

NATURAL ENVIRONMENTAL EVALUATION MEMORANDUM

Boggy Creek Road (CR 530) Widening from Simpson Road to Narcoossee Road

Osceola County, Florida

Prepared For:



**Osceola County Board of County Commissioners
Osceola County, Florida**

County Contract # PS-20-11479-DG

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EXECUTIVE SUMMARY

Osceola County is conducting a corridor evaluation study to consider capacity improvement alignment alternatives associated with Boggy Creek Road (County Road 530) from Simpson Road to Narcoossee Road (State Road 15) (**Appendix A, Figure 1 - Regional Location Map**). This Natural Environmental Evaluation provides a summary of the existing natural resource conditions and potential impacts, permits required, and mitigation options. Due to schedule, specific alternative pond sites and specific floodplain analysis are not evaluated in this memorandum. Natural environmental impacts will be summarized and compared within the final engineering design once alternative alignments and pond sites are selected for consideration.

Natural and artificial wetland and surface water impacts, including freshwater hardwood forests, cypress systems, streams, and borrow ponds occur within the study area. Estimated acreage of wetland impacts and their ecological functional value are further described in Section 2.3. Multiple mitigation banks are available with state and federal credits that can provide mitigation for wetland impacts associated with the Least Environmentally Damaging Practicable Alternative (LEPDA).

Based on the study limits, this project is anticipated to not likely have an adverse effect on state or federal listed species or species protected under federal regulations outside of the Endangered Species Act (ESA) or ESA guidelines, based on proposed Best Management Practices (BMPs) and mitigation, if warranted. Furthermore, no United States Fish and Wildlife Service (USFWS) designated critical habitat is present and there is no National Marine Fisheries Service (NMFS) Essential Fish Habitat (EFH) within the project study area. Although not anticipated, species specific surveys for federally protected species may be required, depending upon the final selected preferred alternative and pond sites. Technical Assistance with the USFWS will be initiated in early design phase by the County to confirm no species-specific surveys are warranted.

An Environmental Resource Permit (ERP) from South Florida Water Management District (SFWMD) will be required for this project. It has been determined through SFWMD that a Sovereignty Submerged Lands (SSL) lease will not be required for work over Jim Branch. Multiple Regulatory Conservation Easements (CE) are located within the project study area. It is anticipated that a Standard Permit (SP) from the US Army Corps of Engineers (USACE) may be required, due to the anticipated acreage of wetland and surface water impacts. A total of seven (7) wetlands, fifteen (15) surface waters (SW), and five (5) other surface waters (OSW) are found within the project study area. This project may also require a Florida Fish and Wildlife Conservation Commission (FWC) gopher tortoise relocation permit and a bald eagle Incidental Take (IT) permit with the USFWS. Notice of Intent (NOI) to use the Construction Generic Permit (GCP), authorized by the Environmental Protection Act (EPA), through the Florida Department of Environmental Protection (FDEP), will be necessary prior to construction commencement.

1.0 PROJECT OVERVIEW

1.1 Project Description

The Boggy Creek Road Study Area is located along approximately 5.9-miles of Boggy Creek Road (CR 530), from Simpson Road to Narcoossee Road (SR 15). The project's study area is displayed on the **Regional Location Map** and **Aerial Location Map** in **Appendix A**. The project study area is near multiple municipalities in addition to unincorporated Osceola County, including the City of Orlando and the City of Kissimmee.

This Natural Environmental Evaluation documents potential occurrence of protected species and their habitat located within the alternatives of the study. This evaluation also provides estimated impacted acreage of wetlands, SW, and OSW within the project limits, as well as anticipated wetland functional value as it relates to mitigation requirements. Lastly, this memorandum summarizes anticipated state and federal permits required for the proposed project during design phase.

1.2 Purpose and Need

The primary purpose and need of the project is focused on capacity improvements to provide a 4-lane urban roadway. Currently, this roadway segment serves as a 2-lane urban major collector with speed limits ranging from 45 miles per hour to 55 miles per hour, this project will enhance regional connectivity and mobility to support the areas economic growth. This necessity is based on existing and future traffic needs, consistent with Osceola County's Comprehensive Plan, and improving overall safety of existing roadway systems in response to current and planned growth.

In addition to the widening, there is also a specific need to evaluate improvements to drainage and lighting, upgrades to the Intelligent Transportation System, modification/replacement of the triple box culvert over Jim Branch, and modification of multiple signalized intersections including at Nele Road, Turnberry Boulevard, and Narcoossee Road (SR 15) within the study area. These modifications address existing traffic congestion and related safety issues. Traffic along Boggy Creek Road and corresponding intersections currently experience long delays and queues during the daily morning and evening commutes, as current capacity demand exceeds the service ability of the existing (2)-lane road.

Osceola County is the state's second fastest growing community with a 31-percent increase in population since 2010 and a 4 percent increase per year in residential growth for the last several years. A significant number of existing and proposed residential communities are under construction, adjacent to and near the study area. In addition, multiple public schools are located off Boggy Creek Road within and near the study limits. As traffic demand continues to increase with future growth, traffic operations are expected to deteriorate further along the congested roadway which serves as a main route for homes and schools in area.

2.0 EXISTING CONDITIONS

2.1 Land Use

A significant portion of land use within the project study area includes residential communities, ranging from low-density housing to multiple high-density single family-homes, improved and unimproved pastures, upland forested areas, open land, community recreation facilities, and public educational facilities. Additionally, the USFWS, Natural Wetland Inventory (NWI) and supplemental site visits identified natural wetlands and other jurisdictional waters within the project study area including forested wetlands and a small tributary identified as Jim Branch. Florida Land Use Code and Classification System (FLUCCS) categories are provided in **Appendix A - FLUCCS Map**. Specific details regarding habitats, based on field verified visits in July and August 2020 are described in the sections below.

2.2 Soils

Soils within the project corridor have been mapped in accordance with data provided by the National Resources Conservation Service (NRCS). A significant portion of the project has been improved as active roadway or other developments; therefore, historically mapped soils are not indicative of current soil types. The soils adjacent to the existing roadway have been influenced/alterd from the surrounding developments and initial roadway construction. This development has led to the influx of fill material into the soils but appear to be relatively consistent with the mapped units. The undeveloped proposed project areas are more consistent with the mapped soils. Soils mapped within the project area include the following soil types (table is located on the following page):

Table 2.3-1: NRCS Soils within the Study Area

Numeric Identifier	Soil Type	Hydric Class
1	Adamsville sand	A
2	Archbold fine sand, 0 to 5 percent slopes	A
3	Basinger fine sand, depressional	A/D
5	Basinger fine sand	A/D
6	Basinger fine sand, depressional	A/D
9	Cassia fine sand	A/D
10	Delray loamy fine sand, depressional	A/D
22	Myakka fine sand	A/D
24	Narcoossee fine sand	A
26	Ona fine sand	B/D
27	Ona fine sand	B/D
31	(Borrow) Pits	n/a
32	Placid fine sand, depressional	A/D
33	Placid variant fine sand	A/D
34	Pomello fine sand, 0 to 5 percent slopes	A
37	St. Johns fine sand	B/D
39	Riviera fine sand, depressional	C/D
40	Samsula muck	A/D
42	Smyrna fine sand	A/D
43	St. Lucie fine sand, 0 to 5 percent slopes	A
44	Smyrna fine sand	A/D
44	Tavares fine sand, 0 to 5 percent slopes	A
54	Zolfo fine sand	A

For details regarding soil location, name, class number, and hydric class unit, please refer to **Appendix A - Soils Maps**.

3.0 PROTECTED SPECIES BIOLOGICAL ASSESSMENT

3.1 Introduction

Protected species include listed species as well as species otherwise protected under other regulations, such as the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act or the Bear Conservation Rule (68A-4.009, Florida Administrative Code). Federal listed species are afforded protections under the Endangered Species Act of 1973, as amended (ESA), under the jurisdiction of the USFWS and the National Marine Fisheries Service (NMFS). Within the state of Florida, federal and state listed species are afforded protection under Chapter 68A-27, Florida Administrative Code, which also states that all species listed by the USFWS and the NMFS that occur within Florida are also included on the Florida Endangered and Threatened Species List as Federally-designated Endangered, Federally-designated Threatened, Federally-designated due to Similarity of Appearance, or Federally-designated Non-Essential Experimental Population

Species. In Florida, state protected animal species are under the jurisdiction of the Florida Fish and Wildlife Conservation Commission (FWC), while state protected plant species are under the jurisdiction of the Florida Department of Agriculture & Consumer Services (FDACS) by rule 5B-40 Florida Administrative Code. The following sections provide resource data collection and evaluation methodology as well as the anticipated species effect determinations.

3.2 Data Collection and Survey Methodology

Literature reviews, agency database searches, and field reviews were conducted to document the potential presence of federal and state protected species, their habitat, and any critical habitat within the project study area. Field reviews were completed during July and August 2020. Reviewed information sources and databases included, but were not limited to, the following:

- Environmental Systems Research Institute (ESRI) World Imagery (ESRI 2019)
- Florida Geographic Data Library ([FGDL], Accessed 2020)
- USFWS Datasets and Consultation Area Maps
 - Critical Habitat for Threatened and Endangered Species (USFWS 2018)
 - Information for Planning and Consultation (USFWS Environmental Conservation Online System, Accessed 2020)
 - Protected Species Consultation Areas (USFWS 2019)
 - Wood Stork Rookeries and Core Foraging Areas (USFWS 2019)
 - Caracara Documented Historic Nest Sites (USFWS 2017)
- Florida Natural Areas Inventory (FNAI) Online Database Matrix (Accessed 2020)
- Regulated Plant Index (Florida Department of State Chapter 5B-40.0055, Florida Administrative Code)
- National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service EFH Mapper (Accessed 2020)
- Audubon Center for Birds of Prey EagleWatch Program Database (Accessed 2020)
- FWC Databases
 - Eagle Nest Locator Website (Accessed 2020)
 - Water Bird Colony Locator Website (Accessed 2020)
 - Florida Black Bear Roadkill Occurrences (Accessed 2020)

Each potential species discussed was assigned a likelihood of occurrence within the project study area based on the data review, field observations, presence of suitable habitat, and the species' known ranges. Each assigned likelihood of occurrence within the study area (none, low, moderate, or high) is based on the following:

- None – The project is outside the species' known range or the project is within the species' range; however, no suitable habitat occurs within or adjacent to the project study area and there are no documented occurrences of the species within the project's study area.
- Low – The project is within the species' range and minimal or marginal quality habitat exists within or adjacent to the project study area; however, there are no documented occurrences of the species within the study area and the species was not observed during the field reviews.

- Moderate – The project is within the species' range and suitable habitat exists within or adjacent to the project's study area; however, there are no documented occurrences of the species within the buffer and the species was not observed during the field review.
- High – The project is within the species' range, suitable habitat exists within or adjacent to the project's study area, there is a documented occurrence of the species or the species was observed during the field review, or the potential presence of the species is widely accepted.

This draft memorandum is being prepared prior to the development of roadway or pond site selections. It is also prepared before the completion of any species-specific surveys that may be required for the future preferred alternative. Due to the absence of design and species survey data, typical effect determinations in standard ESA language were not able to be rendered for some federal listed species. Standard ESA effect determinations are provided for federal listed species with USFWS consultation keys. These effect determinations were made with the assumptions that impacts to suitable habitat for the species may occur and that standard mitigation and protection measures for the species are implemented. For all other federal listed and state listed species, preliminary project effect statements were rendered, using language similar to the effect determinations previously accepted.

In future project phases, when design level information is available and species surveys are completed, standard ESA effect determinations will be rendered for all federal listed species for informal consultation with USFWS, if warranted. Coordination during early design phase with both USFWS and FWC is recommended prior to conducting any species-specific surveys.

3.3 Protected Species Occurrence

Table 3.3-1 below lists all protected species assessed, the species' potential for occurrence, listing status, and preliminary project effect statements. Further habitat investigation should be performed during the project design phase, when stormwater treatment pond site alternatives are selected, in the event that ponds occur outside of the current study area. Habitats impacted by the pond site alternatives will be further evaluated and effect determinations appropriately updated during early design phase.

