

# VEGETATION AND WILDLIFE

## A. Identify the dominant species and other unusual or unique features of the vegetation communities on the site.

### Land Use and Plant Community Descriptions

**Vegetation Communities/Habitats** – A level IV vegetative cover and land use map, based on the Florida Land Use, Cover and Forms Classification System (FLUCFCS) (Florida Department of Transportation 1999). Total acreage of the Restoration project site is approximately 5,181 acres comprised of 2,078 acres of uplands and 3,103 acres of wetlands. A description of the existing vegetation communities/habitat types is provided below.

**Slash Pine Flatwoods (4111)** – The slash pine flatwoods is an upland cover type encompassing approximately 82 acres. It represents the native habitat that characterized the majority of the historical plant community on the project site prior to modification as rangeland for cattle and then later as timberland under intensive pine cultivation. This habitat is not pristine in that some of the pine in the community may have been planted at the onset of silviculture on the site. The ages of the pine are mixed, varying from new regeneration to mature trees, and the trees are scattered throughout the community rather than in obvious rows.

**Live Oak Groves (4271)** – A live oak (*Quercus virginiana*) grove approximately 0.5 acre in size is found along an existing timber road on the west side of the property. The road and associated drainage ditch have bisected this small habitat. This habitat is used extensively by white-tailed deer, turkeys, and other wildlife during the fall of the year when mast production from the live oaks is available for foraging.

**Pine Plantations** – Upland cover types/habitat types occurring on the great majority of the project site consist of various ages of planted slash pine (*Pinus elliottii*) plantation. The age of the plantations was determined from a stand map developed by timber companies who held previous surface leases on the property and/or from increment borings extracted from trees within plantations that were not identified on the stand map. The age and acreages of each slash pine plantation type represented on Restoration include the following:

- Pine plantations 1 – 5 years in age (4411) – 79 acres
- Pine plantations 6 – 10 years in age (4412) - 506 acres
- Pine plantations 11 – 15 years in age (4413) – 499 acres
- Pine plantations 16 – 20 years in age (4414) – 497 acres
- Pine plantations 21-25 years in age (4415) – 284 acres
- Pine plantations 26 – 30 years in age (4416) – 141 acres
- Pine plantations >31 years in age (4417) – 573 acres

Pine plantations occupy essentially all upland habitats and have been expanded into wetlands over the nearly 50 years of silvicultural activities on the property as drainage improvements were made. Pine has been planted on raised beds throughout the property, which enabled foresters to extend the plantations into wetlands. The height of these beds varies from 4” to nearly 18”, depending on the extent of erosion or subsidence that has occurred over the years and the age of the planting. Spacing of the planting beds is approximately 6 feet in width and measurements taken in the field indicate that pine seedlings were planted approximately 4 to 6 feet apart. Roads and fire lanes have been constructed throughout the plantation habitat to permit access for timber

harvesting, routine maintenance and stand examination, and for conducting prescribed burns, and plantation and wetland protection during prescribed burns or wildfire episodes.

Plowing for construction of planting beds for pine seedlings has disturbed upper soil layers, creating a mix of higher and lower elevations on which various grasses and forbs, shrubs, and trees have grown over the approximate 50-year period of silviculture on the project site. Young pine stands in upland areas contain an open herbaceous and woody cover composed of species such as bracken fern (*Pteridium aquilinum*), goldenrod (*Solidago* sp.), white beggarticks (*Bidens alba*), bluestem (*Andropogon* sp.), ragweed (*Ambrosia* sp.), blackberry (*Rubus* sp.), and gallberry (*Ilex glabra*). Carolina redroot (*Lachnanthes caroliniana*) becomes a dominant plant in young pine in the wetter areas along with chain fern (*Woodwardia* sp.), pipewort (*Eriocaulon* sp.), dog fennel (*Eupatorium* sp.), bushy bluestem (*Andropogon glomeratus*), giant plume grass (*Erianthus giganteus*), maidencane (*Panicum hemitomon*), St. John's wort (*Hypericum* sp.), wax myrtle (*Myrica cerifera*), and loblolly bay (*Gordonia lasianthus*). Grasses and low ground cover become more sparse in older pine plantations with saw palmetto (*Serenoa repens*), wax myrtle, gallberry, occasional wiregrass (*Aristida stricta*), and cinnamon fern (*Osmunda cinnamomea*) prevalent understory and midstory species.

**Small Ponds (6211)** – Small ponds, comprising approximately 14 acres, were created on the eastern and western sides of the project site as a water source for cattle and/or borrow area for timber road construction. They are deep enough to be connected with the water table, and thus serve as a source of water for wildlife.

