek

The Museum of Arts and Sciences and the Atlantic Center for the Arts may prove to be valuable partners in optimizing the educational and interpretive opportunities on this site.

The Nature Conservancy still owns the 150 acres that is managed by the Museum of Arts and Sciences. The Environmental Council and Sierra Club have played important roles in the early protection of the creek in-

cluding sponsoring OFW status in 1986. The Southeast Volusia Historical Society and Volusia Anthropological Society have had long-standing interest in protection and interpretation of the cultural, historical and archaeological resources located on the project site. Volunteers will be invaluable in developing, managing, and interpreting this site.

Management Cost Summary

Category Source of Funds	1996/97 Volusia County	1997/98 Volusia County	1998/99 Volusia County
Salary	\$6,240	\$6,240	\$6,240
OPS	\$0	\$0	\$7,712
Expense	\$0	\$0	\$0
OCO	\$0	\$0	\$0
FCO	\$0	\$0	\$0
TOTAL	\$6,240	\$6,240	\$13,952

APPENDIX F:

List of Plant Species Observed by Local Florida Native Plant Society Chapter

Doris Leeper Spruce Creek Preserve

Plant List

<u>Scientific Name</u>	<u>Common Name</u>	<u>FAMILY</u>
1 <i>Acer rubrum</i>	red maple	ACERACEAE
2 <i>Ampelopsis arborea</i>	pepper vine	VITACEAE
3 Andropogon glomeratus var. glaucopsis	Purple bluestem	POACEAE
4 <i>Andropogon</i> spp	Broomsedge	POACEAE
5 <i>Aristida beyrichiana</i>	wiregrass	POACEAE
6 <i>Aristida spiciformis</i>	bottlebrush threeawn	POACEAE
7 <i>Arnoglossum floridanum</i>	Indian Plantain	ASTERACEAE
8 Asimina incana	WOOLLY PAWPAW; POLECAT BUSH	ANNONACEAE
9 <i>Asimina obovata</i>	Flag Pawpaw	ANNONACEAE
10 <i>Asimina parviflora</i>	Small Fruited (Flowered) Pawpaw	ANNONACEAE
11 Asimina pygmaea	DWARF PAWPAW	ANNONACEAE
12 <i>Asimina</i> spp.	pawpaw	ANONACEAE
13 Asparagus aethiopicus	asparagus fern*	ASPARAGACEAE
14 <i>Avicennia germinans</i>	black mangrove	AVICENNIACEAE
15 <i>Baccharis angustifolius</i>	saltbrush	ASTERACEAE
16 <i>Baccharis halimifolia</i>	saltbush	ASTERACEAE
17 <i>Bacopa monnieri</i>	herb-of-grace	PLANTAGINACEAE
18 <i>Batis maritima</i>	saltwort	BATACEAE
19 <i>Bejaria racemosa</i>	tarflower	ERICACEAE
20 <i>Blechnum serrulatum</i>	swamp fern	BLECHNANCEAE
21 <i>Boehmeria cylindrica</i>	false nettle	URTICACEAE
22 <i>Borrchia frutescens</i>	sea ox-eye	ASTERACEAE
23 <i>Callicarpa americana</i>	Beautyberry	LAMIACEAE
	COASTALPLAIN CHAFFHEAD; FLORIDA	
24 Carphephorus corymbosus	PAINTBRUSH	ASTERACEAE
25 Carphephorus odoratissimus	VANILLALEAF	ASTERACEAE
26 <i>Carya floridana</i>	Florida (Scrub) Hickory	JUGLANDACEAE
27 <i>Carya glabra</i>	Pignut Hickory	JUGLANDACEAE
28 <i>Casuarina equisetifolia</i>	Australian pine	CASUARINACEAE
29 <i>Celtis laevigata</i>	hackberry; sugarberry	CELTIDACEAE
30 <i>Centella asiatica</i>	coinwort	ARALIACEAE
31 Cinnamomum camphora	CAMPHORTREE	LAURACEAE
32 <i>Cladonia</i>	deermoss	
33 <i>Clitoria mariana</i>	Butterfly Pea	FABACEAE
34 <i>Coreopsis laevenworthii</i>	Leavonworth's tickseed	ASTERACEAE
35 <i>Cornus foemina</i>	swamp dogwood	CORNACEAE
36 <i>Cyperus</i> spp	flatsedge	CYPERACEAE
37 <i>Dichanthelium ensifolium</i>	witchgrass	POACEAE
38 <i>Dichanthelium</i> spp.	witchgrass	POACEAE
39 Diodia teres	POOR JOE; ROUGH BUTTONWEED	RUBIACEAE
40 <i>Diospyros virginiana</i>	persimmon	EBENACEAE
41 <i>Distichlis spicata</i>	seashore saltgrass	POACEAE
42 <i>Eleocharis</i> spp.	spike rush	CYPERACEAE
43 <i>Epidendrum conopseum</i>	Green Fly Orchid	Epidendrum
44 Erechtites hieraciifolius	FIREWEED	ASTERACEAE
45 <i>Erianthus giganteus</i>	giant plumegrass	POACEAE
46 <i>Erigeron vernus</i>	daisy fleabane	ASTERACEAE
47 Erythrina herbacea	Coralbean	FABACEAE
48 <i>Eupatorium capillifolium</i>	dogfennel	ASTERACEAE

* Denotes exotic species

Doris Leeper Spruce Creek Preserve

Plant List

49 <i>Eupatorium rotundifolium</i>	false hoarhound	ASTERACEAE
50 <i>Eustachys glauca</i>	SALTMARSH FINGERGRASS	POACEAE
51 <i>Euthamia caroliniana</i>	flattop goldenrod	ASTERACEAE
52 <i>Fuirena scirpoidea</i>	SOUTHERN UMBRELLASEDGE	CYPERACEAE
53 <i>Galactia elliotii</i>	milk pea	FABACEAE
54 <i>Gaylussacia tomentosa</i>	dangleberry	ERICACEAE
55 <i>Gelsemium sempervirens</i>	Carolina Yellow Jessamine (vine)	GELSEMIACEAE
56 <i>Gratiola hispida</i>	ROUGH HEDGEHYSSOP	PLANTAGINACEAE
57 <i>Gratiola ramosa</i>	BRANCHED HEDGEHYSSOP	PLANTAGINACEAE
58 <i>Helianthemum corymbosum</i>	PINEBARREN FROSTWEED (rockrose)	CISTACEAE
59 <i>Heliotropium curassavicum</i>	seaside heliotrope	BORAGINACEAE
60 <i>Hypericum cistifolium</i>	St. Johns wort	CLUSIACEAE
61 <i>Hypericum fasciculatum</i>	four-petaled St John's wort	CLUSIACEAE
62 <i>Hypericum hypericoides</i>	St. Andrews Cross	Hypericum
63 <i>Hypericum reductum</i>	sand weed	HYPERICACEAE
64 <i>Hypericum tetrapetalum</i>	St Johns wort	HYPERICACEAE
65 <i>Ilex cassine</i>	dahoon holly	AQUIFOLIACEAE
66 <i>Ilex decidua</i>	Decidious Holly	AQUIFOLIACEAE
67 <i>Ilex glabra</i>	gallberry	AQUIFOLIACEAE
68 <i>Ilex opaca</i>	American Holly	AQUIFOLIACEAE
69 <i>Ilex vomitoria</i>	Yaupon Holly	AQUIFOLIACEAE
70 <i>Ipomoea</i> spp.	morning glory	CONVOLVULACEAE
71 <i>Iva frutescens</i>	bigleaf sumpweed (marshelder)	ASTERACEAE
72 <i>Juncus effusus</i>	soft rush	JUNCACEAE
73 <i>Juncus marginatus</i>	rush	JUNCACEAE
74 <i>Juncus roemerianus</i>	black needle rush	JUNCACEAE
75 <i>Juniperus virginiana</i>	Red Cedar	CUPRESSACEAE
76 <i>Lachnanthes caroliniana</i>	CAROLINA REDROOT	HAEMODORACEAE
	DRYSAND PINWEED; SPREADING	
77 <i>Lechea cf. divaricata</i>	PINWEED	CISTACEAE
78 <i>Limonium carolinianum</i>	sea lavender	PLUMBAGINACEAE
79 <i>Liquidambar styraciflua</i>	sweetgum	ALTINGIACEAE
80 <i>Ludwigia peruviana</i>	Peruvian primrose*	ONAGRACEAE
81 <i>Ludwigia repens</i>	RED LUDWIGIA	ONAGRACEAE
82 <i>Lycium carolinianum</i>	Christmas berry	SOLANACEAE
83 <i>Lyonia ferruginea</i>	rusty lyonia	ERICACEAE
84 <i>Lyonia fruticosa</i>	fetterbush	ERICACEAE
85 <i>Lyonia lucida</i>	shiny lyonia	ERICACEAE
86 <i>Macroptilium lathyroides</i> *		FABACEAE
87 <i>Magnolia grandiflora</i>	Southern Magnolia	MAGNOLIACEAE
88 <i>Mikania scandens</i>	hempvine	ASTERACEAE
89 <i>Monanthochloe keyensis</i>	key grass	POACEAE
90 <i>Monotropa uniflora</i>	Indian Pipes (dried)	ERICACEAE
91 <i>Myrica cerifera</i>	wax myrtle	MYRICACEAE
92 <i>Osmanthus megacarpa</i>	Wild Olive	OLEACEAE
93 <i>Panicum virgatum</i>	switchgrass	POACEAE
94 <i>Parthenocissus quinquefolia</i>	Virginia creeper	VITACEAE
95 <i>Paspalum notatum</i>	bahiagrass	POACEAE
96 <i>Paspalum urvillei</i> *	VASEYGRASS	POACEAE
97 <i>Passiflora incarnata</i>	maypop	PASSIFLORACEAE
98 <i>Persea borbonia</i>	Red Bay	LAURACEAE
99 <i>Persea humilis</i>	Silk Bay	LAURACEAE