Table 3.3-1: Potentially Occurring Protected Species

<u>Scientific Name</u>	<u>Common Name</u>	<u>Federal Status</u>	<u>State Status</u>	<u>Occurrence Potential</u>	<u>Preliminary Project Effects</u>
<u>Plants</u>					
<i>Andropogon acrtatus</i>	Pinewoods bluestem		T	None	No adverse effect anticipated
<i>Bonamia grandiflora</i>	Florida bonamia	T	E	None	No adverse effect anticipated
<i>Calamintha ashei</i>	Ashe's calamint		T	None	No adverse effect anticipated
<i>Calopogon multiflorus</i>	Many-flowered grass-pink		T	None	No adverse effect anticipated
<i>Carex chapmanni</i>	Chapman's sedge		T	None	No adverse effect anticipated
<i>Centrosema arenicola</i>	Sand Butterfly Pea		E	None	No adverse effect anticipated
<i>Chionanthus pygmaeus</i>	Pygmy fringe tree	E	E	None	No adverse effect anticipated
<i>Coleataenia abscissa</i>	Cutthroat grass		E	None	No adverse effect anticipated
<i>Conradina brevifolia</i>	Short-leaved rosemary	E	E	None	No adverse effect anticipated
<i>Conradina grandiflora</i>	Large-flowered rosemary		T	None	No adverse effect anticipated
<i>Deeringothamnus pulchellus</i>	Beautiful paw-paw	E	E	None	No adverse effect anticipated
<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	Scrub buckwheat	T	E	None	No adverse effect anticipated
<i>Hartwrightia floridana</i>	Hartwrightia		T	None	No adverse effect anticipated
<i>Illicium parviflorum</i>	Star Anise		E	None	No adverse effect anticipated
<i>Lechea cernua</i>	Nodding pinweed		T	None	No adverse effect anticipated
<i>Lechea divaricata</i>	Pine pinweed		E	None	No adverse effect anticipated
<i>Liatris ohlingerae</i>	Florida blazing star	E	E	None	No adverse effect anticipated
<i>Lupinus aridorum</i>	Scrub lupine	E	E	None	No adverse effect anticipated
<i>Lythrum flagellare</i>	Lowland loosestrife		E	None	No adverse effect anticipated
<i>Matelea floridana</i>	Florida spiny pod		E	None	No adverse effect anticipated
<i>Najas filifolia</i>	Narrowleaf naiad		T	None	No adverse effect anticipated
<i>Nemastylis floridana</i>	Celestial lily		E	None	No adverse effect anticipated
<i>Nolina atopocarpa</i>	Florida beargrass		T	None	No adverse effect anticipated
<i>Nolina brittoniana</i>	Britton's beargrass	E	E	None	No adverse effect anticipated
<i>Ophioglossum palmatum</i>	Hand fern		E	None	No adverse effect anticipated
<i>Paronychia chartacea</i>	Paper-like nailwort	T	E	None	No adverse effect anticipated
<i>Pecluma plumula</i>	Plume polypody		E	None	No adverse effect anticipated
<i>Pecluma ptilota</i> var. <i>bourgeauana</i>	Comb polypody		E	None	No adverse effect anticipated
<i>Platanthera integra</i>	Yellow fringeless orchid		E	None	No adverse effect anticipated
<i>Polygala lewtonii</i>	Lewton's polygala	E	E	None	No adverse effect anticipated
<i>Polygonella myriophylla</i>	Small's jointweed	E	E	None	No adverse effect anticipated

<i>Prunus geniculata</i>	Scrub plum	E	E	None	No adverse effect anticipated
<i>Pteroglossispis ecristata</i>	Giant orchid		T	None	No adverse effect anticipated
<i>Salix floridana</i>	Florida willow		E	None	No adverse effect anticipated
<i>Schizachyrium niveum</i>	Scrub bluestem		E	None	No adverse effect anticipated
<i>Thelypteris serrata</i>	Toothed maiden fern		E	None	No adverse effect anticipated
<i>Warea amplexifolia</i>	Clasping warea	E	E	None	No adverse effect anticipated
<i>Warea carteri</i>	Carter's warea	E	E	None	No adverse effect anticipated
<i>Zephyranthes simpsonii</i>	Redmargin zephyrlily		T	None	No adverse effect anticipated

Reptiles

<i>Drymarchon corais couperi</i>	Eastern indigo snake	T	T	Moderate	May affect, but is not likely to adversely affect
<i>Gopherus polyphemus</i>	Gopher tortoise	C*	T	Moderate	No adverse effect anticipated
<i>Neoseps reynoldsi</i>	Sand skink	T	T	None	No adverse effect anticipated
<i>Pituophis melanoleucus mugitus</i>	Florida pine snake		T	Low	No adverse effect anticipated
<i>Plestiodon egregious lividus</i>	Blue-tailed mole skink	T	T	None	No adverse effect anticipated

Birds

<i>Ammodramus savannarum floridanaus</i>	Florida grasshopper sparrow	E	E	Low	No adverse effect anticipated
<i>Aphelocoma coerulescens</i>	Florida scrub-jay	T	T	Low	No adverse effect anticipated
<i>Athene cunicularia floridana</i>	Florida burrowing owl		T	Low	No adverse effect anticipated
<i>Egretta caerulea</i>	Little blue heron		T	Moderate	No adverse effect anticipated
<i>Egretta tricolor</i>	Tricolored heron		T	Moderate	No adverse effect anticipated
<i>Falco sparverius paulus</i>	Southeastern American kestrel		T	Moderate	No adverse effect anticipated
<i>Haliaeetus leucocephalus</i>	Bald eagle	NL*	NL*	High	May affect, but is not likely to adversely affect
<i>Antigone canadensis pratensis</i>	Florida sandhill crane		T	High	No adverse effect anticipated
<i>Mycteria americana</i>	Wood stork	T	T	Moderate	May affect, but is not likely to adversely affect
<i>Pandion haliaetus</i>	Osprey	NL*	NL*	Moderate	No effect
<i>Dryobates borealis</i>	Red-cockaded woodpecker	E	E	Low	May affect, but is not likely to adversely affect
<i>Caracara cheriway audubonii</i>	Crested caracara	T	T	Low	May affect, but is not likely to adversely affect
<i>Rostrhamus sociabilis</i>	Snail kite	E	E	None	No adverse effect anticipated

Mammals

<i>Puma [=Felis] concolor coryi</i>	Florida panther	E	E	None	No adverse effect anticipated
<i>Eumops floridanus</i>	Florida bonneted bat	E	E	None	No adverse effect anticipated
<i>Ursus americanus floridanus</i>	Florida black bear	NL*	NL*	Low	No adverse effect anticipated

Note: T = Threatened, E = Endangered, C* = Candidate, NL* = Not Listed (protected under Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, Florida Black Bear Conservation Rule 68A-4.009 Florida Administrative Code, and the FWC Florida Black Bear Management Plan)

Within the study area, there is suitable habitat for one (1) Candidate species, the gopher tortoise. The gopher tortoise is currently under evaluation by USFWS for consideration of federal listing under the ESA. At this time, it is not anticipated that the species will be listed during the design/permitting phase of this project. During design phase of this project, the listing status of this species along with the state plan will be monitored accordingly.

No EFH is located within the project area. Of the species evaluated, only the snail kite has designated critical habitat, the closest of which is located greater than 80 miles south. Therefore, the project is not located within and will not result in the destruction or adverse modification of federally designated critical habitat or EFH.

The project study area is located within the Consultation Area (CA) for Audubon's crested caracara (*Caracara cheriway audubonii*), red-cockaded woodpecker (*Leuconotopicus borealis*), Florida scrub-jay (*Aphelocoma coerulescens*), snail kite (*Rostrhamus sociabilis*), Florida grasshopper sparrow (*Ammodramus savannarum floridanus*), Lake Wales Ridge Plants, and partially within the sand and blue-tailed mole skink consultation area (*Plestiodon reynolds* and *Plestiodon egregious lividus*). Due to the existing development in the project area, lack of suitable habitat, and a lack of documented occurrences within the project study area, no occurrence is anticipated for the snail kite, Lake Wales Ridge Plants, other listed plants, the red-cockaded woodpecker, and the sand and blue-tailed mole skink. The portion of the study area with the skink CA does not meet soils and elevation). For species with anticipated likelihoods of occurrence other than none (low, moderate, or high), further assessment information is provided below.

Federally Protected Species

Eastern indigo snake (*Drymarchon corais couperi*)

Apart from the urbanized and developed areas; the pastures, lawns, undeveloped uplands and wetlands throughout the project area provide potentially suitable habitat for the Eastern indigo snake. Therefore, the potential for occurrence for this species within the study area is moderate. No Eastern indigo snakes were observed during the field review and there are no documented occurrences within the vicinity of the project. As a protection measure for the species, the latest version of the USFWS Standard Protection Measures for the Eastern Indigo Snake will be utilized during construction (**Appendix B**). With the protection measures in place, according to the USFWS *South Florida Ecological Service Office Programmatic Effects Determination Key* (revised July 2017) for the species (Appendix B), it is anticipated that the project “may affect, but is not likely to adversely affect” the Eastern indigo snake. Use of this key resulted in the following sequential determination: A – “project is not located in open water or salt marsh” > B – “permit will be conditioned for use of the Service's most current guidance for *Standard Protection Measures For The Eastern Indigo Snake* (currently 2013) during site preparation and project construction” . C – “the project will impact less than 25 acres of eastern indigo snake habitat...” > D – “The project has known holes, cavities, active or inactive gopher tortoise burrows, or other underground refugia where a snake could be buried, trapped and /or injured” > E – “any permit will be conditioned such that all gopher tortoise burrows, active or inactive will be

excavated prior to site manipulation in the vicinity of the burrow. If an eastern indigo snake is encountered..." = **May affect, but is not likely to adversely affect.**

Florida grasshopper sparrow (*Ammodramus savannarum floridanus*)

This project is located within the consultation area for the Florida grasshopper sparrow. The Florida grasshopper sparrow is listed as endangered by USFWS and FWC due to habitat loss and degradation. The preferred habitat for the grasshopper sparrow has been described as dry prairie that is relatively open and low in stature and consists of treeless, poorly drained grasslands with a history of frequent fires.

No native dry prairie habitat for the Florida grasshopper sparrow is located in the project study limits; however, from multiple field and desktop reviews it is concluded that improved pastures have similar communities to dry prairies. Therefore, the project study area has minimal potentially suitable habitat for the grasshopper sparrow and the species has a "low" occurrence potential. Currently, the USFWS recognizes six (6) known distinct populations remaining for this species, with the closest publicly known population, at Three Lakes Wildlife Management Area, occurring over 20 miles from the project study boundary.

Based on the minimal isolated foraging habitat located within the project study limits and absence of the species historically documented within the area, the project "**may affect, but is not likely to adversely affect**" the grasshopper sparrow. Species-specific surveys are not proposed to confirm absence of this species. Concurrence of this effect determination with the USFWS will be obtained during the design phase.

Florida scrub-jay (*Aphelocoma coerulescens*)

The project is within the consultation area for the Florida scrub-jay, listed threatened species by USFWS. The Florida scrub-jay prefers xeric oak habitats with well-drained sandy soils that are adapted to periodic drought and frequent fires. Three classes of scrub jay habitat are defined by the USFWS *Species Conservation Guidelines, South Florida, Florida Scrub Jay* (USFWS 2004):

- Type I – any upland plant community in which the percent cover of the substrate by scrub oak species is 15 percent or more.
- Type II – any plant community, not meeting the definition of Type I habitat, in which one or more scrub oak species is represented.
- Type III – any upland or seasonally dry wetland within 400 meters (0.25 mile) of any area designated as Type I or Type II habitats.

The majority of the project study area consists of existing ROW and initial field reviews revealed minimal Type III habitat within the project study area. No scrub-jay were observed during site visits. Although the 1992-1993 Florida Scrub-Jay Documented Habitat from FWC identifies habitat located adjacent to the project area, the majority of these areas are now developed as residential housing or are

currently under construction (area north of Boggy Creek Road from Osprey Lane to Fells Lane). Based on these observations, it is anticipated the project “**may affect, but is not likely to adversely affect**” the Florida scrub-jay with no species-specific-surveys proposed. Concurrence of this effect determination with the USFWS will be obtained during the design phase.

Bald eagle (*Haliaeetus leucocephalus*)

The bald eagle was removed from the ESA in 2007 and Florida’s Endangered and Threatened Species list in 2008; however, the eagle remains protected under the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and Florida’s bald eagle rule, Chapter 68A-16.002, Florida Administrative Code. The FWC database identified three (3) documented bald eagle’s nests (OR078, OS214, and OS103) within 0.5-mile of the project study area. The Audubon EagleWatch program database identifies OS103 as OS103a with an additional, alternative eagle nest location as OS103. This alternative nest is located within 660-feet of the project study limits. However, field reviews confirmed the documented nest site is located in a dead pine tree. In contrast, OS214 is listed as last surveyed and known active in 2016 by FWC. This nest is listed as inactive by the Audubon EagleWatch database during the 2020 season. During the preliminary subject project site visits, no nest was observed by environmental staff at site OS214. These nest sites are displayed on the **Wildlife Occurrence Map** in **Appendix A**.

Osceola County is committed to monitoring the two (2) nest locations within proximity to the project for activity. The USFWS Eagle Technical Assistance guidance was utilized to determine current anticipated permitting requirements (**Appendix D**). Coordination with USFWS will occur to ensure that proper monitoring and permits are in place prior to construction, if necessary. An Incidental Take permit application with the USFWS may be required for the proposed project. Provided best management practices are followed in accordance with the permit, it is anticipated the project “**may affect, but is not likely to adversely affect**” the bald eagle. Please refer to **Appendix A, Figure 6 – Bald Eagle Nest Location Map**.

Wood Stork (*Mycteria americana*)

The study area is located within Core Foraging Area (CFA) for three (3) documented wood stork colonies including Eagle Nest Park, Gatorland, and Lake Mary Jane. The wood stork is federally designated as a Threatened species by USFWS. Wood storks are primarily associated with freshwater and estuarine habitats and usually construct nests in stands of medium to tall trees in swamps or islands surrounded by open water.