**Cypress Swamps (6211)** – The cypress swamp community consists of approximately 1,063 acres of forested wetland dominated by pond cypress (*Taxodium ascendens*). This habitat type occurs in almost pure stands as cypress domes, as the predominant tree species in the interior component of wetlands in lower bottom floor elevations where wetter conditions have historically prevailed, and as a component of the north-south wetland strands within the property and those extending off-site. Other tree species in association with pond cypress, particularly in wetland interiors, include blackgum (*Nyssa sylvatica* var. *sylvatica*), slash pine, red maple, loblolly bay, dahoon (*Ilex cassine*), and cabbage palm (*Sabal palmetto*). A dense shrub midstory is present in most wetlands, except where the bottom floor elevations are low enough to support standing water for extended periods of time. Typical woody plants in the midstory include fetterbush (*Lyonia lucida*), dahoon, and wax myrtle, while characteristic understory species included chain fern, swamp fern (*Blechnum serrulatum*), and vines such as grape (*Vitis* sp.) and poison-ivy (*Toxicodendron radicans*). A few areas of cypress swamp contain depressions of sufficient depth to hold water for longer periods of time and receive enough sunlight to promote the growth of shrubs and low trees such as common buttonbush (*Cephalanthus occidentalis*), Carolina willow (*Salix caroliniana*), and herbaceous plants like cattail (*Typha* sp.), smartweed (*Polygonum* sp.), pickerelweed (*Pontederia cordata*), swamp fern, maidencane, and lizard's tail (*Saururus cernuus*).

**Cypress-sawgrass swamps (6212)** – The cypress-sawgrass community, comprising approximately 185 acres, is the major component of the Spruce Creek Swamp interior wetland on the western side of the project site. Mature pond cypress in this habitat type ranges from 6" to 10" dbh and 30 to 45 feet in height. A dense stand of Jamaica swamp sawgrass (*Cladium jamaicense*) is the characteristic ground cover in this habitat type.

**Slash Pine-Cypress Swamps (6271)** – The slash pine-cypress community is the most common wetland community on the project site, consisting of approximately 1,019 acres. This wetland occurs in isolated depressions, as the outer perimeter of wetlands with cypress swamp interiors,

and as a component of wetland strands on slightly higher ground elevations. Slash pine and pond cypress occur in association with one another, forming the dominant components of the tree canopy, but slash pine generally represents higher percent coverage due to its denser and wider crown form and/or numbers of trees in the wetland forest. Tree associates recorded as sub-dominants in the slash pine-cypress swamp include blackgum, red maple, cabbage palm, dahoon, loblolly bay, sweetbay (*Magnolia virginiana*), and swamp bay (*Persea palustris*). Shrub growth is generally dense in this habitat, consisting primarily of fetterbush with saw palmetto scattered throughout, and saplings of the overstory species. Typical ground cover in this habitat is comprised of cinnamon fern, chain fern, swamp fern, poison ivy, grape vine, and leaf litter, especially pine straw, that quite dense in many wetlands, which is indicative of altered hydrology and recent years of drought conditions.

**Sawgrass (6411)** – Jamaica swamp sawgrass is the dominant plant in this freshwater marsh community, which comprises approximately 44 acres and is located primarily in the southwestern corner of the property in Spruce Creek Swamp. Other wetland herbaceous species are scattered throughout the habitat and included sedges (*Carex* sp., *Cyperus* sp.), smartweed, spikerush (*Eleocharis* sp.), pipewort, and beakrush (*Rhynchospora* sp.). Cypress and blackgum are tree species scattered throughout this community, particularly near ecotones (i.e., edges) with forested wetlands.

**Maidencane (6412)** – Pockets of maidencane marsh, totaling 56 acres, are found in the northeastern portion of the project site between I-95 and the FPL powerline right-of-way (ROW) and a small marsh on the south end adjacent to CR 442. Associates species observed on this habitat type include small pond cypress and slash pine, rush (*Juncus* sp.), and sedges.

**Disturbed Land (7401)** – Approximately 0.67 acres of disturbed land occurs on the project site near the hunting camp located immediately adjacent to the south property line of the project site. This area is characterized by natural pine seedling regeneration, dog fennel, goldenrod, ragweed, St. John's wort, and bare soil.

**Limited Access (Interstate System) (8141)** – This cover type includes approximately 83 acres occurring as a narrow strip adjacent to I-95 on the eastern side of the property. Vegetation located within this cover type is similar to that adjoining the western border, and the eastern boundary abuts the mowed ROW along the interstate highway.

**FPL Power Line Easement (8321)** – The FPL power line is an early successional community comprising approximately 38 acres. The northern end of this mowed and maintained corridor is upland habitat, with wetlands predominating along the southern three-fourths. The power line ROW provides a linear ecotone of low grasses, forbs, and woody shrubs surrounded by forested wetlands and pine plantations.

**B. Discuss what survey methods were used to determine the absence or presence of state or federally listed wildlife and plants.**

Database Review of Listed Species of Animals and Plants

Breedlove, Dennis & Associates, Inc. (BDA) maintains a database of protected species of plants and animals that have been confirmed present or could potentially occur in each Florida county, including Volusia County. In addition, BDA has access to statewide Geographic Information Systems (GIS) databases of known locations and potential habitat models of rare and imperiled species. These databases were used in conjunction with field surveys and knowledge of species

habitat requirements to confirm or estimate the likelihood of occurrence of protected species on the Restoration project site.