* Denotes exotic species

Doris Leeper Spruce Creek Preserve

Plant List

100 <i>Persea palustris</i>	swamp bay	LAURACEAE
101 <i>Phlebodium aureum</i>	goldfoot fern	POLYPODIACEAE
102 <i>Photinia pyrifolia</i>	choke cherry	ROSACEAE
103 <i>Phyla nodiflora</i>	Frogfruit	VERBENACEAE
104 <i>Physalis</i> sp.	GROUNDCHERRY	SOLANACEAE
105 Pinguicula caerulea	BLUEFLOWER BUTTERWORT	LENTIBULARIACEAE
106 <i>Pinus clausa</i>	Sand Pine	PINACEAE
107 <i>Pinus elliotii</i>	slash pine	PINACEAE
108 <i>Pinus serotina</i>	pond pine	PINACEAE
109 Pinus taeda	loblolly pine	PINACEAE
Pleopeltis polypodioides var.		
110 michauxiana	Resurrection Fern	POLYPODIACEAE
111 <i>Pluchea</i> spp.	camphorweed	ASTERACEAE
112 <i>Polygala lutea</i>	orange milkwort	POLYGALACEAE
113 <i>Polygonum</i> sp.	smartweed	POLYGONACEAE
114 <i>Proserpinaca pectinata</i>	mermaidweed	HALORAGACEAE
115 <i>Prunus caroliniana</i>	Carolina Cherrylaurel	ROSACEAE
116 <i>Prunus serotina</i>	Black Cherry	ROSACEAE
117 <i>Pteridium aquilinum</i>	Bracken	DENNSTAEDTIACEAE
Pteridium aquilinum var.		
118 latiusculum	bracken fern	DENNSTAEDTIACEAE
119 <i>Pterocalum virgatum</i>	blackroot, rabbit tobacco	ASTERACEAE
120 <i>Ptilimnium capillaceum</i>	mock bishop weed	APIACEAE
121 <i>Quercus chapmanii</i>	Chapman's Oak	FAGACEAE
122 <i>Quercus geminata</i>	sand live oak	FAGACEAE
123 <i>Quercus laurifolia</i>	Laurel Oak	FAGACEAE
124 <i>Quercus minima</i>	DWARF LIVE OAK	FAGACEAE
125 <i>Quercus myrtifolia</i>	Myrtle Oak	FAGACEAE
126 <i>Quercus virginiana</i>	live oak	FAGACEAE
127 <i>Rhexia lutea</i>	yellow meadowbeauty	MELASTOMATACEAE
128 <i>Rhus copallina</i>	Winged Sumac	ANACARDIACEAE
129 <i>Rhynchospora latifolia</i>	star rush	CYPERACEAE
130 <i>Rhynchospora megalocarpa</i>	Big Nut Sedge	CYPERACEAE
131 <i>Rhynchospora</i> spp	beaksedge	CYPERACEAE
132 <i>Rubus argutus</i>	BLACKBERRY	ROSACEAE
133 <i>Rubus trivialis</i>	dewberry	ROSACEAE
134 <i>Sabal etonia</i>	Sabal Minor	ARECACEAE
135 <i>Sabal palmetto</i>	Sabal Palm	ARECACEAE
136 <i>Sabatia grandiflora</i>	rosegentian	GENTIANACEAE
137 <i>Sagittaria lancifolia</i>	arrowhead	ALISMATACEAE
138 Salicornia bigelovii	annual glasswort	AMARANTHACEAE
139 <i>Salix caroliniana</i>	Carolina willow	SALICACEAE
140 <i>Sambucus canadensis</i>	elderberry	ADOXACEAE
141 <i>Samolus ebracteatus</i>	water pimpernel - ebract	SAMOLACEAE
142 <i>Sapindus marginatus</i>	Florida Soapberry	SAPINDACEAE
143 Sapium sebiferum	Chinese tallow*	EUPHORBIACEAE
144 Sarcocornia ambigua	swampfire (perennial glasswort)	AMARANTHACEAE
145 Saururus cernuus	LIZARD'S TAIL	SAURURACEAE
146 <i>Schinus terebinthifolius</i>	Brazilian pepper	ANACARDIACEAE
147 <i>Schinus terebinthifolius</i>	Brazilian pepper*	ANACARDIACEAE
148 <i>Scirpus</i> sp.	bulrush	CYPERACEAE
149 <i>Scleria</i> spp	white nut sedge	CYPERACEAE

* Denotes exotic species

Doris Leeper Spruce Creek Preserve

Plant List

150	<i>Scoparia dulcis</i>	sweetbroom	PLANTAGINACEAE
151	<i>Scutellaria integrifolia</i>	skullcaps	LAMIACEAE
152	<i>Seranoa repens</i>	Saw Palmetto	ARECACEAE
153	<i>Sesuvium portulacastrum</i>	sea purslane	AIZOACEAE
154	<i>Setaria parviflora</i>	foxtail	POACEAE
155	Sisyrinchium angustifolium	NARROWLEAF BLUE-EYED GRASS	IRIDACEAE
156	<i>Smilax auriculata</i>	ear-leafed smilax	SMILACACEAE
157	<i>Smilax glauca</i>	greenbriar	SMILACACEAE
158	<i>Smilax pumila</i>	Sarsaparilla (vine)	SMILACACEAE
159	<i>Smilax spp</i>	Smilax (vine)	SMILACACEAE
160	<i>Solidago sempervirens</i>	seaside goldenrod	ASTERACEAE
161	<i>Solidago spp</i>	Goldenrod	ASTERACEAE
162	<i>Solidago spp.</i>	goldenrod	ASTERACEAE
163	<i>Solidago spp.</i>	goldenrod	ASTERACEAE
164	<i>Spartina alterniflora</i>	smooth cordgrass	POACEAE
165	<i>Spartina bakerii</i>	cordgrass	POACEAE
166	<i>Sphagnum</i>	sphagnum moss	
167	<i>Sporobolus virginicus</i>	coastal dropseed	POACEAE
168	<i>Suaeda linearis</i>	sea blite	AMARANTHACEAE
169	<i>Symphyotrichum tenuifolium</i>	perennial saltmarsh astor	ASTERACEAE
170	Syngonanthus flavidulus	YELLOW HATPINS	ERIOCAULACEAE
171	Tillandsia recurvata	ballmoss	BROMELIACEAE
172	Tillandsia usneoides	Spanish moss	BROMELIACEAE
173	<i>Toxicodendron radicans</i>	poison ivy	ANACARDIACEAE
174	<i>Typha latifolia</i>	cattail	TYPHACEAE
175	<i>Ulmus americana</i>	elm	ULMACEAE
176	<i>Urena lobata</i>	Caesar's weed*	MALVACEAE
177	<i>Utricularia sp.</i>	bladderwort	LENTIBULARIACEAE
178	<i>Vaccinium arboreum</i>	Sparkleberry	ERICACEAE
179	<i>Vaccinium myrsinites</i>	shiny blueberry	ERICACEAE
180	<i>Vaccinium myrsinites</i>	shiny blueberry	ERICACEAE
181	<i>Vaccinium myrsinites</i>	Shiny Blueberry	ERICACEAE
182	<i>Vaccinium stamineum</i>	Deerberry	ERICACEAE
183	<i>Vaccinium stamineum</i>	deerberry	ERICACEAE
184	<i>Vaccinium stamineum</i>	deerberry	ERICACEAE
185	Vicia acutifolia	narrowleaf	FABACEAE
186	<i>Vigna luteola</i>	cow pea	FABACEAE
187	<i>Vitis rotundifolia</i>	muscadine grape vine	VITACEAE
188	<i>Vitis spp</i>	Grape (vine)	VITACEAE
189	Vittaria lineata	shoestring fern	VITTARIACEAE
190	<i>Woodwardia virginica</i>	Virginia chain fern	BLECHNACEAE
191	<i>Ximenia americana</i>	Hog Plum (Deer Apple/Tallow Wood)	XIMENIACEAE
192	<i>Xyris elliotii</i>	yellow-eyed grass	XYRIDACEAE
193	<i>Zamia pumila</i>	Coontie	ZAMIACEAE
194		Deermoss	
195		Old Man's Beard Lichen	
196		Red Blanket Lichen	

* Denotes exotic species

APPENDIX G:
Scrub-Jay Survey

Florida Scrub-Jay Survey Report

Doris Leeper Spruce Creek Preserve
Volusia County, Florida

ZC # 10041

October 25, 2010

Prepared By:
Zev Cohen & Associates
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4475 US 1 South, Suite 601
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Prepared For:
Volusia County Growth and Resource Department
Division of Land Acquisition and Management
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Submitted To:
U.S. Fish and Wildlife Service
North Florida Field Office
Attn: Erin Gawera
7915 Baymeadows Way, Suite 200
Jacksonville, FL 32256-7517



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Appendices

Appendix A – Figures

- Aerial Map
- Quadrangle Map
- Soils Map
- Habitat Map
- Scrub-Jay Survey Location Map
- Florida Scrub-Jay Family Map

Appendix B – Species

- Wildlife Species Observed List

1.0 INTRODUCTION

Zev Cohen and Associates, Inc. (ZCA) was contracted by the Volusia County Growth and Resource Department, Land Acquisition and Management Division, to survey the Doris Leeper Spruce Creek Preserve property (hereafter referred to as the Preserve) for the presence of Florida scrub-jays (*Aphelocoma coerulescens coerulescens*). The Preserve is located along the Spruce Creek from US 1 to I-95 in Volusia County, Florida, within Sections 25, 26, 35, 36, Township 16S, Range 33E. The Preserve consists of approximately 2000 acres of a variety of natural communities (See attached Aerial Map and Quadrangle Map for details). The goal of this survey was to identify the presence/absence of the Florida scrub-jay within the Preserve. The results of this survey will provide Volusia County with a detailed description of the natural communities within the Preserve and provide recommendations for land management techniques which would enhance the communities to provide suitable habitat for the Florida scrub-jay.