The project area contains suitable foraging habitat and the species has a “moderate” occurrence potential. The South Florida Programmatic Concurrence Wood stork revisions to the *Wood Stork Effect Determination Key* dated May 18, 2010 (Appendix C) was reviewed during the species assessment. The determination assumes that the project will impact less than ½-acre of suitable

foraging habitat and proposed impacts will be compensated within the service area at an USFWS approved mitigation bank. A foraging prey analysis has not been conducted since the project is anticipated to impact less than 5 acres of wetlands classified as Suitable Foraging Habitat (SFH). Replacement of SFH will likely be provided within the proposed stormwater system, compared to pre-existing conditions; therefore, no further required mitigation for this species is anticipated. The determination is therefore based on the following species determination key sequence: A – “Project impacts Suitable Foraging Habitat (SFH) ~ at a location greater than 0.76 km (0.47-mile) from a colony site” > B – “Project impact to SFH is less than 0.20 hectare (one-half acre)” = “**may affect, but is not likely to adversely affect**”.

Audubon’s Crested Caracara (*Caracara cheriway audubonii*)

The project is within the USFWS consultation area for Audubon’s crested caracara, which is listed as threatened by the USFWS. Marginal natural habitat exists within the project study area. The crested caracara inhabits large prairies and pastures in south-central Florida. It prefers nesting in cabbage palms; however, it has also been reported to nest in other tree species. No crested caracara nests have been documented within or adjacent to the study area (FNAI 2019). Additionally, no crested caracara was observed during field reviews. The majority of the project area is existing ROW and developed areas. Although suitable habitat exists in the rural lawns and few pastures, these areas are limited, and cabbage palm scarce. These findings result in a “low” potential of crested caracara occurrence within the study area. It is therefore anticipated the project area “**may affect, but is not likely to adversely affect**” the crested caracara. Based on the lack of nesting habitat, natural foraging habitat, and documented occurrence in the regional area, crested caracara species-specific survey efforts are not recommended to confirm absence of the species. Concurrence of this effect determination with the USFWS will be obtained during the design phase.

Other Species protected under MBTA

While the study area contains nesting and foraging habitat for other avian species protected under the MBTA (i.e. Osprey (*Pandion halitus*)), no active nest sites occurred within the project study limits at this time. Updated surveys to confirm absence of new nest sites will be conducted during early design phase, and 90 days prior to construction, to ensure that no IT Permits are required from USFWS.

State Protected Species

Gopher Tortoise (*Gopherus polyphemus*)

The gopher tortoise is listed as threatened by the FWC and the project study area includes habitat suitable for the gopher tortoise. The gopher tortoise inhabits a wide variety of upland habitats and are known to serve as refuge to many species, some of which are protected. The upland pastures and rural land use within the project study area may be suitable for this species; two gopher tortoise burrows were observed during initial field visits and are displayed on the **Wildlife**

Occurrence Map provided in **Appendix A**. According to FWC, “Gopher tortoises and their burrows are protected by state law, and a gopher tortoise relocation permit must be obtained from FWC before disturbing burrows and conducting construction activities (Chapter 68A-27.003, FL Administrative Code). A disturbance includes any type of work within 25 feet of a gopher tortoise burrow.” FWC requires adherence to the most current version of the Gopher Tortoise Permitting Guidelines when performing any earth disturbing activities within 25 feet of any gopher tortoise burrows. If work occurs within 25 feet of a burrow, a gopher tortoise relocation permit prior to construction is typically required by FWC. If these guidelines are followed, including the excavation and relocation of any potentially affected tortoises, “**no adverse effect**” is anticipated for the gopher tortoise as a result of the proposed project.

Florida Pine Snake (*Pituophis melanoleucus mugitus*)

The Florida pine snake is a state threatened species. According to the FWC, the pine snake inhabits xeric habitats such as sandhill, scrub, and pine with well drained sandy soils and moderate to open canopy coverage. Particularly, habitats with densities of pocket gophers and gopher tortoises are suitable for sustaining the species. Florida pine snakes may use other burrows as refugia or construct burrows where nest clutches are laid inside side burrows. The project area consists primarily of rural and residential land uses where typical natural habitat is limited. Although there is a potential of gopher tortoises and pocket gophers, these species or their burrows/mounds were not observed during preliminary site visits. Therefore, the species is determined to have a low likelihood of occurrence within the study boundary. According to the FWC *Florida Pine Snake Species Conservation Measures and Permitting Guidelines (Appendix E)*, species-specific surveys for most activities is not recommended and surveys are not required; however, “surveys for pocket gopher mounds or gopher tortoise burrows will provide an indication of potential Florida pine snake habitat and essential breeding locations. These surveys will help meet the guidelines for minimization of impacts and can help to identify conservation or scientific benefit.” A 100% gopher tortoise survey will be conducted in the final project area prior to construction. If Florida pine snakes are detected on site, coordination with FWC will occur as needed and mitigative measures will be placed during relocation efforts. Therefore, the project will likely have “**no adverse effect**” on the Florida pine snake.

Florida Burrowing Owl (*Athene cunicularia floridana*)

The Florida burrowing owl is listed as threatened by the FWC. This species inhabits sparsely vegetated, sandy habitats throughout Florida. The burrowing owl has been documented occurring at golf courses, airports, pastures, and agricultural fields. The project study area is primarily developed and contains limited remaining pastures. The species was not observed during preliminary site visits and no documented species occurrences are located within the project vicinity (FNAI 2019). For these reasons, there is a low likelihood of Florida burrowing owl occurrence within the study area. Although not anticipated, if burrowing owls are observed during design phase, appropriate conservation and

mitigative measures will be implemented in coordination with the FWC. Therefore, the project will have “**no adverse effect**” on the Florida burrowing owl.

Southeastern American Kestrel (*Falco sparverius paulus*)

The southeastern American kestrel is listed as threatened by the FWC. This species inhabits open woodlands, pastures, agricultural areas, and low-density residential areas. Therefore, minimal habitat for this species occurs throughout the study area. The species was not observed during field reviews and there is no suitable habitat for this species within the project area. In addition, no cavities were observed on any utility poles within the study area. If appropriate consultation measures are taken, there is “**no adverse effect anticipated**” from the project for the southeastern American kestrel.

Florida Sandhill Crane (*Antigone canadensis pratensis*) and Other State Listed Wading Birds

The Florida sandhill crane, little blue heron, and tricolored heron are each listed as threatened by the FWC occurring in Osceola County. No wading bird rookeries or nest sites were observed within the study area at the time of the site visits. One pair of sandhill cranes was observed foraging near the eastern study boundary, just north of the existing corridor. However, assuming mitigation is provided for all natural wetland impacts, no additional consultation or permitting is anticipated to be required. An updated nesting/communal roost survey for wading birds should be performed during future project phases to confirm absence. If nests are identified during updated field reviews, appropriate consultation measures will be taken with FWC. Additionally, any impacts to wetlands and other surface waters are anticipated to be appropriately mitigated. Therefore, there is “**no adverse effect**” for these species, based on the current study limits.

Florida Black Bear (*Ursus americanus floridanus*)

The Florida black bear is state protected under the Bear Conservation Rule (68A-4.009, Florida Administrative Code). According to FWC, the project study area is located within the “occasional” range of the south-central Florida black bear population. The project study area is primarily developed. Black bear road mortality data available via FWC (2020) was reviewed to assess the level of occurrence within the study area. The data indicates that no roadkill is documented within the corridor’s study limits. The nearest black bear roadkill is documented well over 10 miles west/northwest of the study area, occurring in 2013. Due to the limited presence of potentially suitable habitat within the occasional range, there is a low potential for Florida black bear within the study area. The FWC will provide comments during state ERP permitting “in order to minimize and avoid potential negative impacts of land modifications on the conservation and management of black bears,” in accordance with the Bear Conservation Rule. Anticipating that the project has no significant wildlife corridors for this species, and due to the lack of documented road-kills within the study boundary, “**no adverse effect**” for the Florida black bear is anticipated.

Other State-Only Listed Plant Species

The State of Florida does not regulate impacts to state-only listed plants (listed in the Protected Species Table above). No state-only listed plants were observed during initial field visits. However, transportation agencies are often relocating state-listed threatened and endangered plants off-site, prior to construction through volunteer efforts with local Native Plant Societies. Should state listed plants be observed during the design phase of project, the County may wish to provide partnership opportunity with the Florida Department of Agricultural and Consumer Services (FDACS) in the preservation of these species and consider similar relocation efforts.

4.0 WETLAND AND SURFACE WATERS

4.1 Data Collection

Prior to field surveys, environmental scientists reviewed the most current information regarding the location and extent of wetlands and surface waters in the project area. These wetland and surface water habitats were defined according to the corresponding FLUCCS categories. The information included, but was not limited to:

- United States Geological Survey (USGS) Topographic Maps
- USFWS National Wetland Inventory (NWI)
- NRCS Soil Survey of Osceola County
- SFWMD Land Use and Cover Forms
- FNAI Landcover Maps and Online Matrix (Accessed 2020)
- Florida Geographic Data Library (FGDL) (Accessed 2020)

4.2 Wetland and Surface Water Assessment Methodology

A wetland and surface water evaluation was performed within the project study limits, focusing on areas within and directly adjacent to the existing roadway and pond site alternatives. The wetland evaluation relied on literature reviews and limited field surveys to identify the approximate location and extent of natural and artificial wetlands and surface waters, while assessing their ecological value using the Unified Mitigation Assessment Methodology (UMAM). Environmental scientists used information to evaluate potential direct and indirect effects to wetlands and surface waters, including the potential cumulative impacts to those jurisdictional features in the general regional area. Practicable measures to avoid and/or minimize impacts to those wetlands and surface waters are proposed in Section 2.3.1 – Avoidance and Minimization.

The approximate extent of natural and artificial wetlands and surface waters was identified using the methodology described in Rule 62-340, Florida Administrative Code, *Delineation of the Landward Extent of Wetlands and Surface Waters*, the Corps of Engineers *Wetland Delineation Manual* (USACE, 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (USACE, 2010). For locations of these specific systems in the project study area, please refer to the **Figure 9 - Wetland, Surface Water and Other Surface Waters Maps** in **Appendix A**.

4.3 Wetlands, Surface Waters, and OSWs Habitats

The following descriptions of these communities are provided below and can be found on the **Figure 4 - FLUCCS Maps and Wetland, Surface Waters, and Other Surface Waters Maps** provided in **Appendix A**.

FLUCCS 510 - Streams and Waterways

This land use class includes small tributaries and streams that are located within the cross the existing roadway corridor. One named tributary is located within the existing Boggy Creek Road ROW limits, identified as Jim Branch. A triple box culvert is currently located at the Jim Branch Creek crossing. Within the immediate project limits the creek is lined with riprap, roadside bahiagrass (*Paspalum notatum*) and forested hardwood communities.

FLUCCS 530 - Reservoirs (Upland-Cut) OSWs

Within the study area, OSW features associated with the existing roadway and surrounding development are located throughout the project. These include roadside ditches that were historically dredged from uplands during the original construction of the roadway, and large borrow areas, created historically to transport upland fill material off-site.

Along the existing ROW corridor, ditch systems are dominated by bahiagrass with some presence of opportunistic and hydric vegetation such as sedges (*Cyperus* spp. and *Carex* spp.), marsh pennywort (*Hydrocotyle* sp.), and beggartick (*Bidens alba*). Other upland-cut OSWs include a large borrow area within the study boundary. Once an abandoned citrus-grove, the area is overgrown with thick vegetation including Florida elderberry (*Sambucus nigra* subsp. *Canadensis*), Brazilian pepper (*Schinus terebinthifolia*), Peruvian primerose-willow (*Ludwigia peruviana*), cattail (*Typha* spp.), red maple (*Acer rubrum*), and other occasional canopy species surrounding the edges including oaks (*Quercus* spp.) and native pines (*Pinus* spp.).

The large borrow areas are part of a permitted borrow site, approved by SFWMD in 2000, concurrent with SFWMD Permit # 49-01043-P. These borrow areas are extremely overgrown with nuisance and exotic vegetation similar to species listed above.

FLUCCS 617-Mixed Wetland Hardwoods

Within the study limits, there are remnants of mixed wetland hardwood systems that extend beyond the study boundary. These systems are of moderate ecological value and have some exotic/nuisance species encroachment. Canopy species include red maple and various oaks, with encroachment of Brazilian pepper midstory. Groundcover is comprised of cinnamon fern (*Osmundastrum cinnamomeum*) and other opportunistic species such as dogfennel (*Eupatorium capillifolium*) and pennywort.

FLUCCS 621 - Cypress

These wetlands are dominated by both bald and pond cypress (*Taxodium* sp.). Within the project study area, these cypress domes have a scattered understory of wax myrtle (*Myrica cerifera*), red maple, Carolina willow (*Salix caroliniana*), and loblolly bay (*Persea borbonia*). The shrub and ground cover near the edge of these systems consist of a

mixture of native, exotic, and opportunistic species. Some prevalent vegetation observed include common buttonbush (*Cephalanthus occidentalis*), Peruvian primrose-willow, swamp fern (*Telmatoblechnum serrulatum*), dogfennel, Florida elderberry, wild taro (*Xanthosoma sagittifolium*), lizard's tail (*Saururus cernuus*), Brazilian pepper, and Cinnamon fern.