#### Gopher Tortoise Surveys

The principal species subject to systematic surveys was the gopher tortoise (*Gopherus polyphemus*). Although gopher tortoises generally are associated with longleaf pine -xeric oak sandhills, they also occur in scrub, xeric hammock, pine flatwoods, dry prairie, coastal grasslands and dunes, mixed hardwood-pine communities, and a variety of disturbed habitats (Enge et al. 2006). The Restoration project site is a former pine flatwoods site that has been subject to intensive silvicultural operations, including bedding, for several decades. Enge et al. (2006) summarized the effects of silvicultural operations on gopher tortoise habitats as follows. Habitat becomes degraded when the canopy of pine plantations closes and little or no ground cover forage is available. Site preparation reduces native ground cover, and sparse cover of legume and non-legume forbs provides poor forage, resulting in slower tortoise growth rates and delayed sexual maturity. Lack of prescribed fire also results in canopy closure and reduced tortoise forage plants. Local isolated populations of gopher tortoises may persist for decades in overgrown habitat, but recruitment of young into these populations declines as canopy closure increases and habitat quality decreases. Gopher tortoises often do well in early successional stages of planted pines, but as the canopy closes tortoises are forced to move to peripheral areas, often relocating to road shoulders where they are easily observed and give a false impression of abundance because adjacent pine plantations are largely unoccupied. This is in large part what was found on the restoration project site.

Gopher tortoises are typically precluded from areas of hydric soils due to their inability to construct burrows. Given the intensive silvicultural operations and the extent of hydric soils occurring on much of the Restoration project site, the gopher tortoise population was expected to be low. In our Methodology Letter of June 29, 2006, to Mr. Steve Lau (Florida Fish and Wildlife Conservation Commission, Vero Beach), we proposed to survey gopher tortoises only on the 2,526.94 acres of the Restoration project site characterized by upland plant communities occurring on non-hydric soils (Table B-2, Acreage and Percent Area of Upland Cover Types Occurring on Non-hydric Soils on the Restoration Project Site, Volusia County, Florida). This would be a 15% survey of this area for a total of 379 acres surveyed. Pedestrian surveys were designed to record the presence of active and inactive gopher tortoise burrows within 30 feet of each transect using GPS technology.

**Table B-2**  
**Acreeage and Percent Area of Upland Cover Types Occurring on Non-hydric Soils on the**  
**Restoration Project Site, Volusia County, Florida**

FLUCFCS CODE	FLUCFCS DESCRIPTION	ACREAGE	PERCENT AREAL COVER
180	Recreational	0.55	0.02
211	Improved Pastures	0.03	<0.01
320	Shrub and Brushland	3.57	0.14
330	Mixed Rangeland	0.18	0.01
411	Pine Flatwoods	127.14	5.03
441	Coniferous Plantations	1,391.51	55.07
443	Forest Regeneration Areas	976.30	38.64
743	Spoil Areas	0.03	<0.01
814	Roads and Highways	0.49	0.02
832	Electrical Power Lines	27.14	1.07
<b>TOTAL</b>		<b>2,526.94</b>	<b>100.00</b>

#### Bald Eagle Nest

A known bald eagle (*Haliaeetus leucocephalus*) nest (Nest No. VO041) has been active on the site since at least 2000. The status of the eagle nest was verified in the field on May 4, 2006.

#### Surveys for Other Protected Species

Other listed species that may occur on the site, including American alligator (*Alligator mississippiensis*), eastern indigo snake (*Drymarchon couperi*), limpkin (*Aramus guarauna*), snowy egret (*Egretta thula*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), white ibis (*Eudocimus albus*), wood stork (*Mycteria americana*), Florida black bear (*Ursus americanus floridanus*), and Rugel's pawpaw (*Deeringothamnus rugelii*), and swallow tailed kites are either rarely encountered or are confined to wetlands, and many of the habitats they are likely to utilize will be protected from development and incorporated into on-site preserves. Therefore, no systematic surveys were conducted to confirm the presence of these species. Rather, biologists conducting gopher tortoise surveys recorded observations of these listed species as they were encountered incidental to gopher tortoise surveys.

- C. **List all state or federally listed wildlife and plant resources that were observed on the site. Given the natural communities on site, list any additional state or federally listed wildlife and plant resources expected to occur on the site. Additionally, address any unique wildlife and plant resources, such as colonial bird nesting sites and migrating bird concentration areas. For species that are either observed or expected to utilize the site, discuss the known or expected location and population size on site, existence (and extent, if known) of adjacent, contiguous habitat off-site, and any special habitat requirements of the species.**

Listed Species Present or Potentially Present on the Restoration project site

State and federally listed species of plants and animals observed on the Restoration project site are listed in Table C-1, Likelihood that listed species of animals and plants known to occur in Volusia County occur on the Restoration project site. Listed species confirmed present on the site include gopher tortoise, bald eagle, white ibis, little blue heron, and Florida black bear. Listed species that could potentially occur on the project site, but whose presence has not been confirmed, include American alligator, eastern indigo snake, limpkin, snowy egret, tricolored heron, wood stork, and Rugel's pawpaw.