2.0 BACKGROUND INFORMATION

The Florida scrub-jay is listed as Threatened by the U.S. Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWC), pursuant to the Federal Endangered Species Act (50 C.F.R. 17.11) and the Florida Administrative Code (Chapter 39-27.002, F.A.C.), respectively. The most significant difference between these regulations is that the ESA specifically protects the loss of habitat and not just the loss of the species. The ESA protects scrub-jays from being “killed, harassed, taken”, etc. either directly or indirectly. A direct taking would include destroying a nest with young in the nest or the killing of an adult. An indirect or incidental taking would involve the development of occupied habitat leading to habitat destruction, even if the birds were not directly harmed. The habitat loss prevents the birds from using the site for portions of their life cycle and eventually leads to their destruction. Generally, the Florida Administrative Code only protects the species from a direct taking.

Scrub-jays inhabit oak scrub communities with nearby open sandy areas. Scrub-jays typically nest in dense scrub oak pockets. Dense scrub oak sub-canopies provide protection from predatory raptors and domestic cats. This protection is critical to the survival of scrub-jays, which are brightly colored birds with poor evasive flying abilities. Typically, scrub-jays stay relatively close to or on the ground. Scrub-jays generally hop along the ground and between dense shrubby vegetation while foraging. The primary vegetative source of food for the Florida scrub-jay is acorns, however scrub-jays are known to eat certain insect larvae. The proximity of open sandy areas for acorn caching is critical to the species, as the individuals are vulnerable to predation for shorter periods of time when the caching areas are closer to dense protective vegetation. Areas of dense oak and pine canopy cover and areas of extensive saw palmetto are of limited suitability to scrub-jays.

Scrub-jays exemplify cooperative breeding, which means offspring from previous nesting cycles remain to help the parental adults raise future offspring. Scrub-jay families typically consist of an adult pair, plus 1-10 adult and juvenile helpers. The presence of 1 or 2 helpers per adult pair is typical, thus typical family size is three to four individuals.

3.0 METHODS

3.1 Background Research

A background literature search was conducted to determine if scrub-jays have been documented on the Preserve or in the vicinity. Where available, distribution and observation data were reviewed from the following sources: the Florida Natural Areas Inventory (FNAI), the Florida Committee on Rare and Endangered Plants and Animals (FCREPA) publications, the FWC, the USFWS, Florida Audubon Society and through consulting other published reference materials such as Cox (1987). In addition, ZCA's *Florida Scrub-Jay Database* (a Zev Cohen proprietary database comprised of data acquired from several agencies, direct observations, and scientific journals) was reviewed to obtain location data recorded by others.

3.2 Habitat Evaluation

An inventory of the wildlife habitat found within the Preserve was made, and a Habitat Map was produced using the Florida Natural Areas Inventory Guide to the Natural Communities of Florida: 2010 Edition. Notes and observations for each habitat type were recorded by dominant species for each vegetative stratum. Additionally, the site was evaluated for the type of scrub-jay habitat (Type I, Type II, or Type III Habitat). Type I, II, and III habitats are varying degrees of suitable scrub-jay habitat as described in Fitzpatrick *et. al.*, (1991):

- Type I Habitat – Any upland plant community in which percent cover of the substrate by scrub oak species is 15% or more.
- Type II Habitat – Any plant community not meeting the definition of Type I habitat, in which one or more scrub oak species is represented [the presence of any amount of scrub oak is the key indicator].
- Type III Habitat – Any upland or seasonally dry wetland within ¼ mile of any area designated as Type I or Type II habitat.

3.3 Scrub-jay Field Survey

ZCA, along with Volusia County Environmental staff, surveyed the Preserve in accordance with the techniques outlined in Fitzpatrick *et. al.*, (1991). The survey consisted of the playback of recorded scrub-jay vocalizations at stations that were located

to provide broadcast coverage of the entire site as well as broadcasts off-site without trespassing on private land (see attached Scrub-Jay Survey Map). The location of each station was located using a hand-held GPS unit (Garmin eTrex Venture personal navigator). The recorded locations are accurate to within 3 meters. A portable compact disc player (Sony Atrac3plus Model No. ZS-XN30) was used to broadcast recordings of scrub-jay scolding and territory advertisement calls. The audio track was excerpted from Keller (1997). Typically, when these calls are played in an occupied scrub-jay territory, the resident jays will respond to the playback with calls of their own and visual displays in an attempt to locate and challenge the perceived intruder. The surveys were started in the morning hours and documented in daily field notes. The CD was not played during any precipitation, or in the presence of observed predators. The vocalizations played were unobstructed by other loud noises as the major roadways in the area are buffered by the trees found within the Preserve.

The survey protocol also followed guidelines provided by the USFWS North Florida Field Office, in their document, *Scrub-Jay Survey Guidelines*, which was adapted from Fitzpatrick *et. al.*, (1991). The survey also incorporated the guidelines provided by the USFWS North Florida Field Office, in their document, *Florida Scrub-Jay Urban Survey Protocol*.

4.0 RESULTS

4.1 Background Research

Background research in the vicinity of the subject property revealed the potential presence of five (5) Florida scrub-jay populations/families, within a two mile radius. The potential areas include four (4) known families within one mile south of the western parcel and one (1) family directly south of the eastern most parcel (see Florida Scrub-Jay Family Map, attached). No Florida scrub-jays have been documented on the subject property. Please note that the data used for this map includes data from the original statewide surveys conducted in 1992 and 1993 (Fitzpatrick *et al.*). Many of the scrub-jay families represented potentially no longer occur in the area due to development and predation.

4.2 Habitat Descriptions

The following is a description of the cover type listed by its designated FNAI community (see attached Habitat Map). Included in the descriptions are land management recommendations which could return the habitats which have a high potential to occupy Florida scrub-jay families back to historical conditions.

Natural Communities:

Hardwood Forested Uplands

Mesic Hammock – Mesic hammocks are well developed hardwood and/or palm forests on rarely inundated soils. The canopy is typically closed and dominated by live oak (*Quercus virginiana*), cabbage palm (*Sabal palmetto*), southern magnolia (*Magnolia grandiflora*), and pignut hickory (*Carya glabra*). The mesic hammocks found at the Preserve are dominated by the canopy trees mentioned above and the canopy is closed. The understory consists of saw palmetto (*Serenoa repens*), American beautyberry (*Callicarpa americana*), gallberry (*Ilex glabra*), sparkleberry (*Vaccinium arboreum*), yaupon holly (*Ilex vomitoria*) and wax myrtle (*Myrica cerifera*).

Mesic hammocks are not considered fire-adapted communities. With that in mind the mesic hammocks found at the Preserve, as like many throughout central and northeast Florida, are very healthy and functioning superbly. The most common disturbance is logging, understory clearing, cattle grazing, and introduction of feral hogs. The disturbances mentioned above have not occurred at the Preserve.

High Pine and Scrub

Scrub (Type I Habitat) – Scrub is a community composed of evergreen shrubs, with or without a canopy of pines, and is found on dry, infertile, sandy ridges. Scrub is dominated by myrtle oak (*Quercus myrtifolia*), sand live oak (*Quercus geminate*), Chapman's oak (*Quercus chapmanii*), sand pine (*Pinus clausa*), Florida rosemary (*Ceratiola ericoides*), rusty lyonia (*Lyonia ferruginea*), and saw palmetto. The oaks form a dense cover interspersed with patchy openings that consist of bare sand with a sparse cover of herbs, particularly threeawns (*Aristida* spp.), hairsedges (*Bulbostylis* spp.), sandyfield beaksedge (*Rhynchospora megalocarpa*), pinweeds (*Lechea* spp.), jointweeds (*Polygonella* spp.), and ground lichens (*Ladonia leporine*, *Cladonia prostrate*, *Cladina subtenuis*, and *Cladina evansii*).

Florida scrub is home to a multitude of rare animals. This includes the Florida scrub-jay, scrub lizard (*Sceloporus woodi*), gopher tortoise (*Gopherus polyphemus*), Florida mouse (*Peromyscus floridanus*), short-tailed snake (*Stilosoma extenuatum*), gopher frog (*Rana capito*), and many other species.

While scrub is a fire-maintained community, it is not easily ignited. Scrub is thought to have burned less frequently than communities with a more easily ignited grassy groundcover, such as sandhill or mesic flatwoods. Scrub oak dominated scrub, as found within the Preserve, likely burned naturally at intervals between 5 and 20 years based on the habitat requirements of the Florida scrub-jay. Oak height is a critical limiting factor

for Florida scrub-jays which have been documented to abandon territories where the oaks reached >3 meters. A minimum of five years is based on the time required for re-sprouting oak stems to reach acorn-bearing height.

Growth rates of scrub oaks are related to burn history and environmental conditions onsite. Long unburned oak scrub, which comprises the Preserve, may attain heights unsuitable for scrub-jays up to 50 percent faster after fire than regularly burned oak scrub and thus may at first require shorter burn intervals to maintain optimum heights following restoration of burning. In addition, small openings, needed by Florida scrub-jays for caching acorns, may need to be artificially restored in long unburned scrub by piling up fuel to create hotspots that kill the roots of the oaks.