FLUCCS 630 – Wetland Forested Mixed

There is one wetland system within the study area. Primary canopy species include oaks, pines, cypress, and red maple. Understory composition contains some opportunistic species, with similar species observed in nearby Mixed Wetland Hardwoods.

4.4 Avoidance and Minimization

Section 404 of the Clean Water Act requires an applicant to choose the Least Environmentally Damaging Practicable Alternative (LEDPA) for the preferred alternative. Additionally, Statewide Environmental Resource Permit (SWERP) regulations require an applicant to eliminate and reduce jurisdictional impacts to the greatest “practicable extent” unless those impacts are low in quality or mitigation for impacts is higher in ecological value and regionally significant.

Measures to avoid indirect impacts associated with the proposed pond design will be considered during early design phase. Impacts to the scattered wetland systems will be minimized to the greatest practicable extent, and an Avoidance and Minimization Statement will be provided to the Corps during permitting phase, explaining the LEDPA. Due to the observed occurrence of state and/or federal protected species within the study area, the LEDPA may be the result in slightly higher impacts to low quality wetlands, in order to avoid or minimize protected/listed species impacts, including those species protected by ESA or FWC regulations.

Osceola County will furthermore ensure that an approved Stormwater Pollution Prevention Plan (SWPPP) is implemented during construction to prevent sediment and untreated stormwater runoff into adjacent off-site wetlands and surface waters and will comply with all National Pollutant Discharge Elimination System (NPDES) criteria during construction activities. The proposed treatment system for the expanded corridor will provide improved treatment and attenuation for offsite systems in the adjacent properties.

4.5 Estimated Jurisdictional Impacts and Ecological Value

Direct, Indirect, and Cumulative Impacts

Within the study boundary, there are approximately 10.7 acres of natural wetlands, 2 acres of surface waters, and 21.9 acres of OSWs (artificial waterbodies created from uplands). Direct impact acreage will depend upon the final selected alignment for the corridor, as well as selected pond sites. Wetland, surface water, and OSW boundaries, in comparison to the Pond Sites and overall study area, are displayed on the **Wetland, Surface Water, and Other Surface Waters Maps** in **Appendix A**.

Indirect impacts to natural wetlands and surface waters off-site are anticipated to be minimal along the existing roadway, as wetland/surface water systems within and abutting

the existing roadway have been exposed to secondary impacts such as noise, dumping of trash, and direct stormwater runoff from the existing roadway for 40+ years. The systems have significant edge effect characteristics, with invasive and exotic flora species due to the existing development and associated edge-effects. Most of the wetland systems within the pond site alternatives, however, have less invasive species and are of moderate ecological value. Early discussion during pre-application meetings with SFWMD and USACE will be held to confirm agreed upon indirect impacts to all wetland and surface water systems.

Cumulative effects on the environment, based on current federal regulations, are considered those effects resulting from incremental impacts of the action, when added with other past, present and reasonably foreseeable future actions, regardless of the agency or private entity that undertakes that action. Neither alternative is anticipated to significantly contribute to cumulative effects in the regional area, due to their location along the existing roadway corridor and in previous existing development. This project is proposed to accommodate surrounding residential, municipal and commercial development that has already been permitted and by both state and federal agencies. Therefore, as much of the corridor is already urban, significant cumulative impacts are not anticipated as a result of this project.

State cumulative impact criteria requires consideration of wetland impacts as they relate to the location of proposed mitigation and are based on designated regulatory drainage basins. Because there are mitigation banks with available credits in-basin, cumulative wetland impact criteria will be achievable through purchase of credits from a state permitted mitigation bank.

Estimated Functional Value Assessment

The ecological values of the existing natural systems within the study area are provided below. Average functional values are assessed using the Uniform Mitigation and Assessment Method (UMAM). Per UMAM criteria, Landscape Support, Community Structure and Water Environment were primary factors in consideration of the system's ecological value. The UMAM is the primary method for mitigation assessment for most available mitigation bank credits in the regional area. However, other functional assessments (Ratio Method, Wetland Rapid Assessment Procedure [WRAP]) may be needed during design, depending on the chosen mitigation option. Most, if not all wetland systems are likely jurisdictional with both the state and the USACE, due to their hydrologic connection to East Lake Tohopekaliga.

Table 4.5-1 Estimated UMAM Values

Wetland Habitats Within Study Area	Location and Landscape	Water Environment	Community Structure	Estimated UMAM Score
Borrow Pits	3	2	3	0.27
Surface Waters	4	5	4	0.43
Wetland Forested Mixed	4	6	5	0.5
Mixed Wetland Hardwoods	4	6	6	0.53
Cypress	4	6	7	0.57

Regulatory Conservation Easements within the Study Area

Desktop review of available information reveals that the study boundary contains multiple Regulatory Conservation Easements (CEs) within pond sites and adjacent to the existing corridor ROW limits. These CEs are displayed on the **Regulatory Conservation Easement Maps**, located in **Appendix A**.

Partial or full release of these easements will be required prior to SFWMD issuing a permit for construction in these areas. Due to current proprietary policies, as set forth by the SFWMD Governing Board, the release of a regulatory CE must be deemed necessary and applicants must demonstrate that there are no reasonable/feasible alternative for avoidance to the regulatory easement, prior to consideration for release. It is recommended that early coordination occur with SFWMD regulatory staff if a partial or full release is anticipated for the proposed corridor or necessary pond site.

4.6 Conceptual Permitting Requirements and Mitigation Options

Capacity improvements to Boggy Creek Road will require an Environmental Resource Permit through SFWMD. There are two primary components of ERP review: stormwater design and regulatory science review. The primary stormwater criteria to meet rule primarily considers attenuation and treatment (stormwater system design) whereas regulatory science reviews will focus on practicable elimination and reduction of resource impacts, including wetland dependent species, direct and secondary impacts to natural wetlands and surface waters, and mitigation analysis.

Once the ERP application is submitted, SFWMD will correspond with other state agencies to solicit any comments. Typical agencies solicited include Division of Historic Resources (DHR) and FWC.

In addition to state ERP requirements, natural wetlands and surface waters are likely jurisdictional with the USACE, based on current Corps Waters of the United States (WOTUS) regulations. USACE will require state ERP issuance (water quality certification, per EPA requirements) prior to the issuance of a Standard Permit. The USACE, in adherence with the Section 404 Clean Water Act and Natural Environmental Policy Act (NEPA), will require that the Least Environmentally Damaging Practicable Alternative (LEPDA) be selected for both alignment and pond alternatives. During the PD&E study, documentation of the LEPDA will be provided through analysis in the final engineering report, Pond Siting Memorandum, and other documents for the County to ensure efficient state and federal permitting during the design phase.

State and federal agencies have different hierarchical mitigation preferences, examples include on-site wetland mitigation, off-site mitigation, and mitigation bank credits. If mitigation bank credits are available, the USACE will typically require the use of bank credits for mitigation, unless proposed Permittee Responsible Mitigation (PRM) is regionally significant. There are multiple state and federal mitigation banks with credits available to service the study area and within the USACE Kissimmee Hydrologic Unit Code (HUC) code. Currently there is at least one mitigation bank that provides credits within the SFWMD Lake Hart Regulatory basin, meeting the state's ERP *Cumulative Impact* criteria.

Given the anticipated UMAM scores assigned and including secondary impacts, wetland mitigation costs range from \$50,000-\$80,000 per acre. This estimate assumes wetlands are not encumbered by regulatory CEs. If wetland impacts are proposed within a regulatory CE, ecological replacement of the mitigation site will also be required prior to release of the CE, therefore, costs per acre of CE encumbered wetlands may range between \$100,000-\$160,000. Early coordination and pre-application meetings with both agencies will provide further insight to available mitigation options.

Prior to construction, per EPA regulations, the County's selected contractor must apply for use of a National Pollutant Discharge Elimination System (NPDES) permit, administered by FDEP. The project will require the development of a sediment control plan for use of this permit.

In addition to state ERP and Section 404 Permits, it is possible that the project will require permits for impacts to wildlife habitat through FWC and/or USFWS, depending on the preferred corridor alignment and selected pond sites. Regardless of the preferred alignment, gopher tortoise relocation is anticipated for any impacts to habitat within 25 feet of potentially occupied burrows.

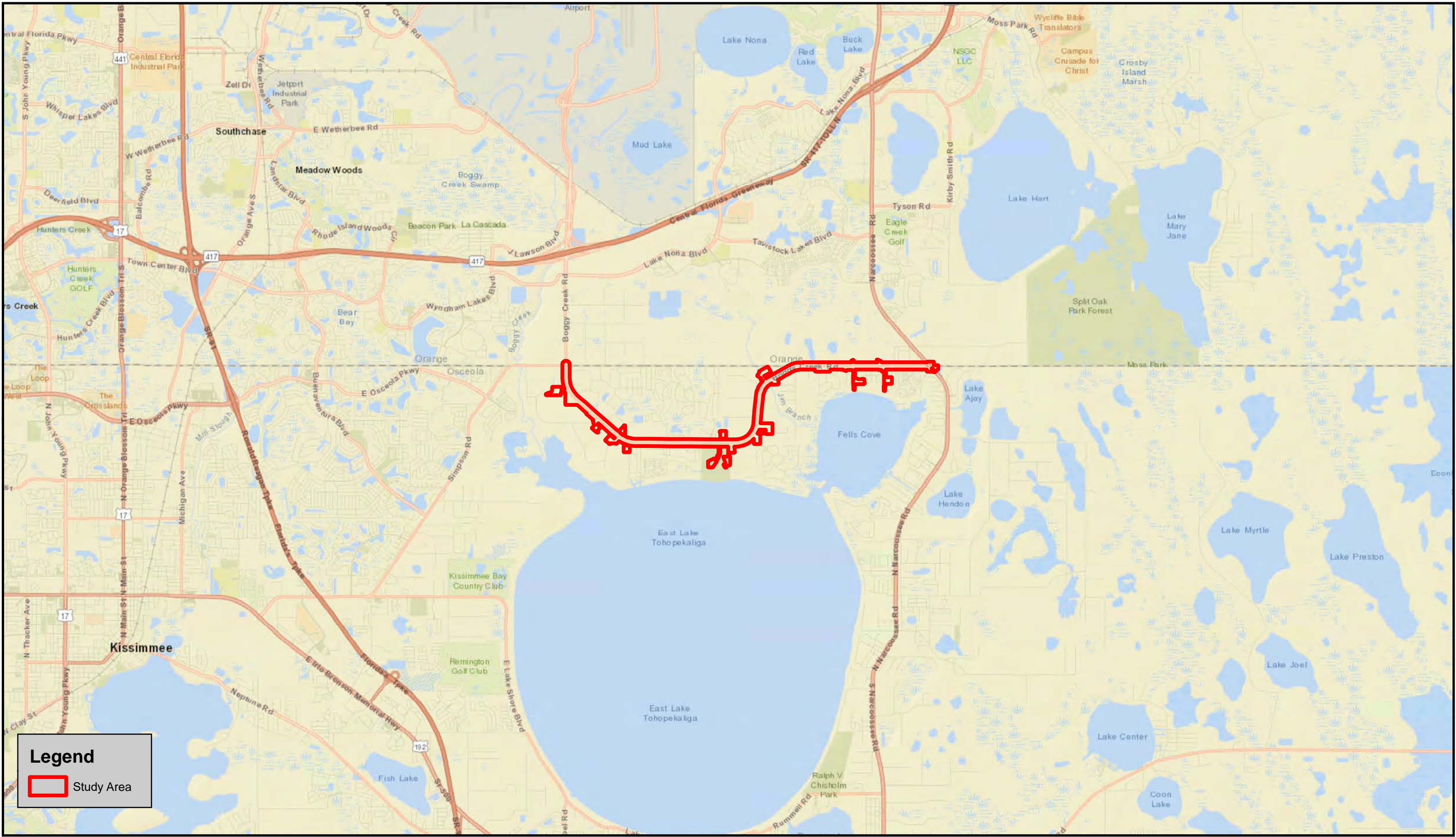
In the unlikely event that any federally protected species are adversely impacted by the preferred alignment (or pond sites), approvals/permits may be necessary through formal consultation with USFWS. Some of the same regional mitigation banks that provide wetland mitigation credits also provide conservation credits for impacts to protected species, if needed.

5.0 SUMMARY OF COMMITMENTS

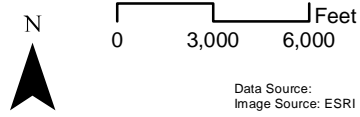
The Boggy Creek Road project study area includes wetlands, surface waters, and occurrence of multiple protected species. The following commitments are recommended to avoid and minimize impacts to natural protected resources, where practicable:

- The *Standard Protection Measures for the Eastern Indigo Snake* will be implemented during project construction.
- Avoidance and minimization of wetland and listed species impacts will continue to be evaluated during the final design, permitting and construction phases of this project and all possible and practicable measures to avoid or minimize these impacts during design, construction and operation will be incorporated.
- Pre-construction surveys for the bald eagle, southeastern American kestrel, Florida sandhill crane, Florida burrowing owl, gopher tortoise, bald eagle, listed plants and any other listed species will be performed as required.
- BMPs to control erosion and sedimentation in accordance with Standard Specifications for Road and Bridge Construction will be implemented.