**Table C-1  
Likelihood that listed species of animals and plants known to occur in Volusia County occur on the Restoration project site**

Species	Habitat of Occurrence	Likelihood of Occurrence	Designated Status <sup>1</sup>	
			USFWS <sup>2</sup>	FWC <sup>3</sup>
REPTILES				
<i>Alligator mississippiensis</i> American alligator	Wetlands, lakes, and streams.	High	T(S/A)	SSC
<i>Caretta caretta</i> Loggerhead sea turtle	Subtropical regions, coastal waters, and the Indian River Lagoon system, continental shelves, lagoons and estuaries in temperate, subtropical, and tropical waters.	N/A	T	T
<i>Chelonia mydas</i> Green sea turtle	Pelagic habitat.	N/A	E	E
<i>Dermochelys coriacea</i> Leatherback sea turtle	Temperate or even sub-polar waters	N/A	E	E
<i>Drymarchon corais couperi</i> Eastern indigo snake	Pine flatwoods, tropical hammocks.	Moderate to High	T	T
<i>Eretmochelys imbricata</i> Hawksbill sea turtle	Coral reefs and other hard-bottom habitats such as lime stone ledges and outcroppings.	N/A	E	E
<i>Gopherus polyphemus</i> Gopher tortoise	Xeric; sand pine, longleaf pine, turkey oak and live oak hammocks and sand pine scrub.	Present		SSC
<i>Lepidochelys kemp</i> Atlantic ridley turtle	Coastal waters, bays and sounds in waters less than 6.6 feet deep.	N/A	E	E
<i>Nerodia fasciata taeniata</i> Atlantic salt marsh snake	Tidal creeks and salt marshes where it is usually associated with fiddler crab burrows and glassworts.	N/A	T	T

Species	Habitat of Occurrence	Likelihood of Occurrence	Designated Status <sup>1</sup>	
			USFWS <sup>2</sup>	FWC <sup>3</sup>
<i>Pituophis melanoleucus mugitus</i> Florida pine snake	Relatively open canopies and dry sandy soils, in which it burrows. Especially sandhills and former sandhills, including old fields and pastures, but also sand pine scrub and scrubby flatwoods. Often coexists with pocket gophers and gopher tortoises.	Low		SSC
<b>FISH</b>				
<i>Pteronotropis welaka</i> Bluenose shiner	Blackwater rivers and streams, spring runs	Unlikely		SSC
<i>Acipenser brevirostrum</i> Shortnose sturgeon	Rivers, estuaries	N/A	E	E
<b>AMPHIBIANS</b>				
<i>Rana capito</i> Florida gopher (=crawfish) frog	Sandhills with turkey and bluejack oaks; sand pine scrub, in and around gopher tortoise burrows.	Moderate		SSC
<b>BIRDS</b>				
<i>Ajaia ajaja</i> Roseate spoonbill	Primarily coastal birds. Nests are located in thickets of large red mangrove or black mangrove on islands.	Unlikely		SSC
<i>Aphelocoma coerulescens</i> Florida scrub-jay	Oak scrub, with shrubs of live, myrtle, and Chapman's oaks, palmettos and sand pine.	Unlikely	T	T
<i>Aramus guarauna</i> Limpkin	Slow moving freshwater streams and rivers, swamps, marshes, and lakeshores.	Moderate to High		SSC
<i>Charadrius melodus</i> Piping plover	Outer beaches, extensive sand fills, large tidal sand flats, and mud flats.	Unlikely	T	T
<i>Egretta caerulea</i> Little blue heron	Shallow freshwater, brackish, and saltwater habitats.	Present		SSC
<i>Egretta rufescens</i> Reddish egret	Almost entirely a coastal species nesting on mangrove islands and feeding in the surrounding shallows. Rarely seen in inland freshwater habitats even in extreme southern Florida.	Unlikely		SSC

Species	Habitat of Occurrence	Likelihood of Occurrence	Designated Status <sup>1</sup>	
			USFWS <sup>2</sup>	FWC <sup>3</sup>
<i>Egretta thula</i> Snowy egret	Nests both inland and in coastal wetlands with nests placed in many types of woody shrubs, especially mangroves and willows. Almost all nesting is over shallow waters or on islands that are separated from shoreline by extensive open water. Feeds in many types of permanently and seasonally flooded wetlands, streams, lakes, and swamps, and in manmade impoundments and ditches. Usually prefers calm waters.	High		SSC
<i>Egretta tricolor</i> Tricolored heron	Most nesting colonies occur on mangrove islands or in willow thickets in fresh water, but nesting sites include other woody thickets on islands or over standing water. Prefers coastal environments. Feeds in a variety of permanently and seasonally flooded wetlands, mangrove swamps, tidal creeks, ditches, and edges of ponds and lakes.	Moderate		SSC
<i>Eudocimus albus</i> White ibis	Freshwater marsh, various types of forested wetlands, salt marsh, mangrove swamp, tidal mud flats, ruderal	Present		SSC
<i>Falco peregrinus anatum</i> American peregrine falcon	Migrant and wintering; open terrain, coastal and barrier island shorelines, lake and river margins, prairies, coastal ponds, sloughs, marshes and urban areas with adequate prey.	Unlikely	E	E
<i>Falco peregrinus tundrius</i> Arctic peregrine falcon	Winter in Florida: coastal areas provide optimum habitat where mangroves are regenerating from hurricane damage, with dead stubs standing among scattered ponds and sloughs.	Unlikely		E
<i>Falco sparverius paulus</i> Southeastern American kestrel	Pine flatwoods, dry prairies.	Low		T
<i>Grus canadensis pratensis</i> Florida sandhill crane	Wet prairies, marshy lake margins, and low-lying improved cattle pastures.	Low		T
<i>Haematopus palliatus</i> American oystercatcher	Broad open coastal beaches, mud flats, and spoil islands.	Unlikely		SSC
<i>Haliaeetus l. leucocephalus</i> Southern bald eagle	Pine flatwoods, dry prairies.	Present	T	T
<i>Mycteria americana</i> Wood stork	Wetlands; nesting in cypress swamps.	High	E	E