Pine Flatwoods and Dry Prairie

Wet Flatwoods – Wet flatwoods are pine forests with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs, and low shrubs. The canopy of the wet flatwoods within the Preserve consists of planted slash pine (*Pinus elliottii*). The subcanopy consists of loblolly bay (*Gordonia lasianthus*), swamp bay (*Persea palustris*), dahoon holly (*Ilex cassine*), and wax myrtle. The shrub layer is dominated by gallberry, shiny yonina, and saw palmetto. The herbaceous layer consists primarily of wiregrass (*Aristida stricta*), blue maidencane (*Amphicarpum muhlenbergianum*), Carolina redroot (*Lachnanthes carolina*), beaksedges (*Rhynchospora* spp.), and maidencane (*Panicum hemitomon*). Due to this site being fire suppressed the shrub layer is more abundant compared to the herbs.

Wet flatwoods tend to have a longer fire interval than upland pine flatwoods in the order of 5 to 7 years. If the interval is too long, 7 to 10 years, it can lead to an increase in woody species cover and a decline in grasses and forb cover. Many factors other than frequency of fire, such as season of fire, pre- and post-fire soil moistures, groundwater levels, weather, plant size or age at the time of fire, can greatly influence tree mortality and vegetation response to fire. Fire in the growing season can reduce the stature of woody vegetation, particularly hardwoods, prevent increases in shrub densities, and promote flowering of herbaceous groundcover.

Mesic Flatwoods (Type I Habitat) – Mesic flatwoods are generally characterized by an open canopy of tall pines and dense ground cover including shrubs, grasses, and forbs. Historically this community's canopy was dominated by longleaf pine (*Pinus palustris*). Today the majority of mesic flatwoods found throughout central and northeastern Florida are dominated by dense stands of slash pine due to the pine silviculture industry and furthermore by prolonged periods of fire exclusion. The canopy found within the mesic flatwoods of the Preserve is comprised mostly of slash pine. The ground cover is dominated by a heavy cover of saw palmetto and gallberry. In natural state, mesic flatwood herbaceous cover is dominated by wiregrass, dropseeds (*Sporobolus* spp.),

panicgrasses (*Dichanthelium* spp.), and broomsedges (*Andropogon* spp.). Limited areas of wiregrass, or other herbaceous cover, are found within the mesic flatwoods of the Preserve due to fire exclusion.

Mesic flatwoods require frequent fire (2 to 4 year intervals). Longleaf pines have thick bark to protect them from fire and their seeds need the mineral soil and open sunlight that fire provides to germinate. Longleaf pine during the grass stage is fire resistant. All of the mesic flatwood constituent plant species recover rapidly from fire and several species require fire to reproduce. Wiregrass requires fire to flower, along with a number of other characteristic herbs. Red-cockaded woodpeckers (*Picoides borealis*), which nest in cavities in mature living pines, will abandon a nesting site if the midstory becomes too tall and dense.

The need for frequent fire to control hardwood and off-site pine invasion has been documented for many years. It is also well documented that fire stimulates flowering in many flatwood herbs and that frequent fire increases species richness and abundance. Controlled burns in mesic flatwoods also indirectly determine the fire frequency and season for all the adjacent natural communities.

Statistics from lightning caused fires suggest that most areas in Florida would naturally burn at the beginning of the lightning season. Growing season fires (April to mid-August) are known to be necessary for flowering and seed set in wiregrass.

Scrubby Flatwoods (Type I Habitat) – Scrubby flatwoods have an open canopy of widely spaced pine trees and a low, shrubby understory dominated by scrub oaks and saw palmetto. Scrubby flatwoods differ from the aforementioned scrub in the presence of wiregrass, a greater abundance of saw palmetto, and/or the presence of typical flatwoods shrubs such as gallberry and fetterbushes. Structurally it differs from scrub in its lack of a continuous cover of scrubby oaks.

The scrubby flatwoods at the Preserve have a canopy of longleaf pine, slash pine, and sand pine. The understory consists of a closed cover of sand live oak, myrtle oak, Chapman's oak, saw palmetto, gallberry, and fetterbush. Some instances of grasses were found which include wiregrass, broomsedge bluestem (*Andropogon virginicus*), and shiny blueberry (*Vaccinium myrsinites*). The majority of the scrubby flatwoods found within the Preserve has a closed canopy of scrub oaks in the 3 to 4 meter range in height due to the lack of fire.

Scrubby flatwoods are often associated with scrub and/or mesic flatwoods. Therefore many of the rare species associated with the aforementioned scrub are also likely to inhabit scrubby flatwoods.

Scrubby flatwoods have a more continuous ground cover than scrub, therefore

historically have burned more readily than scrub. But due to less ground cover grasses scrubby flatwoods tend to burn less readily than mesic flatwoods. Therefore scrubby flatwoods historically have burned at a frequency intermediate of the two, most likely in the 5 to 15 year range. Light ground fires in the surrounding mesic flatwoods tend to enter scrubby flatwoods and extinguish, leading to a patchwork of recently burned and unburned portions, a situation which has been found to be favorable for scrub-jays. Therefore variability in season and frequency of prescribed fires to produce a mosaic of burned and unburned patches would be the most desirable for maintaining high biotic diversity within this community.

Coastal Uplands

Maritime Hammock – Maritime hammock is predominantly evergreen hardwood forest growing on stabilized coastal dunes lying at varying distances from the shore. The maritime hammocks found within the Preserve have a closed canopy dominated by live oak, cabbage palm, southern magnolia, and pignut hickory. The subcanopy is dominated by red cedar (*Juniperus virginiana*), yaupon holly (*Ilex vomitoria*), saw palmetto, Brazilian pepper, red bay (*Persea borbonia*), wild coffee (*Psychotria nervosa*), wax myrtle, and wild orange (*Citrus* spp.). The invasive exotic Australian pine (*Casuarina equisetifolia*) was also noted within the maritime hammock communities of the Preserve.

Fire is naturally rare in this community. Fire could weaken the canopy trees making them more susceptible to damage by other coastal stresses. Invasion by exotic species such as Brazilian pepper and Australian pine following storm and wind disturbance is an ongoing threat to the community. Also the composition of maritime hammock is in danger to be affected by the Laurel Wilt Disease, which is fatal to red bays over 1 inch in dbh. This disease is caused by an exotic wood-boring beetle (*Xyleborus glabratus*). The loss of red bays within the subcanopy could potentially lead to further invasion by Brazilian pepper.

Freshwater Non-Forested Wetlands

Wet Prairie – Wet prairie is an herbaceous community found on continuously wet, but not inundated, soils on somewhat flat or gentle slopes between lower lying depression marshes, shrub bogs, or dome swamps and slightly higher wet or mesic flatwoods, or dry prairie. The wet prairies found within the Preserve are small depressions adjacent to wet flatwoods and mesic flatwoods. The groundcover consists primarily of yellow eyed grass (*Xyris* spp.), St. John's wort (*Hypericum fasciculatum*), maidencane, beaksedges, and Carolina redroot.

Natural fires likely entered wet prairies from surrounding pine flatwoods and burned through them when they were dry enough to carry fire. It is estimated that wet prairies found adjacent to pine flatwoods historically had a fire interval of 2 to 4 years. In

absence of fire, shrubs and trees invade wet prairie and shade out the light-loving herbaceous species. Further evidence of fire interval is the necessity of many of the dominant grasses that require fire to stimulate flowering. Wet prairies are sensitive to relatively slight physical alterations to the soil surface which can permanently alter the hydrology. Such disturbances include soil rutting by human disturbance or hog rooting. These disturbances can cause major changes in species composition that require expensive restoration to repair.

Freshwater Forested Wetlands

Coastal Hydric Hammock – Coastal hydric hammock is an evergreen hardwood and/or palm forest with a variable understory typically dominated by palms and ferns occurring on moist soils, often with limestone very near the surface. While species composition varies, the community generally has a closed canopy of oaks and palms, an open understory, and a sparse to a moderate groundcover of grasses and ferns. The coastal hydric hammock found within the Preserve has a canopy which is 100% cabbage palm. The subcanopy consists of swamp bay, wax myrtle, and saw palmetto. The herbaceous cover is dominated by Virginia chain fern (*Woodwardia virginica*), cinnamon fern (*Osmunda cinnamomea*), and royal fern (*Osmunda regalis* var. *spectabilis*).

Fire is not considered an important component of coastal hydric hammock dynamics; however they do burn occasionally. Due to this coastal hydric hammock being dominated by old growth cabbage palm fire most likely occurred historically. Cabbage palms are fire tolerant and intense fires favor the species. Feral hogs tend to be the most common cause of disturbance to this habitat. Hog rutting causes soil disturbance which can allow the spread of the exotic Brazilian pepper as it is found directly adjacent to this habitat.

Bottomland Forest – Bottomland forest is a deciduous, or mixed deciduous/evergreen closed-canopy forest within riverine floodplains and in shallow depressions. The dominate canopy species found within this community at the Preserve include laurel oak (*Quercus laurifolia*), sweetbay (*Magnolia virginiana*), cabbage palm, swamp tupelo (*Nyssa sylvatica* var. *biflora*), water oak (*Quercus nigra*), sugarberry (*Celtis laevigata*), American elm (*Ulmus americana*), water hickory (*Carya aquatica*), and red maple (*Acer rubrum*). The understory consists of swamp dogwood (*Cornus foemina*), dahoon holly (*Ilex cassine*), swamp bay, shiny lyonia (*Lyonia lucida*), and wax myrtle.

Bottomland forests are a preferred habitat for the Florida black bear (*Ursus americanus floridanus*) as they roam along the banks of streams and riverine systems.