Appendix A



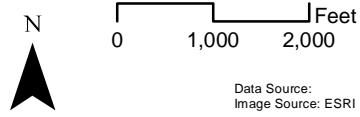
Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Regional Location Map



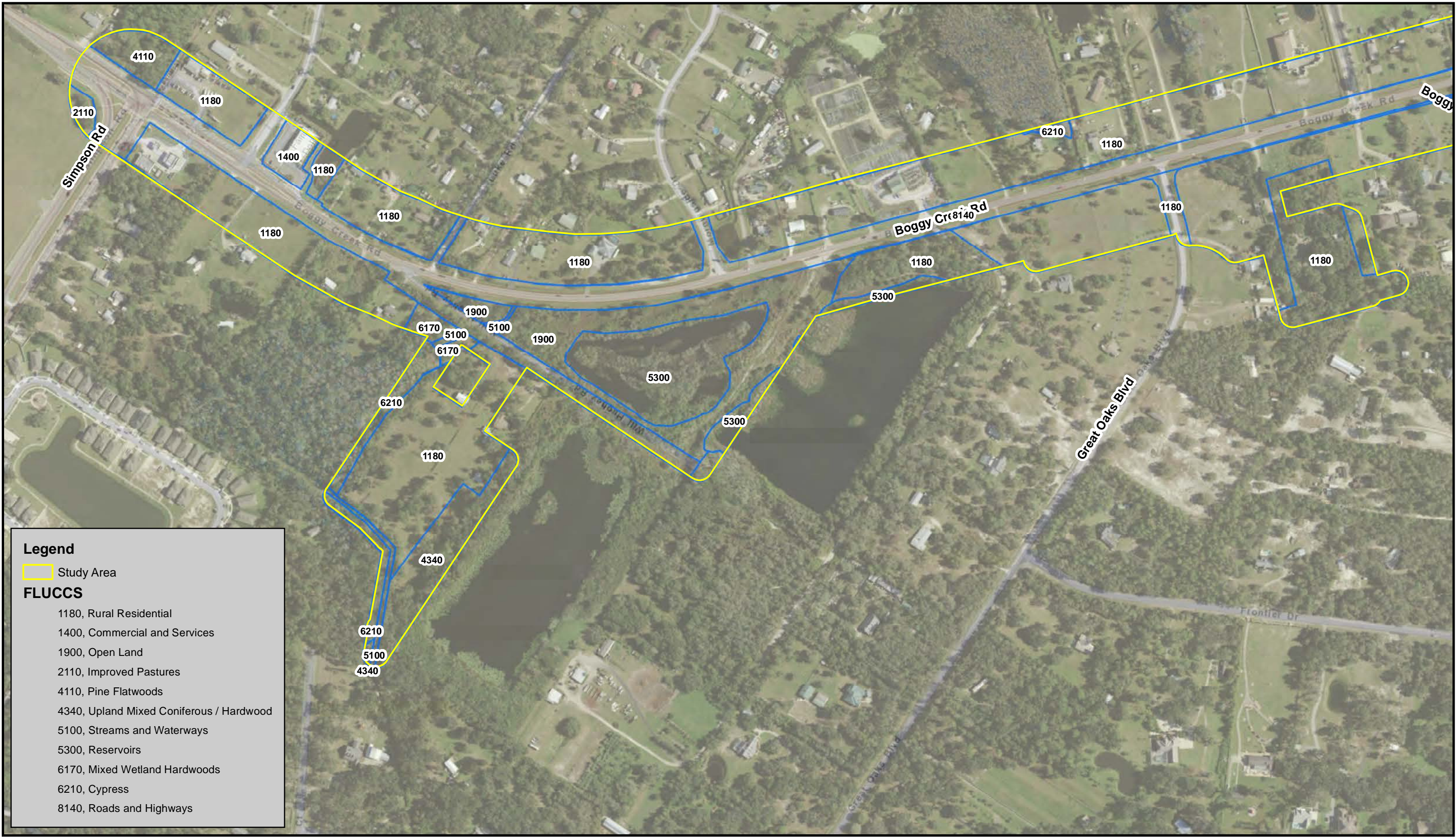
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Bogy Creek Road (CR 530) Widening
Simpson Road to Narcoossee Road
Osceola County, FL
Aerial Location Map



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Image Source: ESRI



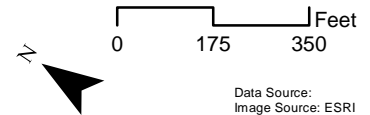
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Study Area

FLUCCS

- 1180, Rural Residential
- 1400, Commercial and Services
- 1900, Open Land
- 2110, Improved Pastures
- 4110, Pine Flatwoods
- 4340, Upland Mixed Coniferous / Hardwood
- 5100, Streams and Waterways
- 5300, Reservoirs
- 6170, Mixed Wetland Hardwoods
- 6210, Cypress
- 8140, Roads and Highways

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 FLUCCS





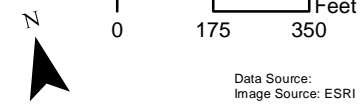
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Study Area

FLUCCS

- 1180, Rural Residential
- 1210, Fixed Single Family Units
- 1710, Educational Facilities
- 5300, Reservoirs
- 6210, Cypress
- 8140, Roads and Highways

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 FLUCCS





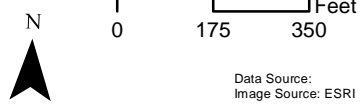
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Study Area

FLUCCS

- 1180, Rural Residential
- 1210, Fixed Single Family Units
- 1710, Educational Facilities
- 1860, Community Recreation Facilities
- 2110, Improved Pastures
- 4340, Upland Mixed Coniferous / Hardwood
- 5300, Reservoirs
- 6170, Mixed Wetland Hardwoods
- 6210, Cypress
- 8140, Roads and Highways

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 FLUCCS





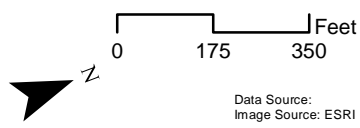
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Study Area

FLUCCS

- 1180, Rural Residential
- 1210, Fixed Single Family Units
- 1710, Educational Facilities
- 2110, Improved Pastures
- 3210, Palmetto Prairies
- 4340, Upland Mixed Coniferous / Hardwood
- 5100, Streams and Waterways
- 5300, Reservoirs
- 8140, Roads and Highways

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 FLUCCS





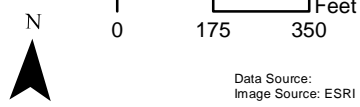
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Study Area

FLUCCS

- 1180, Rural Residential
- 1210, Fixed Single Family Units
- 1710, Educational Facilities
- 4340, Upland Mixed Coniferous / Hardwood
- 5300, Reservoirs
- 8140, Roads and Highways

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 FLUCCS





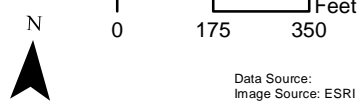
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Study Area

FLUCCS

- 1210, Fixed Single Family Units
- 1320, Mobile Home Units
- 1400, Commercial and Services
- 4210, Xeric Oak
- 4340, Upland Mixed Coniferous / Hardwood
- 5300, Reservoirs
- 6300, Wetland Forested Mixed
- 8140, Roads and Highways

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 FLUCCS





Legend

Study Area

Soils/Name/Hydric Class

5;Basinger fine sand;A/D

6;Basinger fine sand, depressional;A/D

9;Cassia fine sand;A/D

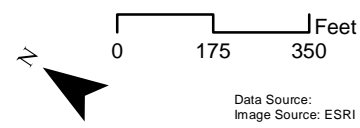
10;Delray loamy fine sand, depressional;A/D

24;Narcoossee fine sand;A

42;Smyrna fine sand;A/D

44;Smyrna fine sand;A/D

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Soils Map





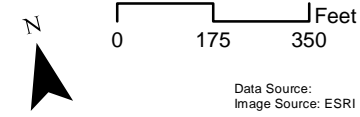
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Study Area

Soils/Name/Hydric Class

- 1;Adamsville sand;A
- 5;Basinger fine sand;A/D
- 6;Basinger fine sand, depressional;A/D
- 9;Cassia fine sand;A/D
- 24;Narcoossee fine sand;A
- 32;Placid fine sand, depressional;A/D
- 34;Pomello fine sand, 0 to 5 percent slopes;A
- 42;Smyrna fine sand;A/D
- 44;Tavares fine sand, 0 to 5 percent slopes;A

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Soils Map





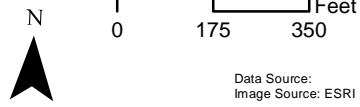
Legend

Study Area

Soils/Name/Hydric Class

- 5;Basinger fine sand;A/D
- 6;Basinger fine sand, depressional;A/D
- 22;Myakka fine sand;A/D
- 27;Ona fine sand;B/D
- 32;Placid fine sand, depressional;A/D
- 34;Pomello fine sand, 0 to 5 percent slopes;A
- 42;Smyrna fine sand;A/D

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Soils Map





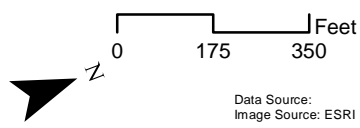
Legend

Study Area

Soils/Name/Hydric Class

- 1;Adamsville sand;A
- 5;Basinger fine sand;A/D
- 6;Basinger fine sand, depressional;A/D
- 22;Myakka fine sand;A/D
- 24;Narcoossee fine sand;A
- 27;Ona fine sand;B/D
- 32;Placid fine sand, depressional;A/D
- 34;Pomello fine sand, 0 to 5 percent slopes;A
- 42;Smyrna fine sand;A/D

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Soils Map

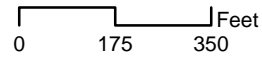


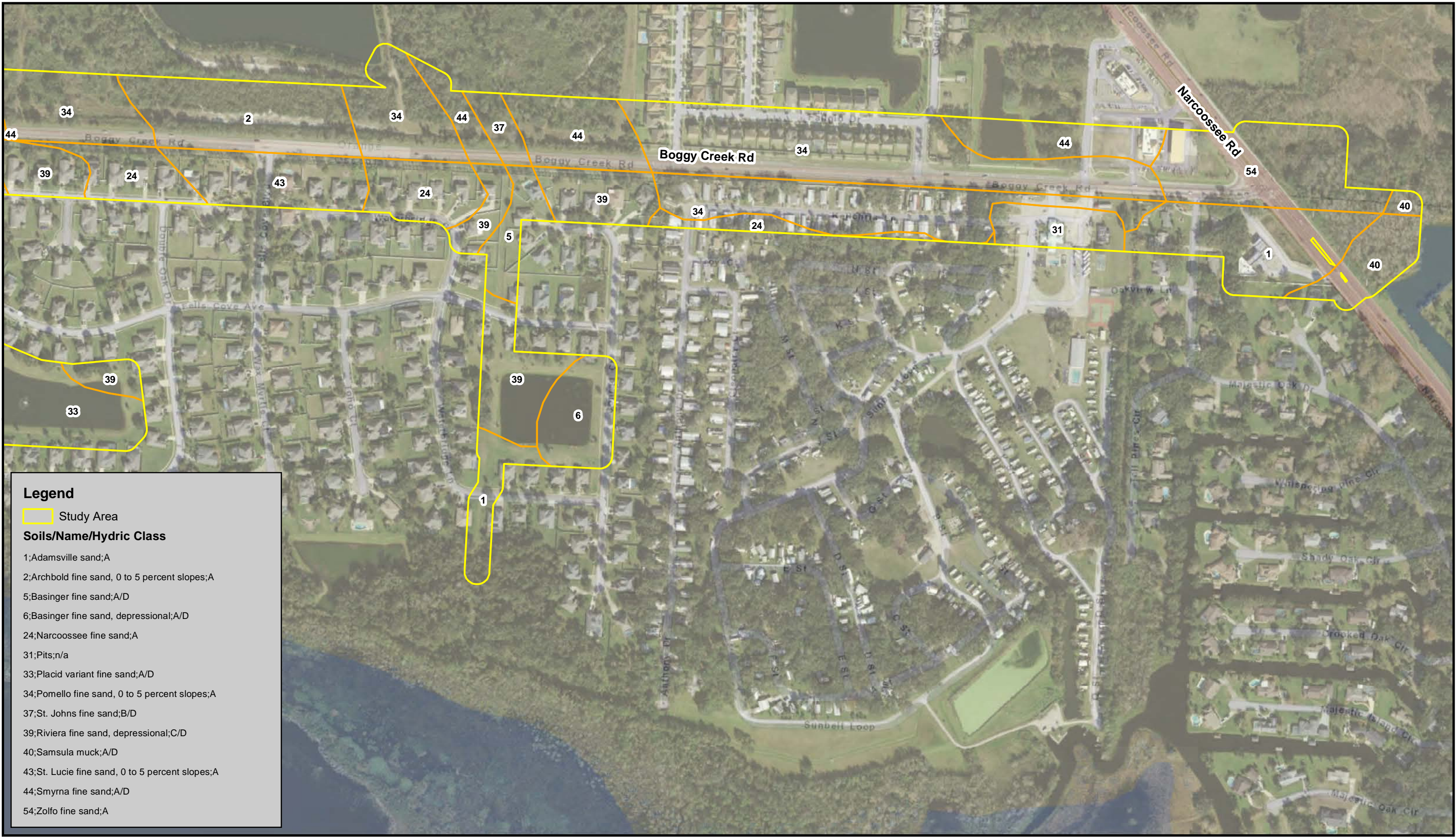


Legend

- Study Area
- Soils/Name/Hydric Class**
- 2;Archbold fine sand, 0 to 5 percent slopes;A
- 3;Basinger fine sand, depressional;A/D
- 5;Basinger fine sand;A/D
- 6;Basinger fine sand, depressional;A/D
- 24;Narcoossee fine sand;A
- 26;Ona fine sand;B/D
- 32;Placid fine sand, depressional;A/D
- 33;Placid variant fine sand;A/D
- 34;Pomello fine sand, 0 to 5 percent slopes;A
- 37;St. Johns fine sand;B/D
- 39;Riviera fine sand, depressional;C/D
- 42;Smyrna fine sand;A/D
- 43;St. Lucie fine sand, 0 to 5 percent slopes;A
- 44;Smyrna fine sand;A/D