Species	Habitat of Occurrence	Likelihood of Occurrence	Designated Status <sup>1</sup>	
			USFWS <sup>2</sup>	FWC <sup>3</sup>
<i>Pelecanus occidentalis carolinensis</i> Eastern brown pelican	Nest primarily in mangrove trees from 2 to 35 feet above high tide line. Nesting is confined to coastal islands. Feeding occurs primarily in shallow estuarine waters.	Unlikely		SSC
<i>Picoides borealis</i> Red-cockaded woodpecker	Pinewoods with mature to overmature pines.	Low	E	SSC
<i>Polyborus plancus audubonii</i> Audubon's crested caracara	Open country. Dry prairies with scattered cabbage palms and wetter areas constitute the typical habitat, although it also occurs in improved pasturelands and even in relatively wooded areas with more limited stretches of open grassland.	Unlikely	T	T
<i>Rostrhamus sociabilis plumbeus</i> Everglade snail kite	Marsh with distant horizon and low vegetative profile.	Unlikely	E	E
<i>Rhynchops niger</i> Black skimmer	Beaches, tidal mud flats, sandbars, tidal creeks, estuarine bays and lagoons	Unlikely		T
<i>Sterna antillarum</i> Least tern	Beaches, tidal mud flats, estuarine and marine waters, lakes	Unlikely		T
<i>Vermivora bachmani</i> Bachman's warbler	Variety of woodlands, usually in lowlands.	Low	E	E
<b>MAMMALS</b>				
<i>Balaena glacialis</i> Right whale	Coastal/near shore	N/A		E
<i>Balaenoptera physalus</i> Finback whale	Coastal/near shore	N/A		E
<i>Megaptera novaengliae</i> Humpback whale	Shallow coastal area in summer and winter	N/A		E
<i>Peromyscus polionotus niveiventris</i> Southeastern beach mouse	Sea oats zone of primary coastal dunes.	N/A	T	T
<i>Physeter catodon</i> Sperm whale; cachalot	Deep waters beyond the edge of the continental shelf.	N/A		E
<i>Plecotus rafinesquii macrotis</i> Southeastern big-eared bat	Heavily forested regions.	Low	UR2	

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<i>Podomys floridanus</i> Florida mouse	Xeric sand pine scrub in early succession, and longleaf pine/turkey oak.	Low		SSC
<i>Sciurus niger shermani</i> Sherman's fox squirrel	Sandhills in longleaf pine/turkey oak associations, sand pine scrub, and live oak hammock.	Low		SSC
<i>Trichechus manatus latirostris</i> Florida manatee	Estuarine bays and lagoons, seagrass beds, rivers, spring runs	N/A	E	E
<i>Ursus americanus floridanus</i> Florida black bear	Swamps, bays, and thickets.	Present		T
<b>PLANTS</b>				
<i>Centrosema arenicola</i> Pineland butterfly pea	Sandhill, scrubby flatwoods, dry upland woods.	Low		E
<i>Cucurbita okeechobeensis</i> ssp. o Okeechobee gourd	Pond apple swamps, mixed hardwood swamp	Low to Moderate	E	
<i>Deeringothamnus rugelii</i> Rugel's pawpaw; yellow squirrel-banana	Poorly drained slash pine/saw palmetto flatwoods.	Moderate	E	
<i>Matelea floridana</i> Florida milkvine	Upland mixed forest, upland hardwood forests in a narrow band between the dry upper slopes and the mesic lower slopes of ravines, within southeastern deciduous forests.	Low		E
<i>Pecluma plumula</i> Plume polypody	Tree branches or limestone in hammocks, wet woods, and lime sinks.	Low		E
<i>Pecluma ptilodon</i> Comb polypody	Rockland hammocks, strand swamps, and wetwoods, often on tree bases and fallen logs.	Low		E
<i>Peperomia humilis</i> Low peperomia	Shell mounds and limestone outcrops in mesic hammocks, coastal berms, and cypress swamps. Rarely on tree trunks, branches, or rotting logs.	Low		E
<i>Schwalbea americana</i> American chaffseed	Sandhill, pine savannas, pine flatwoods	Moderate	E	

<sup>1</sup>E = Endangered; T = Threatened; T(S/A) = Threatened due to Similarity of Appearance; SSC = Species of Special Concern; C = Candidate for Listing, Sufficient Information Available; CH = Critical Habitat

<sup>2</sup>U.S. Fish and Wildlife Service

<sup>3</sup>Florida Fish and Wildlife Conservation Commission

### Gopher Tortoise Surveys

Gopher tortoise surveys were conducted along 83 transects on August 2, August 4, August 7-11, and August 14-17, 2006. Mean transect length was 1,948 feet, and transect lengths ranged from 365 to 6,643 feet. Total length of transects surveyed was 161,651 feet (30.62 miles). Transects were typically traversed in parallel with two or three biologists walking 30 feet apart, but a few transects were completed by only one biologist. Although original plans were to census gopher tortoise burrows within 30 feet on either side of a transect, surveys were considered effective to only 15 feet on each side due to the dense understory. Thus, the effective coverage of each transect was 30-90 feet depending on number of biologists conducting each transect. The total area of the site included within gopher tortoise surveys was 248.58 acres.