Bottomland forests are not considered fire-adapted communities. The most common disturbance of bottomland forest is logging and introduction of feral hogs. The bottomland forests found within the Preserve do not appear to have been logged in the

past and hog presence was not found. Other disturbances such as man made dikes or dams which do not allow for adequate drainage also cause considerable damage to bottomland forests. No damming or diking has occurred within the Preserve.

Marine and Estuarine Vegetated Wetlands

Salt Marsh – Salt marsh is a largely herbaceous community that occurs in the portion of the coastal zone affected by tides and seawater and protected from large waves, either by the broad, gently sloping topography of the shore, by a barrier island, or by location along a bay or estuary. In the case of the Preserve the salt marshes are protected from wave activity by barrier islands. The dominate species is saltmarsh cordgrass (*Spartina alterniflora*) and needle rush (*Juncus roemerianus*). The landward edge of the marsh consists of sawgrass (*Cladium jamaicense*), saltmeadow cordgrass (*Spartina patens*), marsh elder (*Iva frutescens*), sea oxeye daisy (*Borrchia frutescens*), and christmasberry (*Lycium carolinianum*). The salt marshes within the Preserve also have sporadic black mangroves (*Avicennia germinans*) found throughout.

Salt marshes, along with mangrove swamps, are some of the most biologically productive natural communities in the world. The base of the food chain is supplied not only by the rooted plant matter, but also by the algae and detritus found of the stems of plants, on the sediment surface, and suspended in the water column of pools and tidal creeks.

Fire is known to occur in salt marshes, although sporadically, either by spreading from adjacent uplands or from lightning strikes in the marsh itself.

Ditch/canal features are found in a portion of the salt marshes on the Preserve. The ditching is consistent to what occurred in the area in the 1950's and 1960's which is referred to as dragline ditching. The purpose of the ditches was to interrupt the life cycle of saltmarsh mosquitoes (*Aedes taeniorhynchus*, *A. sollicitans*) by altering their breeding sites. Saltmarsh mosquitoes lay their eggs on moist soils. These eggs hatch in huge numbers when the marsh is flooded by tides or rain. Dragline ditching converts large acreages to ditch and spoil piles while altering the hydrology of the remaining wetland and providing access for mosquito-eating fish. The ditches are mostly open water due to the depth. Along the edges nuisance species such as cattail (*Typha* spp.) and Carolina willow (*Salix caroliniana*) dominate the plant composition. Backfilling of these historic mosquito ditches has been a very successful form of salt marsh restoration throughout the state.

Mangrove Swamp – Mangrove swamps are dense forests occurring along relatively flat, low wave energy, marine and estuarine shorelines. Four species of mangroves occur in Florida consisting of red mangrove (*Rhizophora mangle*), black mangrove, white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). The four species can occur either in mixed stands or often in differentiated, monospecific zones

that reflect varying degrees of tidal influence, levels of salinity, and types of substrate. Red mangroves often dominate the lowest (deep water) zone, followed by black mangroves, then white, and finally buttonwoods which are normally found within the transition zone between the upland and wetland limits.

Mangrove swamps often exist with no understory, although in some open areas species such as sea-oxeye daisy, marsh elder, saltwort (*Batis maritima*), and giant leatherfern (*Acrostichum danaeifolium*) may be found.

The biological importance of mangrove swamps is well documented as numerous marine and estuarine organisms depend on the swamps for a portion of their life cycle. The continuous shedding of mangrove leaves and other plant components also produce as much as 80 percent of the total organic material available in the aquatic food web. Mangrove swamps are considered one of the most productive forest systems in the world. Mangrove swamps provide important habitat for many rare and endangered flora and fauna and also functions as nursery grounds for many of Florida's commercially and recreationally important fish and shellfish.

Mangroves continue to face survival pressure resulting from oil spills, altered tidal flows, and changes in the quantity, quality, and timing of the fresh water input as a result of development of adjacent uplands. Mangrove swamps are sensitive to colonization by exotic species such as Brazilian pepper (*Schinus terebinthifolius*) and Australian pine (*Casuarina equisetifolia*). Both of the above species have been observed within the Preserve. Management of the mangrove swamps within the Preserve should include the hand removal of any of the above exotic species found within the existing mangrove swamps.

Rivers and Streams (Riverine)

Blackwater Stream - The open water areas within the Preserve include the tidal waters of the Spruce Creek and Murray Creek. These tidal creek systems, due to proximity to the Ponce Inlet, provide extremely valuable habitat for commercial marine species that spend all or part of their life cycle in tidal creeks which include mullet (*Mugil* spp.), spot (*Leiostomus xanthurus*), blue crabs (*Callinectes sapindus*), oysters (*Crassostrea virginica*), and shrimp (*Penaeus* spp.). The smaller minnows and juvenile fish in the tidal creeks provide food for many recreationally important, predatory fish, such as tarpon (*Megalops atlanticus*), snook (*Centropomus undecimalis*), red drum (*Sciaenops ocellatus*), and spotted seatrout (*Cynoscion nebulosus*).

Altered Landcover Types

Clearing – A portion of the pine mesic flatwoods in the northeast portion of the Preserve burned recently. The fire was extremely hot causing all the canopy trees along with the

understory to die. As a safety precaution all the trees were toppled and then removed. The area remains as cleared with sporadic vegetation.

Impoundment/Artificial Pond – Two impoundments occur within the Preserve. One is a large human made pond (approximately 35 acres) found on the eastern side of the Preserve. The pond is tidally influenced and appears to be shallow across. Ponds of this nature were created in the past as duck ponds for hunters to use during the duck migrations in the spring and fall.

A smaller freshwater borrow pond is located on the western side of the Preserve. This pond was used as a dirt mine in the past for use as fill. The side slopes drop dramatically and only a small littoral shelf is present.

Improved pasture – A small portion of improved pasture is included within the Preserve. This area consists of actively maintained bahiagrass (*Paspalum notatum*). It is currently used for parking equestrian trailers used by visitors of the Preserve. Gopher tortoises actively use this area for forage and a few burrows were also identified.

Successional Hardwood Forest – This habitat is found along a canal which was historically draglined through a wetland hardwood forest. The existing vegetation consists of a canopy of laurel oak, slash and longleaf pine, cabbage palm, sugarberry, and southern magnolia.

4.3 Field Survey

The scrub-jay survey was conducted over 5 consecutive days starting on 26 July 2010 and ending on 30 July 2010 (see attached list of species observed). Survey times generally began in the early morning hours (6:30 am) and generally ended around 10:00 a.m. Weather conditions were generally optimal with good visibility, no precipitation, calm winds, and temperatures within the acceptable range. Multiple teams of 2 biologists were used to cover the 88 survey stations within the appropriate times. One scrub-jay responded to the vocalization recording at station 1-27. The one scrub-jay observed flew from south of the property to the southern boundary to respond to the voice recording. It then flew back offsite and did not return. This sighting occurred on 28 July 2010, and the scrub-jay was not seen at any other locations or on other days. No scrub-jays were documented throughout the rest of the entire property demonstrating that the habitats need appropriate land management.

5.0 DISCUSSION

The Florida scrub-jay inhabits fire dominated, low-growing, oak scrub habitat found on well-drained sandy soils. They may persist in areas with sparser oaks or scrub areas that are overgrown, but at much lower densities and with reduced survivorship. Oak height is a critical limiting factor for Florida scrub-jays which have been documented to abandon

territories where the oaks reached >3 meters. The mesic flatwoods, scrubby flatwoods, and scrub found within the Preserve provide the potential for valuable acreage which could be utilized by local scrub-jay families and offspring. Prescribed fire within the above habitats is essential to re-establish these areas as optimum Florida scrub-jay habitats.

As stated previously, the continued existence of the Florida scrub-jay species will depend on preservation and long-term management of suitable scrub habitat. The three habitats above represent approximately 815.76 acres of the Doris Leeper Spruce Creek Preserve (mesic flatwoods – 281.59 acres, scrub – 280.04 acres, and scrubby flatwoods – 254.13 acres). With the presence of multiple Florida scrub-jay families within two miles of the Preserve the importance of managing the habitats to there appropriate historical state is of immeasurable value.

5.0 CONCLUSION

Zev Cohen and Associates has conducted a Florida scrub-jay (*Aphelocoma c. coerulescens*) survey for the subject property. Research data shows that potentially five (5) Florida scrub-jay populations/families, within a two mile radius. The potential areas include four (4) known families within one mile south of the western parcel and one (1) family directly south of the eastern most parcel. One scrub-jay responded to the vocalization recording at station 1-27. The one scrub-jay observed flew from south of the property to the southern boundary to respond to the voice recording. It then flew back offsite and did not return. No scrub-jays were documented throughout the rest of the entire property demonstrating that the habitats need appropriate land management.

Zev Cohen and Associates, Inc. is seeking concurrence from USFWS that the Florida scrub-jay does not occupy the Doris Leeper Spruce Creek Preserve in its present state due to the overgrown condition of the potential scrub-jay habitats onsite.