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Soils Map

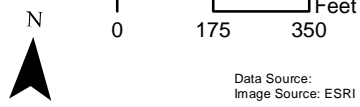


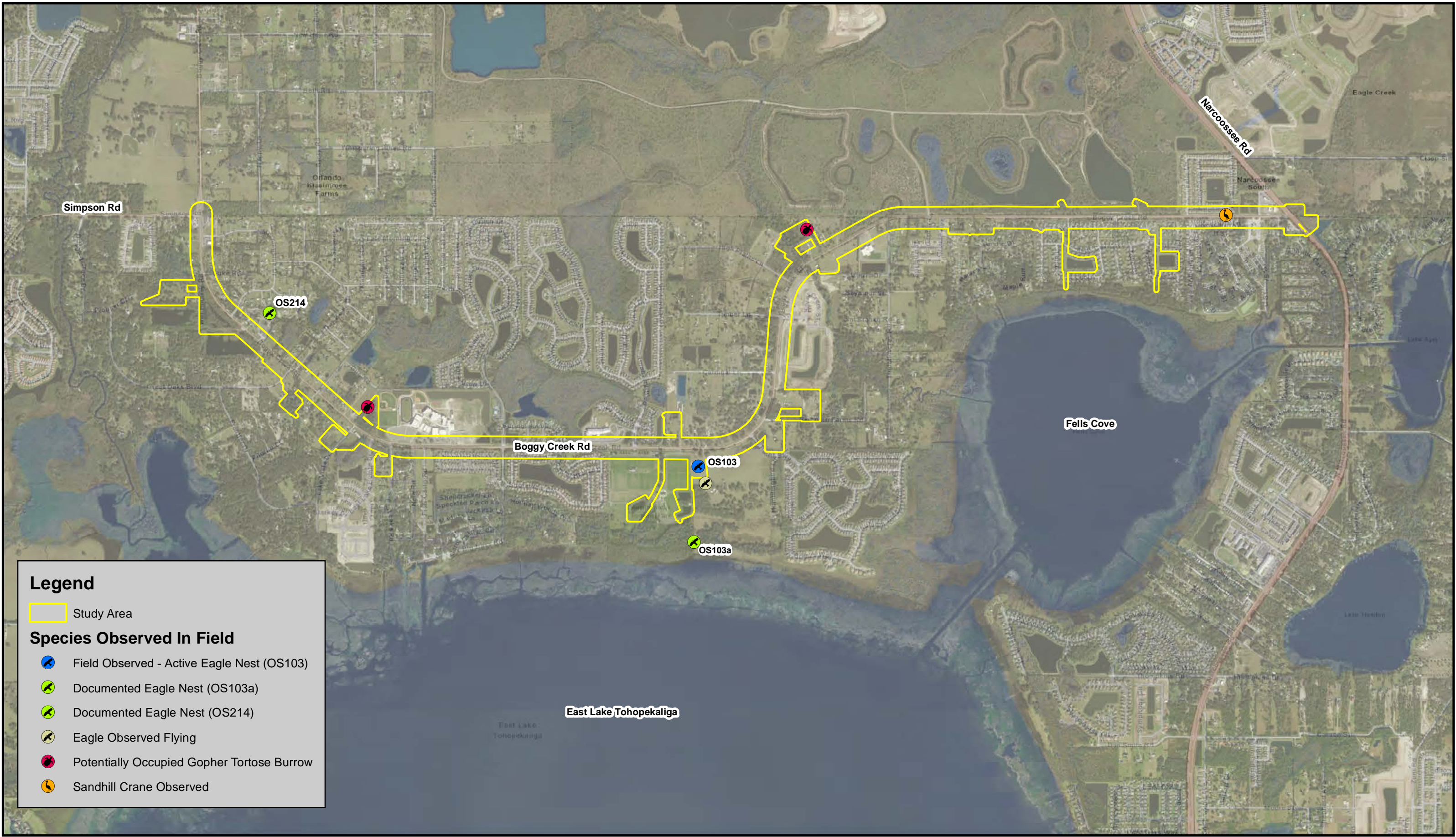


Legend








- Study Area
- Soils/Name/Hydric Class**
- 1;Adamsville sand;A
- 2;Archbold fine sand, 0 to 5 percent slopes;A
- 5;Basinger fine sand;A/D
- 6;Basinger fine sand, depressional;A/D
- 24;Narcoossee fine sand;A
- 31;Pits;n/a
- 33;Placid variant fine sand;A/D
- 34;Pomello fine sand, 0 to 5 percent slopes;A
- 37;St. Johns fine sand;B/D
- 39;Riviera fine sand, depressional;C/D
- 40;Samsula muck;A/D
- 43;St. Lucie fine sand, 0 to 5 percent slopes;A
- 44;Smyrna fine sand;A/D
- 54;Zolfo fine sand;A

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Soils Map




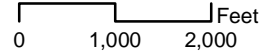


Legend

-  Study Area
- Species Observed In Field**
-  Field Observed - Active Eagle Nest (OS103)
-  Documented Eagle Nest (OS103a)
-  Documented Eagle Nest (OS214)
-  Eagle Observed Flying
-  Potentially Occupied Gopher Tortoise Burrow
-  Sandhill Crane Observed

Bogy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Wildlife Occurrence Map



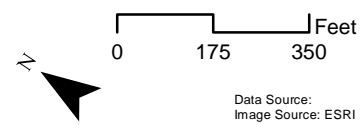


 Data Source: ESRI
 Image Source: ESRI



Legend

- Study Area
- Wetlands, Other Surface Waters, and Surface Waters**
- Other Surface Water (OSW)
- Surface Water (SW)
- Wetland (W)

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Wetland, OSW, and SW Map

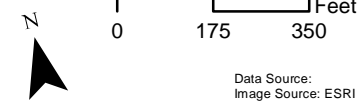




Legend

- Study Area
- Wetlands, Other Surface Waters, and Surface Waters**
- Other Surface Water (OSW)
- Surface Water (SW)
- Wetland (W)

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Wetland, OSW, and SW Map

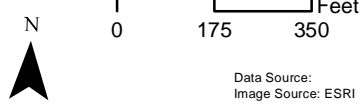


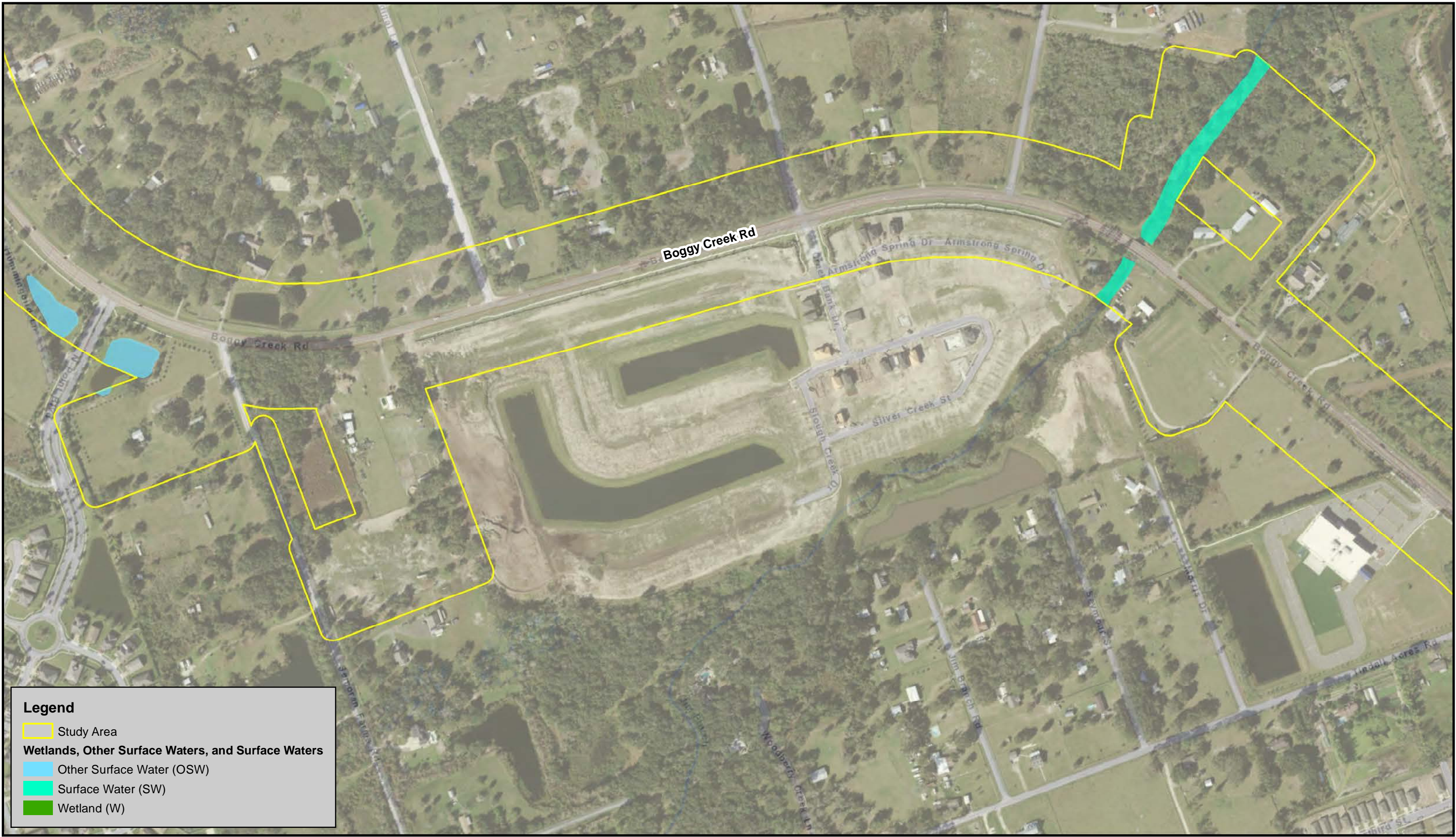


Legend

- Study Area
- Wetlands, Other Surface Waters, and Surface Waters**
- Other Surface Water (OSW)
- Surface Water (SW)
- Wetland (W)