Gopher tortoise transects were originally designed to sample all areas of the site with uplands vegetation on non-hydric soils. However, the dense undergrowth and small number of gopher tortoise burrows encountered in the initial set of transects led to a revision in plans with efforts being redirected to uplands vegetation types within the proposed development footprint. Although gopher tortoise surveys were conducted in potentially suitable habitats in most areas of the site, habitats within the development footprint were more intensively sampled to obtain a better estimate of impacts of development on gopher tortoise populations.

A total of 35 gopher tortoise burrows (26 active and 9 inactive) at a density of 0.14 tortoise burrows per acre was recorded within the 248.58 acres of the Restoration project site subjected to surveys (Table C-2, Results of Gopher Tortoise surveys on the Restoration project site during August 2006). The portion of the development footprint supporting uplands cover types contained 1,973.42 acres. The gopher tortoise transects resulted in the survey of 155.97 acres, or 8%, of the potentially suitable habitat within the development footprint. A total of 26 gopher tortoise burrows (18 active and 8 inactive) was recorded during the surveys in potentially suitable uplands habitats within the development footprint. This translates to a density of 0.17 gopher tortoise burrows per acre in the area likely to be impacted by development. Most of the gopher tortoise burrows were found in the northeast corner of the site.

**Table C-2**  
**Results of Gopher Tortoise surveys on the Restoration project site during August 2006**

Area	Total Area (Acres)	Gopher Tortoise Transects (Acres)	Percent of Area	Active Burrows (No.)	Inactive Burrows (No.)	Total Burrows (No.)	Burrow Density (No./Acre)
<b>Restoration Project Site<sup>1</sup></b>	6,281.66	248.58	3.96	26.00	9.00	35.00	0.14
<b>All Uplands on Non-hydric Soils</b>	2,526.94	194.98	7.72	23.00	7.00	30.00	0.15
<b>Development Footprint</b>							
Uplands Only (no wetlands)	1,973.42	155.97	7.90	18.00	8.00	26.00	0.17
Uplands on Non-hydric Soils	1,547.97	138.38	8.94	17.00	7.00	24.00	0.17
Total Footprint Area	2,547.18	165.66	6.50	18.00	8.00	26.00	0.16
<b>Outside of Development Footprint</b>							
Uplands on Non-hydric Soils	978.66	56.60	5.78	6.00	0.00	6.00	0.11
All Other Areas on Hydric Soils	2,755.82	26.32	0.96	2.00	1.00	3.00	0.11
<b>Total Outside of Footprint</b>	<b>3,734.51</b>	<b>82.92</b>	<b>2.22</b>	<b>8.00</b>	<b>1.00</b>	<b>9.00</b>	<b>0.11</b>

<sup>1</sup>Includes portion of property in City of New Smyrna Beach

The size of the gopher tortoise population in areas proposed for development can be estimated using the population density measured on site, rates of burrow occupancy found in the scientific literature, and the size of the area to be impacted by development. The number of tortoises likely to be impacted by the proposed development is estimated as follows:

$$(0.17 \text{ burrows/acre}) \times (0.614 \text{ tortoises/burrow}) \times (1973.42 \text{ acres}) = 206 \text{ tortoises.}$$

The FWC requires 15% mitigation for impacts on gopher tortoise populations with densities of 0.4-0.8 tortoises per acre, and for populations <0.4 tortoises per acre, FWC policy requires mitigation as the proportion of the measured density relative to 0.4 tortoises per acre and relative to the 15% mitigation requirement. The amount of mitigation required for impacts to gopher tortoises within the uplands areas of the development footprint was calculated as follows:

$$(15\% \times 1973.42 \text{ acres}) \times (0.17 \text{ burrows/acre} \times 0.614 \text{ tortoises/burrow}) / 0.40 \text{ tortoises per acre} = 77.24 \text{ acres.}$$

The proposed Development Plan for the Restoration project site will result in the preservation, restoration, and management of approximately 979 acres of upland vegetation types on non-hydric soils (Table B-2, Acreage and Percent Area of Upland Cover Types Occurring on Non-hydric Soils on the Restoration Project Site, Volusia County, Florida). These preserves will be more than adequate to mitigate for the impacts of development on gopher tortoises. The management plan for the Restoration project site preserve calls for the restoration of the pine plantations to a more natural pine flatwoods ecosystem with more widely spaced pines, an herbaceous ground cover, and frequent prescribed fires. These management actions will dramatically improve habitat suitability for gopher tortoises on the site, and the preserves will serve as relocation sites for gopher tortoises within areas impacted by development. The preliminary calculations above suggest that as many as 206 gopher tortoises will have to be relocated from areas of the site impacted by development. Given the low density of tortoises throughout the Restoration project site, the proposed preserves can easily absorb the approximately 206 tortoises displaced by development.