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10041_SJ report
Enclosures

APPENDIX A

FIGURES



 **Property Limits**
state owned parcels

Source : 2006 Volusia County True Color Aerials

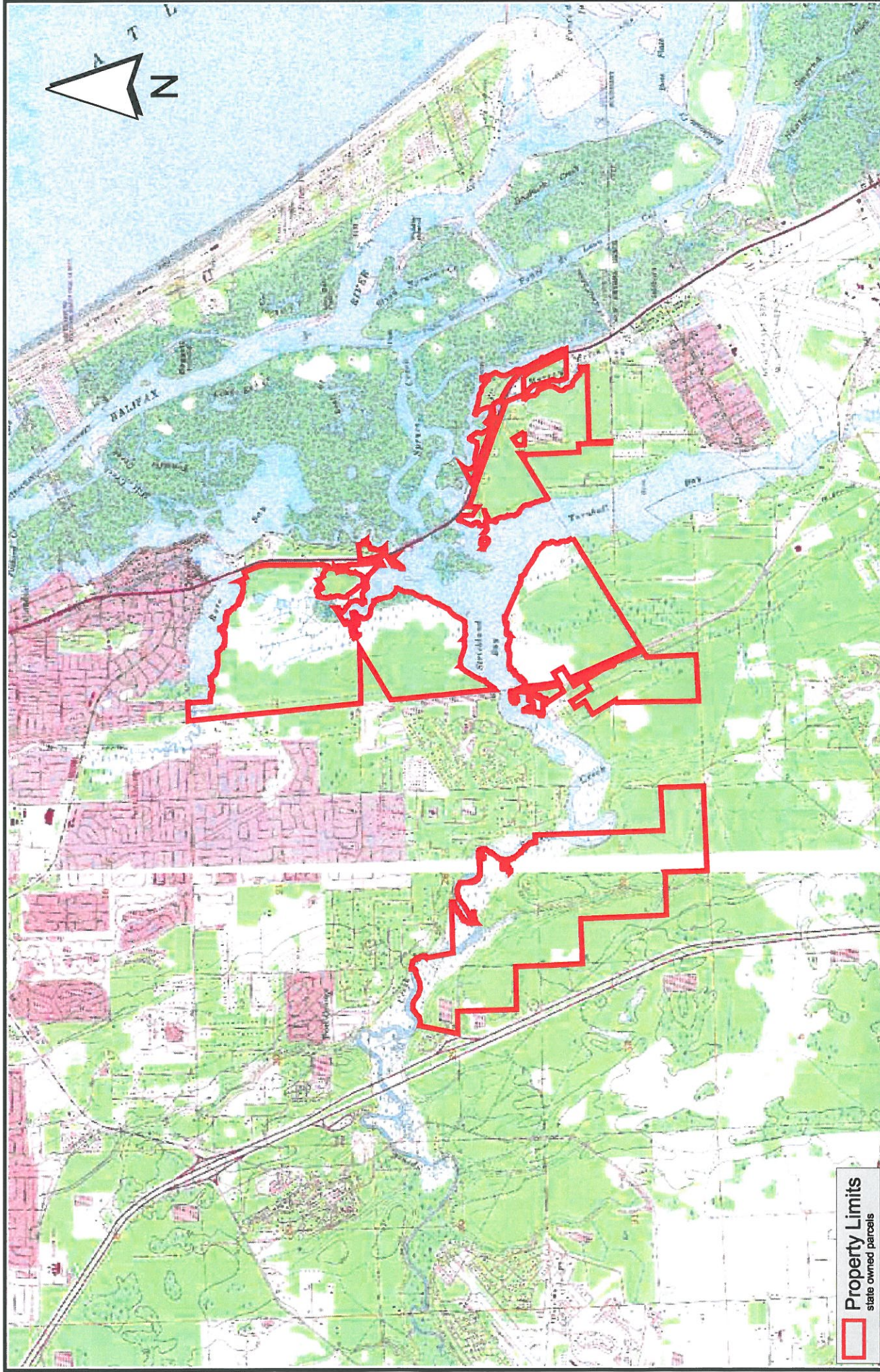
Date : 08/16/10

Path : Z:/10041/lmp.apr

2500 0 2500 Feet

AERIAL MAP **DORIS LEEPER SPRUCE CREEK PRESERVE** **VOLUSIA COUNTY, FLORIDA**

G - 19



Property Limits
state owned parcels

Source : Daytona, Samsula, Port Orange, and
New Smyrna Beach, FL Quadrangle map

Date : 08/16/10

Path : Z:/10041/lmp.apr

4000 0 4000 Feet



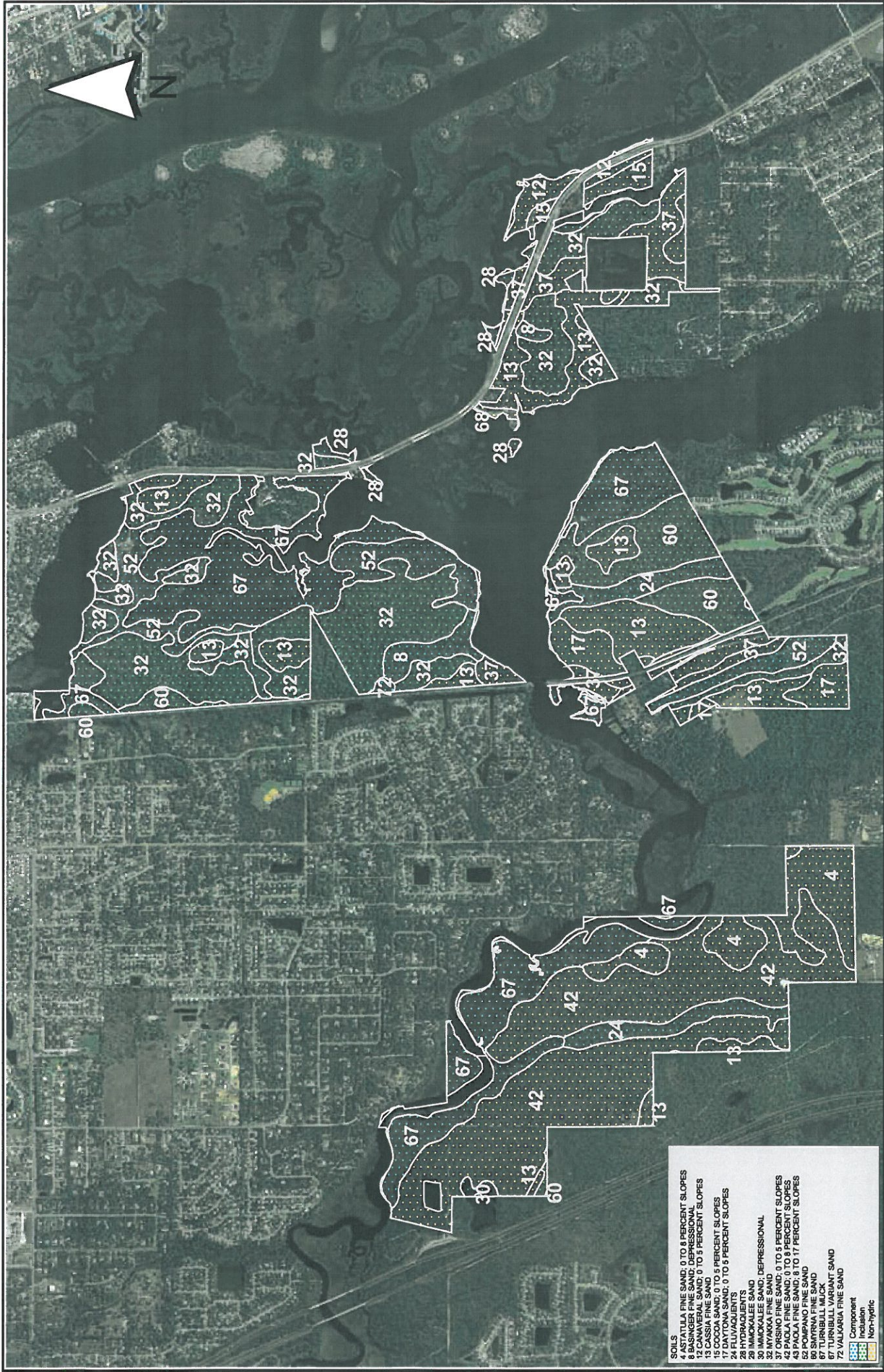
QUADRANGLE MAP DORIS LEEPER SPRUCE CREEK PRESERVE VOLUSIA COUNTY, FLORIDA

G - 20



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SOILS

4	ASTATULA FINE SAND; 0 TO 8 PERCENT SLOPES
8	BASINGER FINE SAND; DEPRESSIONAL
11	CLAYTON FINE SAND; 0 TO 5 PERCENT SLOPES
13	CASSIA FINE SAND
15	COCOA SAND; 0 TO 5 PERCENT SLOPES
17	DAYTONA SAND; 0 TO 5 PERCENT SLOPES
24	FLUVAQUENTS
28	HYDROQUENTS
30	IMOKALEE SAND; DEPRESSIONAL
32	MYAKKA FINE SAND
37	ORSINO FINE SAND; 0 TO 5 PERCENT SLOPES
42	PAOLA FINE SAND; 0 TO 8 PERCENT SLOPES
52	POUNAMA FINE SAND; 0 TO 17 PERCENT SLOPES
60	SATYRNA FINE SAND
67	TURNBULL MUCK
67	TURNBULL VARIANT SAND
72	VALCARGA FINE SAND