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Wetland, OSW, and SW Map

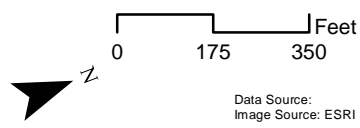


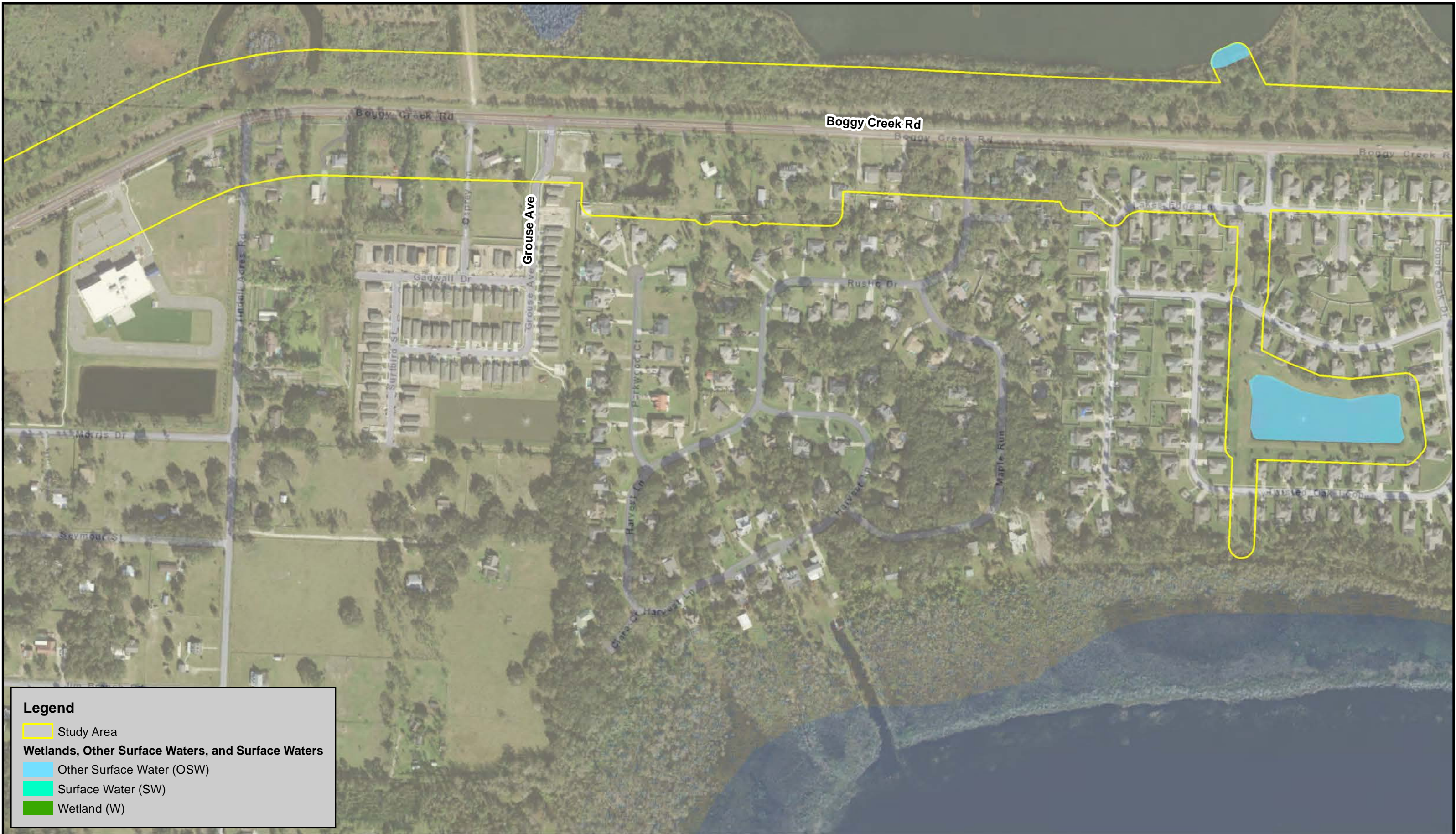


Legend

- Study Area
- Wetlands, Other Surface Waters, and Surface Waters**
- Other Surface Water (OSW)
- Surface Water (SW)
- Wetland (W)

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Wetland, OSW, and SW Map

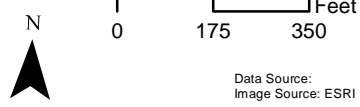


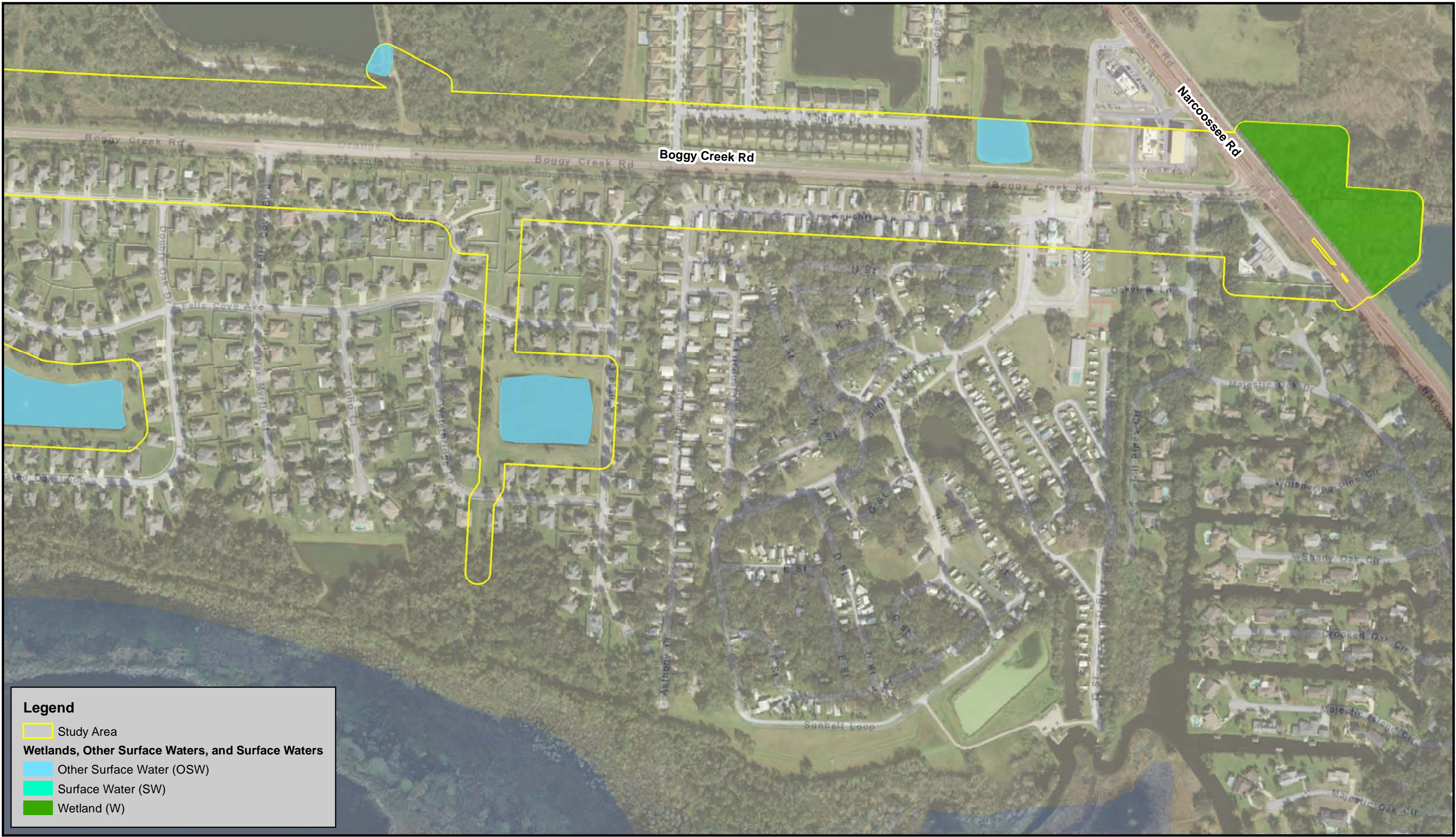


Legend

- Study Area
- Wetlands, Other Surface Waters, and Surface Waters**
- Other Surface Water (OSW)
- Surface Water (SW)
- Wetland (W)

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Wetland, OSW, and SW Map

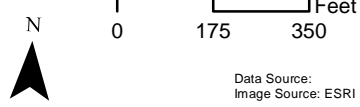




Legend

- Study Area
- Wetlands, Other Surface Waters, and Surface Waters**
- Other Surface Water (OSW)
- Surface Water (SW)
- Wetland (W)

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcossee Road
 Osceola County, FL
 Wetland, OSW, and SW Map





Legend

- Project Area
- Type**
- Proposed Pond Site Alternative
- South Florida Water Management District Conservation Areas

Boggy Creek Road (CR 530) Widening

Simpson Road to Narcoossee Road
Osceola County, FL

Regulatory Conservation Easements - Overview



2C



Legend

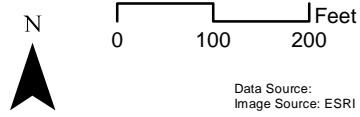
- Study Area
- Type**
- Proposed Pond Site Alternative
- South Florida Water Management District Conservation Areas