#### Bald Eagle Nest

The bald eagle nest (Nest No. VO041) that occurs on the Restoration project site has been active since 2000. This nest, which occurs in a large pine tree of approximately 24 inch dbh, was visited in the field on May 4, 2006. An adult bald eagle was observed on the nest, and several fish bones were observed beneath the nest, suggesting use during the 2005-06 nesting season. The bald eagle nest site is located in an area of the site that will be preserved.

#### Florida Black Bear

The Florida black bear has been confirmed present on the Restoration project site as a result of incidental observations made during gopher tortoise surveys and other visits to the site. A marker tree was found on the site immediately east of the Spruce Creek Swamp. Bear signs in the form of tracks and scat have been observed at six other locations on the site. Based on the size of the tracks observed, at least two different bears used the site during the summer of 2006. Given their wide-ranging habits, preference for forested habitats, and tolerance of silvicultural activities, black bears may be expected to use habitats throughout the site.

### Rugel's Pawpaw

Rugel's pawpaw, a plant listed as endangered by the U.S. Fish and Wildlife Service and the Florida Department of Agriculture and Consumer Services, is endemic to a small area of eastern Volusia County. This plant is found in frequently burned open slash pine (*Pinus elliotii*) or longleaf pine flatwoods with wiregrass (*Aristida stricta*) and saw palmetto (*Serenoa repens*) in the understory. Rugel's pawpaw is known from only 29 sites, about half of which are on public lands. Rugel's pawpaw is not known to occur on the Restoration project site based on available records or on preliminary field surveys conducted prior to the DRI application. However, the most intensive field surveys conducted on site were in August 2006, which is outside the preferred survey season of late March through June when the species is in flower.

Most known records of Rugel's pawpaw are associated with Immokalee sands (15) and Satellite fine sand (6). The remainder is associated with Myakka fine sand (2), Samsula muck (2), Basinger fine sand depressional (1), Pomona fine sand (1), Pompano fine sand (1), and Smyrna fine sand (1). Each of these soil types occurs on the Restoration project site with the exception of Satellite fine sand. The likelihood that Rugel's pawpaw occurs on site seems to be low given the intensive forestry management practices that have been previously implemented on the site and the lack of preferred habitat conditions, including open overstory, herbaceous ground cover, and frequent fires. However, protection of approximately 89% of the preferred soil type and management of on-site preserves as an open, frequently burned flatwoods ecosystem will likely protect Rugel's pawpaw, if present, and create habitat conditions favorable for colonization by this species in the future.

### Other Listed Species

Listed species of wading birds were recorded during systematic surveys for gopher tortoises. Little blue herons and white ibises were observed using wetlands on site during August 2006. Listed species of wading birds may occur in wetlands on site during any time of year. However, on-site wetlands probably are not important to the nesting success of listed species of wading birds because there are no known active wading bird rookeries within 9 miles of the site, nor are there known wood stork rookeries within 18 miles of the site. These are the furthest documented distances these wading birds are likely to fly during the nesting season to forage in wetlands and return food to incubating adults and nestlings (Cox et al. 1994). No wading bird rookeries were observed on the site, but most of the surveys were conducted outside of the nesting season, and no surveys were conducted in the interior of Spruce Creek Swamp.

No eastern indigo snakes were observed on site incidental to gopher tortoise surveys. Eastern indigo snakes typically occur in low population densities, and systematic surveys intended to assess the status of this species on the Restoration project site were not attempted due to the low probability of success.

No American alligators were observed on site incidental to gopher tortoise surveys, but the species likely occurs within Spruce Creek Swamp and periodically in other wetlands on site.

Finally, swallow-tailed kites were surveyed within the central to southern portions of the north-south wetland strand, just west of the proposed alignment of Williamson Boulevard on the proposed Development Plan. Since these species have not been found in adjacent areas, the identified sites have been set aside for protection and will be monitored through the SMMP process.

**D. Indicate what impact development of the site will pose to affected state or federally listed wildlife and plant resources.**

The proposed development will impact approximately 1,637 acres (32%) of uplands and wetlands on the 5,181-acre Restoration project site. The remainder of the site will be preserved, restored, and managed as natural areas including habitats for rare, imperiled, and common species of plants and animals.

The project will result in the loss of very poor quality gopher tortoise habitat estimated to support about 206 individuals. However, the project will result in the preservation, restoration, and management of approximately 1,030 acres of uplands comprising suitable gopher tortoise habitat. The acreage preserved is more than sufficient to mitigate for the loss of gopher tortoise habitat and to serve as relocation sites for the estimated 206 gopher tortoises displaced by development.

The project site is within the Secondary Range of the St. Johns population of the Florida black bear (Simek et al. 2005). Secondary Range is defined as areas of Florida where there are frequent sightings, roadkills, or nuisance records of black bears, but a sustainable reproducing population has not been documented. The project will result in the loss of habitat that currently supports a Florida black bear population of unknown size in southeast Volusia County. Although home range sizes vary greatly among individuals, age classes, and populations, female home ranges average 9,216 acres and male home ranges average 39,744 acres in Florida (Eason 2003). If these home range sizes apply to the Restoration project site, the proposed development would result in the loss of habitat equal to 28% and 6% of a female and male home range, respectively. However, the project plans are designed to provide large preserved habitats for black bears; roads and overpasses have been designed to provide a free movement corridor with other adjacent habitats.