Component
 Inclusion
 Non-hydric

Source : 2006 Volusia County True Color Aerials

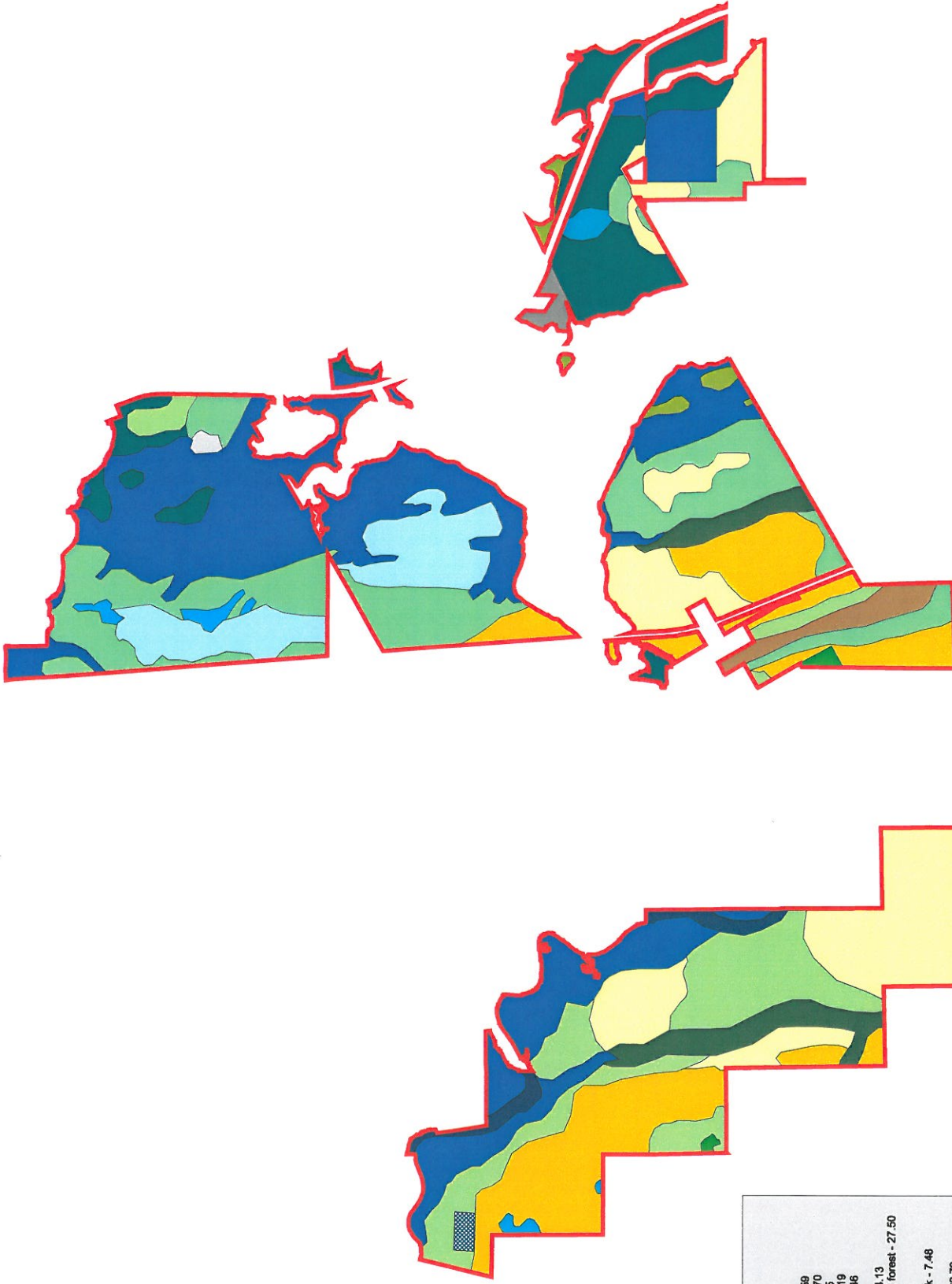
Date : 08/16/10

Path : Z:/10041/Imp.apr

2500 0 2500 Feet

SOILS MAP DORIS LEEPER SPRUCE CREEK PRESERVE VOLUSIA COUNTY, FLORIDA

G - 21



Property Limits	
Habitats - Acres	
clearing	3.44
developed	9.76
marsh	281.59
marsh	185.70
improved pasture	4.85
mangrove swamp	15.19
bottomland forest	65.48
scrub	280.04
scrubby flatwoods	254.13
successional hardwood forest	27.50
wet flatwoods	112.83
wet prairie	13.61
coastal hydric hammock	7.48
salt marsh	480.94
maritime hammock	182.79
impoundment	5.01
blackwater stream	21.89

Source :

Date : 08/16/10

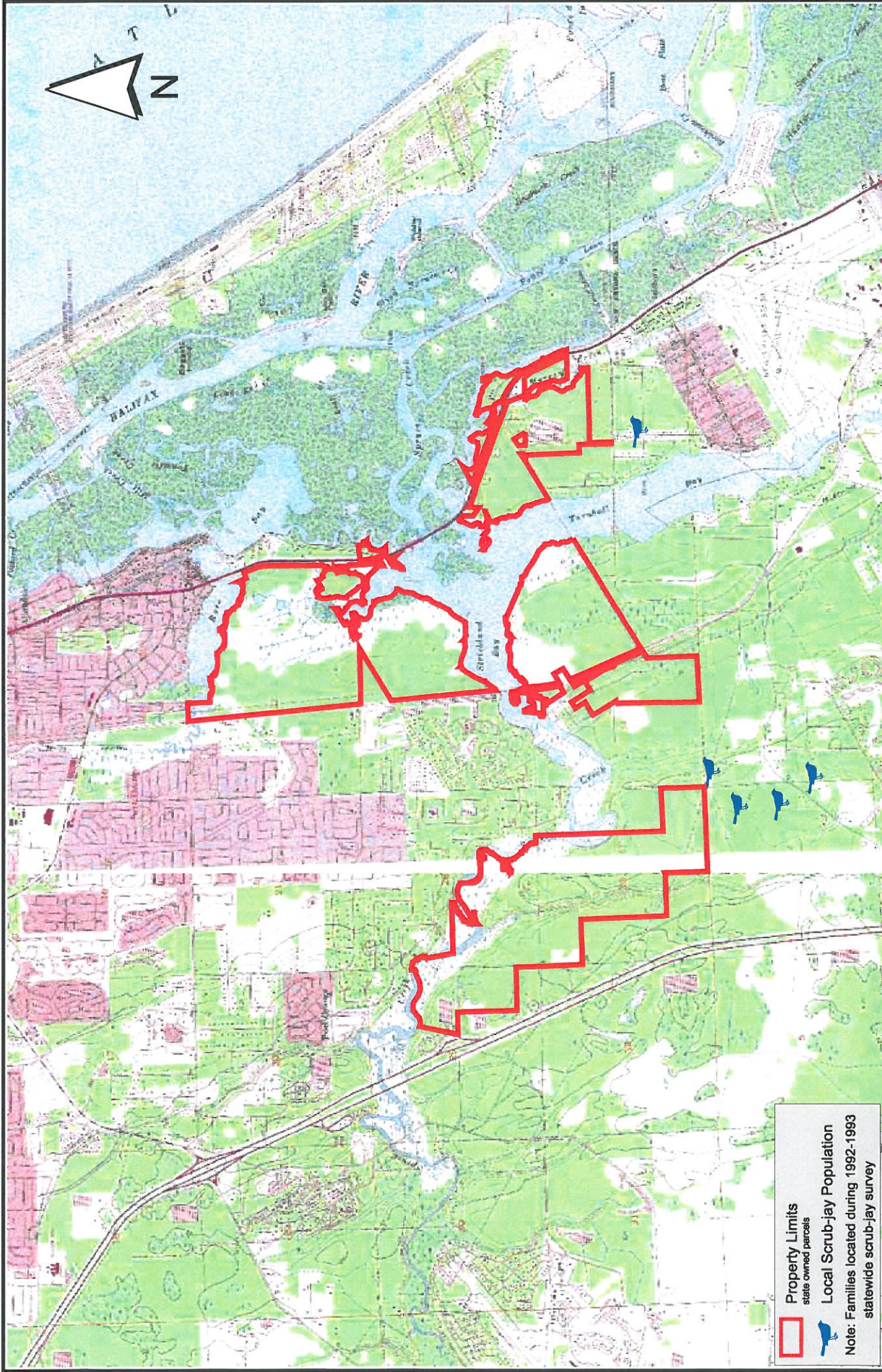
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2500 0 2500 Feet