The proposed development will result in the loss of forested wetlands habitat. These areas of foraging habitat will be lost to limpkins and several listed species of wading birds, including little blue heron, snowy egret, white ibis, and wood stork. However, this loss is not likely to adversely affect nesting success of statewide wading bird populations because on-site wetlands are not within normal distances that wading birds will travel from rookeries to forage and return food to the rookery. In addition, loss of these wetlands will be offset by the preservation, restoration, and management of on-site wetlands that have been subject to past drainage operations and conversion of many wetland areas to bedded pine plantations. Hydroperiod and site restoration activities are likely to improve remaining on-site wetlands as habitats for American alligators, limpkins, and listed wading birds.

Development areas are not proposed within 660 feet of the existing bald eagle nest, and, therefore, further consultation with the USFWS is not anticipated.

Impacts of the project on eastern indigo snakes are hard to predict. The species has not been confirmed present on the site. Eastern indigo snakes inhabit a variety of mesic and xeric habitats in Florida, and they have fairly large home ranges. Conversion of approximately 1,637 acres of uplands and wetlands may impact eastern indigo snakes, if they are present, but the preservation, restoration, and management of natural areas on site would more than likely offset adverse impacts to indigo snakes, especially considering that preserved areas will be interconnected with large wetlands systems such as Spruce Creek Swamp extending off site to other areas.

- E. Discuss what measures are proposed to be taken to mitigate impacts to state and federally listed wildlife and plant resources. If protection is proposed to occur on site, describe what legal instrument will be used to protect the site, and what management actions will be taken to maintain habitat value. If protection is proposed to occur off-site, identify the proposed amount and type of lands to be mitigated as well as whether mitigation would be through a regional mitigation land bank, by acquisition of lands that adjoin existing public holdings, or by other means.**

The key measure taken to mitigate impacts to state and federally listed wildlife and plant resources is the preservation, restoration, and management of 3,544 acres of the site as an ecosystem of forested and herbaceous wetlands and uplands. On-site preserves have been designed as an interconnected and integrated system of large blocks of natural habitat linked together by wildlife corridors. Upland preserves have been designed to take advantage of proposed roads and natural wetlands as firebreaks, effectively producing management units that can be managed with prescribed fire to avoid the occurrence of wild fires and minimize smoke and fire threats to neighboring developments. A key feature of the preserve system is a system of large upland buffers along the entire length of Spruce Creek Swamp on the west side of the property.

Hydrologic restoration will return more natural hydroperiods to the wetlands throughout the site, including the forested wetlands of Spruce Creek Swamp. Drainage ditches dug through many areas of the site in the past have lowered the water table in many areas, which in turn has left many wetlands with hydroperiods that are shorter in duration and lower in flood depth. In addition, many former wetlands areas have been bedded and converted to pine plantations, reducing habitat values for many wetland-dependent species. Wetlands restoration will improve habitat conditions for American alligator, limpkin, little blue heron, snowy egret, white ibis, wood stork, and other species of wading birds.

Upland habitat areas within the preserves have been designed as larger habitat blocks that serve as conservation hubs large enough to meet the area requirements of many species of plants and animals typical of pine flatwoods ecosystems. Upland preserves have been situated to take advantage of natural wetlands and proposed roads to form management units that can accommodate the use of prescribed fire to maintain natural ecosystem functions. Upland preserves are interconnected throughout the site by habitat corridors consisting of both uplands and wetlands to ensure that wildlife are able to disperse throughout all preserves, effectively maintaining viable populations of species of wildlife and plants typical of natural pine flatwoods habitats. Elevated wildlife underpasses will be installed in areas where roads intersect with natural corridors to ensure that wildlife linkages remain intact to accommodate wildlife movement throughout an interconnected system of natural areas within the site. Underpasses will be constructed to a size and design that will accommodate movements of black bears. In addition, the natural areas on site will remain connected to the larger system of off-site natural areas through the wetlands associated with Spruce Creek and its tributaries. Listed species that will benefit from restoration and management of pine flatwoods uplands include gopher tortoise, Florida black bear, bald eagle, eastern indigo snake, and Rugel's pawpaw.

Many species of wildlife, both common and rare, depend on the close juxtaposition of wetland and upland habitats of sufficient area. For example, many hylid frogs spend most of the year in uplands surrounding wetlands, but return to wetlands each year to breed. Conversely, aquatic turtles spend most of the year in wetlands or permanently flooded areas, but move to uplands to lay eggs during each year's nesting season. Wild turkeys (*Melagris gallopavo*) often roost in forested wetlands but nest and forage in adjacent flatwoods habitats. The on-site preserves have

been designed as a mosaic of uplands and wetlands to ensure that the needs of all species are met, not just those associated with wetlands. Common species of wildlife that benefit from the mosaic of habitats in the preservation system include pinewoods treefrog (*Hyla femoralis*), oak toad (*Bufo quercicus*), striped mud turtle (*Kinosternon baurii*), prothonotary warbler (*Protonotaria citrea*), wild turkey, pileated woodpecker (*Dryocopus pileatus*), white-eyed vireo (*Vireo griseus*), raccoon (*Procyon lotor*), bobcat (*Lynx rufus*), and white-tailed deer (*Odocoileus virginianus*).

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