HABITAT MAP DORIS LEEPER SPRUCE CREEK PRESERVE VOLUSIA COUNTY, FLORIDA

G - 22



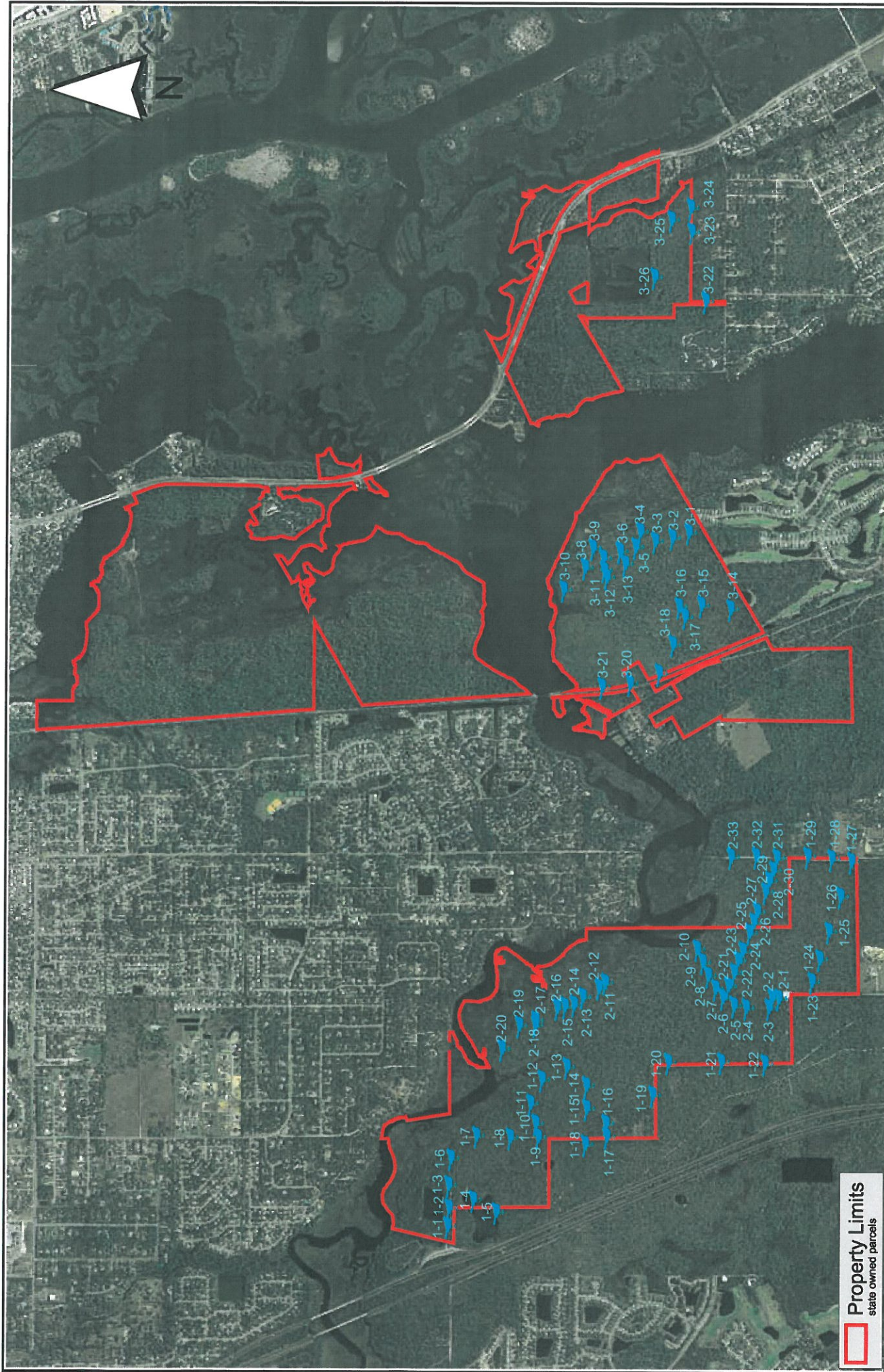
 Property Limits
state owned parcels
 Local Scrub-jay Population
Note: Families located during 1992-1993
statewide scrub-jay survey

Source : Daytona, Samsula, Port Orange, and
New Smyrna Beach, FL Quadrangle map
Date : 08/16/10
Path : Z:/10041/lmp.apr



LOCAL SCRUB JAY FAMILY MAP DORIS LEEPER SPRUCE CREEK PRESERVE VOLUSIA COUNTY, FLORIDA

G - 23



Source : 2006 Volusia County True Color Aerials

Date : 08/16/10

Path : Z:/10041/Imp.apr

2500 0 2500 Feet

SCRUB JAY VOCALIZATION STATION MAP DORIS LEEPER SPRUCE CREEK PRESERVE VOLUSIA COUNTY, FLORIDA

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APPENDIX B

Wildlife Species Observed List

Fish and Wildlife

Wildlife observations, both direct and indirect (indirect observations of their presence include remnants, tracks, burrows, calls, scat, etc.), were made throughout the course of the site investigations. Pedestrian transects were traversed along existing field trails, as well as along vegetational community boundaries. Fish species identification was collected via 8 foot cast net throws and 50 foot seine net pulls. A list of species observed is provided in the following table:

Table 1: Wildlife species observed on the Doris Leeper Spruce Creek Preserve in Volusia County, Florida.

Taxon	Common Name	Scientific Name	Listed Species*
Reptiles/Amphibians			
	Green anole	<i>Anolis carolinensis</i>	No
	Five-lined skink	<i>Eumeces fasciatus</i>	No
	Southern toad	<i>Anaxyrus terrestris</i>	No
	Green tree frog	<i>Hyla cinerea</i>	No
	Southern black racer	<i>Coluber constrictor priapus</i>	No
	Florida box turtle	<i>Terrapene carolina bauri</i>	No
	Gopher tortoise	<i>Gopherus polyphemus</i>	Yes
	Florida softshell turtle	<i>Apalone ferox</i>	No
	American alligator	<i>Alligator mississippiensis</i>	Yes
Fish			
	Freshwater		
	Eastern mudminnow	<i>Umbra pygmaea</i>	No
	Mosquitofish	<i>Gambusia spp.</i>	No
	Bluegill	<i>Lepomis macrochirus</i>	No
	Warmouth	<i>Lepomis gulosus</i>	No
	Florida largemouth bass	<i>Micropterus salmoides floridanus</i>	No
	Longnose gar	<i>Lepisosteus osseus</i>	No
	Marine		
	Mud minnow	<i>Fundulus grandis</i>	No
	Yellowfin mojarra	<i>Gerres cinereus</i>	No
	Striped mojarra	<i>Eugerres plumieri</i>	No
	Bay anchovy	<i>Anchoa mitchilli</i>	No
	White mullet	<i>Mugil curema</i>	No
	Striped mullet	<i>Mugil cephalus</i>	No
	Atlantic needlefish	<i>Strongylura marina</i>	No
	Atlantic menhaden	<i>Brevoortia tyrannus</i>	No
	Gulf pipefish	<i>Syngnathus scovelli</i>	No
	Sheepshead	<i>Archosargus probatocephalus</i>	No
	Grey (Mangrove) snapper	<i>Lutjanus griseus</i>	No
	Summer flounder	<i>Paralichthys dentatus</i>	No
	Common snook	<i>Centropomus undecimalis</i>	No

Birds

Anhinga	<i>Anhinga anhinga</i>	No
Wood stork	<i>Mycteria americana</i>	Yes
Brown pelican	<i>Pelecanus occidentalis</i>	Yes
Osprey	<i>Pandion haliaetus</i>	Yes
Tricolored heron	<i>Egretta tricolor</i>	Yes
White ibis	<i>Eudocimus albus</i>	Yes
Cattle egret	<i>Bubulcus ibis</i>	No
Great blue heron	<i>Ardea herodias</i>	No
Great egret	<i>Ardea alba</i>	No
Belted kingfisher	<i>Ceryle alcyon</i>	No
Ruby-throated hummingbird	<i>Archilochus colubris</i>	No
Carolina chickadee	<i>Poecile carolinensis</i>	No
Carolina wren	<i>Thryothorus ludovicianus</i>	No
Grey catbird	<i>Dumetella carolinensis</i>	No
Downy woodpecker	<i>Picoides pubescens</i>	No
Pileated woodpecker	<i>Dryocopus pileatus</i>	No
Red bellied woodpecker	<i>Melanerpes carolinus</i>	No
Blue jay	<i>Cyanocitta cristata</i>	No
Florida scrub-jay	<i>Aphelocoma coerulescens</i>	Yes
Mockingbird	<i>Mimus polyglottos</i>	No
Loggerhead shrike	<i>Lanius ludovicianus</i>	No
Red-winged blackbird	<i>Agelaius phoeniceus</i>	No
Eastern towhee	<i>Pipilo erythrophthalmus</i>	No
Tufted titmouse	<i>Baeolophus bicolor</i>	No
White-eyed vireo	<i>Vireo griseus</i>	No
Brown thrasher	<i>Toxostoma rufum</i>	No
Northern cardinal	<i>Cardinalis cardinalis</i>	No
Common ground dove	<i>Columbina passerine</i>	No
Mourning dove	<i>Zenaida macroura</i>	No
Wild turkey	<i>Meleagris gallopavo</i>	No
American crow	<i>Corvus brachyrhynchos</i>	No
Boat-tailed grackle	<i>Quiscalus major</i>	No
Black vulture	<i>Coragyps atratus</i>	No
Red-shouldered hawk	<i>Buteo jamaicensis</i>	No
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Yes

Mammals

Nine-banded armadillo	<i>Dasypus novemcinctus</i>	No
Southeastern pocket gopher	<i>Geomys pinetis</i>	No
Raccoon	<i>Procyon lotor</i>	No
Bobcat	<i>Felis rufus</i>	No
Grey squirrel	<i>Sciurus carolinensis</i>	No
White-tailed deer	<i>Odocoileus virginianus</i>	No

USFWS Concurrence Letter



United States Department of the Interior

U. S. FISH AND WILDLIFE SERVICE

7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:

41910-2011-TA-0087

December 13, 2010

Jody Sisk
Zev Cohen and Associates, Inc.
4475 US 1 South, Suite 601
St. Augustine, Florida 32086

RE: 41910-2011-TA-0087

Dear Mr. Sisk,

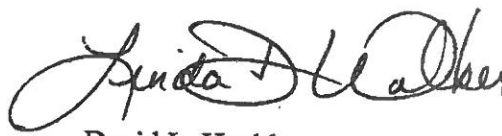
Thank you for your letter dated December 1, 2010, to the U.S. Fish and Wildlife Service (Service) regarding the Doris Leeper Spruce Creek Preserve property located along Spruce Creek from US1 to I-95 (Sections 25, 26, 35, and 36, Township 16 South, Range 33 East) in Volusia County, Florida. Scrub-jay surveys of the site were conducted on July 26-30, 2010, and information in the report reveals that no scrub-jays were observed on the property. One scrub-jay was reported to approach the southern boundary of the property during the survey, but it did not come into the property and flew back off-site heading south.

Based on the above information, the U.S. Fish and Wildlife Service concludes that at this time the parcel is not occupied by the Florida scrub-jay. The Doris Leeper Spruce Creek Preserve intends to manage the scrub habitat on the property according to details within the report. Managing these areas may allow the development of more appropriate habitat for scrub-jays in the future.

Note that the Service's determination in this letter is valid for a period of no more than two years from the date of this letter. If additional information in the future indicates that the property is being used by scrub-jays, please notify our office so that we can reassess our determination.

If you have any further questions please contact Erin Gawera at (904) 731-3121.

Sincerely,


David L. Hankla
for Field Supervisor