Boggy Creek Road (CR 530) Widening

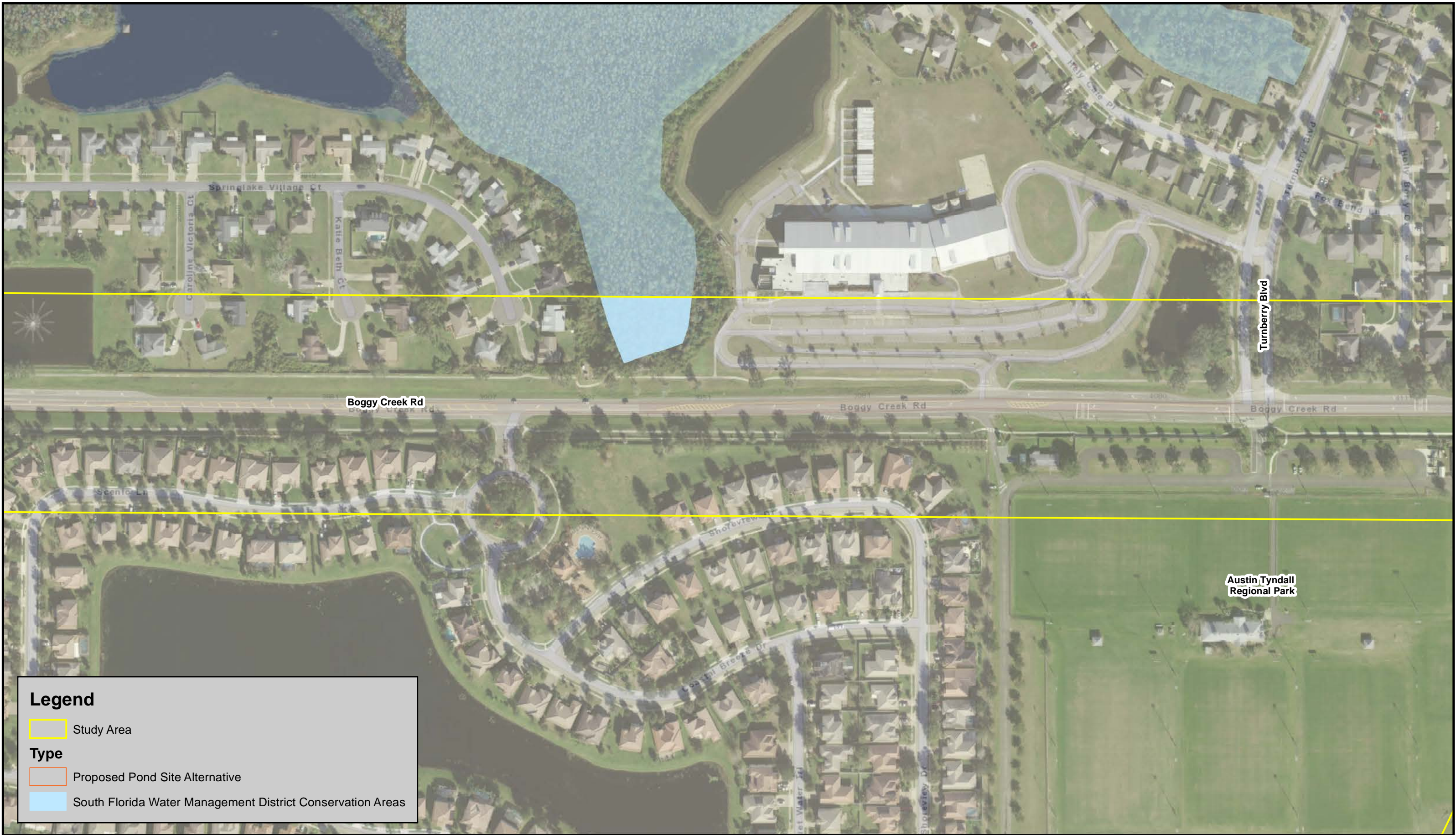
Simpson Road to Narcoossee Road

Osceola County, FL

Regulatory Conservation Easements - Sheet 1



Data Source: ESRI
Image Source: ESRI

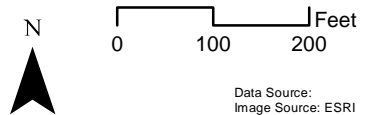


Boggy Creek Road (CR 530) Widening

Simpson Road to Narcoossee Road

Osceola County, FL

Regulatory Conservation Easements - Sheet 2



Data Source:
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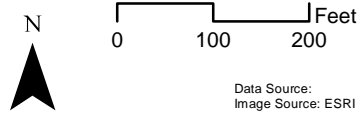
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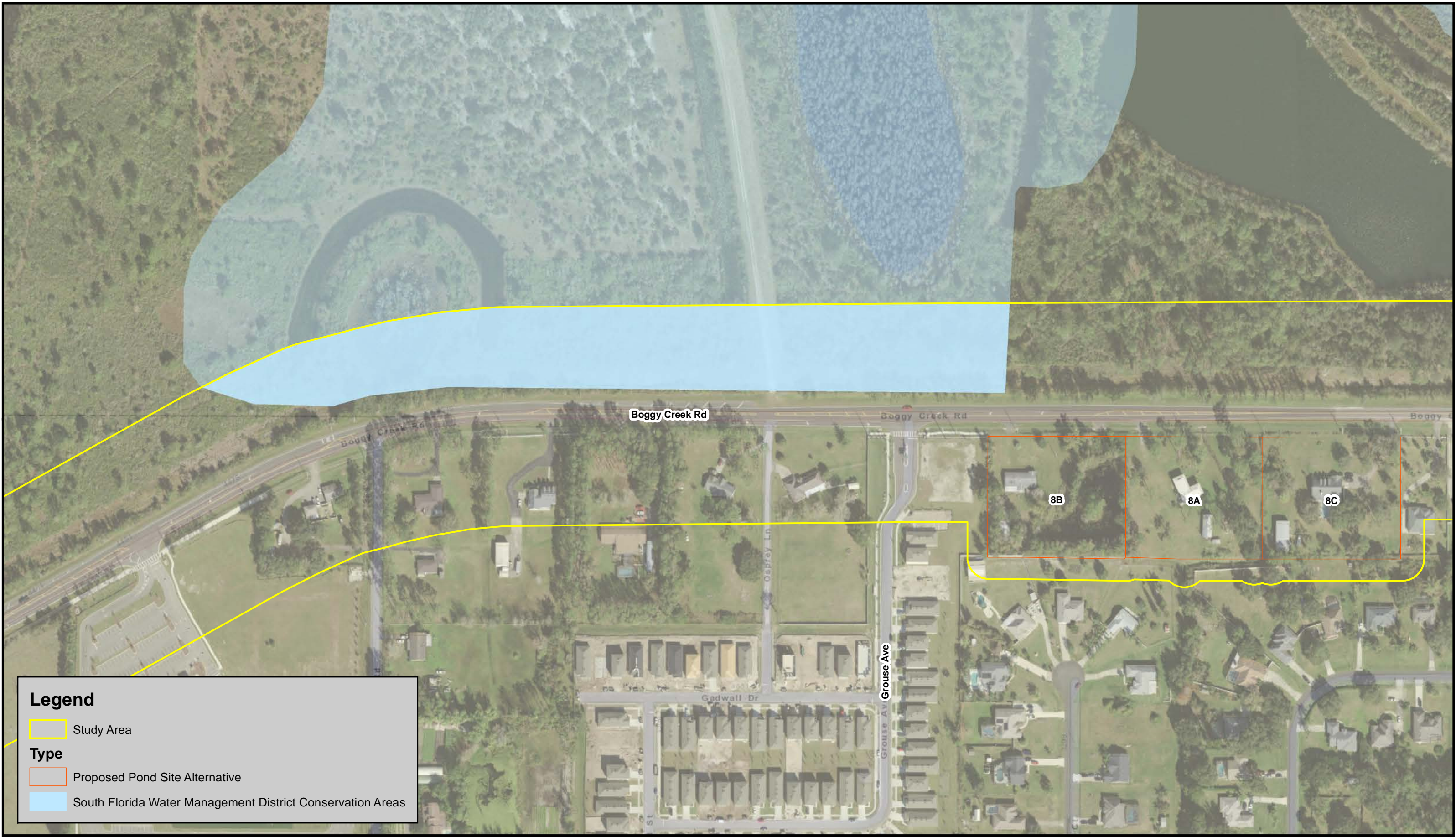


Legend

- Study Area
- Type**
- Proposed Pond Site Alternative
- South Florida Water Management District Conservation Areas

Boggy Creek Road (CR 530) Widening
 Simpson Road to Narcoossee Road
 Osceola County, FL
 Regulatory Conservation Easements - Sheet 3

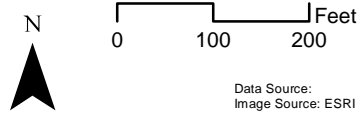




Boggy Creek Road (CR 530) Widening

Simpson Road to Narcoossee Road
Osceola County, FL

Regulatory Conservation Easements - Sheet 4



Data Source: ESRI
Image Source: ESRI

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE
U.S. Fish and Wildlife Service
August 12, 2013

The eastern indigo snake protection/education plan (Plan) below has been developed by the U.S. Fish and Wildlife Service (USFWS) in Florida for use by applicants and their construction personnel. At least **30 days prior** to any clearing/land alteration activities, the applicant shall notify the appropriate USFWS Field Office via e-mail that the Plan will be implemented as described below (North Florida Field Office: jaxregs@fws.gov; South Florida Field Office: verobeach@fws.gov; Panama City Field Office: panamacity@fws.gov). As long as the signatory of the e-mail certifies compliance with the below Plan (including use of the attached poster and brochure), no further written confirmation or “approval” from the USFWS is needed and the applicant may move forward with the project.

If the applicant decides to use an eastern indigo snake protection/education plan other than the approved Plan below, written confirmation or “approval” from the USFWS that the plan is adequate must be obtained. At least 30 days prior to any clearing/land alteration activities, the applicant shall submit their unique plan for review and approval. The USFWS will respond via e-mail, typically within 30 days of receiving the plan, either concurring that the plan is adequate or requesting additional information. A concurrence e-mail from the appropriate USFWS Field Office will fulfill approval requirements.

The Plan materials should consist of: 1) a combination of posters and pamphlets (see **Poster Information** section below); and 2) verbal educational instructions to construction personnel by supervisory or management personnel before any clearing/land alteration activities are initiated (see **Pre-Construction Activities** and **During Construction Activities** sections below).

POSTER INFORMATION

Posters with the following information shall be placed at strategic locations on the construction site and along any proposed access roads (a final poster for Plan compliance, to be printed on 11” x 17” or larger paper and laminated, is attached):

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands

and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTION UNDER FEDERAL AND STATE LAW: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. “Taking” of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. “Take” is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of \$25,000 for civil violations and up to \$50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the live eastern indigo snake sufficient time to move away from the site without interference;
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

Telephone numbers of USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida Field Office – (904) 731-3336
Panama City Field Office – (850) 769-0552
South Florida Field Office – (772) 562-3909

PRE-CONSTRUCTION ACTIVITIES

1. The applicant or designated agent will post educational posters in the construction office and throughout the construction site, including any access roads. The posters must be clearly visible to all construction staff. A sample poster is attached.
2. Prior to the onset of construction activities, the applicant/designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational brochure including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office (a final brochure for Plan compliance, to be printed double-sided on 8.5" x 11" paper and then properly folded, is attached). Photos of eastern indigo snakes may be accessed on USFWS and/or FWC websites.
3. Construction staff will be informed that in the event that an eastern indigo snake (live or dead) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Field Office. The contact information for the USFWS is provided on the referenced posters and brochures.

DURING CONSTRUCTION ACTIVITIES

1. During initial site clearing activities, an onsite observer may be utilized to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).
2. If an eastern indigo snake is discovered during gopher tortoise relocation activities (i.e. burrow excavation), the USFWS shall be contacted within one business day to obtain further guidance which may result in further project consultation.
3. Periodically during construction activities, the applicant's designated agent should visit the project area to observe the condition of the posters and Plan materials, and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.

POST CONSTRUCTION ACTIVITIES

Whether or not eastern indigo snakes are observed during construction activities, a monitoring report should be submitted to the appropriate USFWS Field Office within 60 days of project completion. The report can be sent electronically to the appropriate USFWS e-mail address listed on page one of this Plan.



United States Department of the Interior



FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

August 1, 2017

Donnie Kinard
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Subject: Consultation Key for the Eastern Indigo Snake – Revised

Dear Mr. Kinard:

This letter revises and replaces the January 25, 2010, and August 13, 2013, letters to the U.S. Army Corps of Engineers (Corps) regarding the use of the eastern indigo snake programmatic effect determination key (Key) for projects occurring within the South Florida Ecological Service's Office (SFESO) jurisdiction. This revision supersedes all prior versions of the Key in the SFESO area. The purpose of this revision is to clarify portions of the previous keys based on questions we have been asked, specifically related to habitat and refugia used by eastern indigo snakes (*Drymarchon corais couperi*), in the southern portion of their range and within the jurisdiction of the SFESO. This Key is provided pursuant to the Service's authorities under the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C.1531 *et seq.*). This Key revision has been assigned Service Consultation Code: 41420-2009-I-0467-R001.

The purpose of this Key is to assist the Corps (or other Federal action agency) in making appropriate effects determinations for the eastern indigo snake under section 7 of the Act, and streamline informal consultation with the SFESO for the eastern indigo snake when the proposed action can be walked through the Key. The Key is a tool available to the Corps (or other Federal action agency) for the purposes of expediting section 7 consultations. There is no requirement to use the Key. There will be cases when the use of the Key is not appropriate. These include, but are not limited to: where project specific information is outside of the scope of the Key or instances where there is new biological information about the species. In these cases, we recommend the Corps (or other Federal action agency) initiates traditional consultation pursuant to section 7 of the Act, and identify that consultation is being requested outside of the Key.

This Key uses project size and home ranges of eastern indigo snakes as the basis for making determinations of "may affect, but is not likely to adversely affect" (NLAA) and "may affect, and is likely to adversely affect" (may affect). Suitable habitat for the eastern indigo snake consists of a mosaic of habitats types, most of which occur throughout South Florida. Information on home ranges for individuals is not available in specific habitats in South Florida. Therefore, the SFESO uses the information from a 26-year study conducted by Layne and Steiner (1996) at Archbold Biological Station, Lake Placid, Florida, as the best available

information. Layne and Steiner (1996) determined the average home range size for a female eastern indigo snake was 46 acres and 184 acres for a male.

Projects that would remove/destroy less than 25 acres of eastern indigo snake habitat are expected to result in the loss of a portion of an eastern indigo snakes home range that would not impair the ability of the individual to feed, breed, and shelter. Therefore, the Service finds that take would not be reasonably certain to occur due to habitat loss. However, these projects have the potential to injure or kill an eastern indigo snake if the individual is crushed by equipment during site preparation or other project aspects. The Service's *Standard Protection Measures for the Eastern Indigo Snake* (Service 2013 or most current version) and the excavation of underground refugia (where a snake could be buried, trapped and/or injured), when implemented, are designed to avoid these forms of take. Consequently, projects less than 25 acres that include the Service's *Standard Protection Measures for the Eastern Indigo Snake* (Service 2013 or most current version) and a commitment to excavate underground refugia as part of the proposed action would be expected to avoid take and thus, may affect, but are not likely to adversely affect the species.

If a proposed project would impact less than 25 acres of vegetated eastern indigo snake habitat (not urban/ human-altered) completely surrounded by urban development, and an eastern indigo snake has been observed on site, the Key should not be used. The Service recommends formal consultation for this situation because of the expected increased value of the vegetated habitat within the individual's home range.

Projects that would remove 25 acres or more of eastern indigo snake habitat could remove more than half of a female eastern indigo snakes home range. This loss of habitat within a home range would be expected to significantly impair the ability of that individual to feed, breed, and shelter. Therefore, the Service finds take through habitat loss would be reasonably certain to occur and formal consultation is appropriate. Furthermore, these projects have the potential to injure or kill an eastern indigo snake if the individual is crushed by equipment during site preparation or other project aspects. The Service's *Standard Protection Measures for the Eastern Indigo Snake* (Service 2013 or most current version) and the excavation of underground refugia (where a snake could be buried, trapped and/or injured), when implemented, are designed to avoid these forms of take.

Eastern indigo snakes use a variety of habitat and are difficult to detect. Therefore, site specific information on the land use, observations of eastern indigo snakes within the vicinity, as well as other factors, as appropriate, will all be considered by the Service when making a final recommendation on the appropriate effects determination and whether it is appropriate to conclude consultation with the Corps (or other Federal action agency) formally or informally for projects that will impact 25 acres or more of habitat. Accordingly, when the use of the Key results in a determination of "may affect," the Corps (or other Federal action agency) is advised that consultation may be concluded informally or formally, depending on the project specific effects to eastern indigo snakes. Technical assistance from the Service can assist you in making a determination prior to submitting a request for consultation. In circumstances where the Corps (or other Federal action agency) desires to proceed with a consultation request prior to receiving

additional technical assistance from the Service, we recommend the agency documents the biological rationale for their determination and proceed with a request accordingly.

If the use of the Key results in a determination of “no effect,” no further consultation is necessary with the SFESO. If the use of the Key results in a determination of “NLAA,” the SFESO concurs with this determination based on the rationale provide above, and no further consultation is necessary for the effects of the proposed action on the eastern indigo snake. For “no effect” or “NLAA” determinations, the Service recommends that the Corps (or other Federal action agency) documents the pathway used to reach your no effect or NLAA determination in the project record and proceed with other species analysis as warranted.

Eastern Indigo Snake Programmatic Effect Determination Key
Revised July 2017
South Florida Ecological Service Office

Scope of the Key

This Key should be used only in the review of permit applications for effects determinations for the eastern indigo snake (*Drymarchon corais couperi*) within the South Florida Ecological Service’s Office (SFESO) area (Broward, Charlotte, Collier, De Soto, Glades, Hardee, Hendry, Highlands, Lee, Indian River, Martin, Miami-Dade, Monroe, Okeechobee, Osceola, Palm Beach, Polk, Sarasota, and St. Lucie Counties). There is no designated critical habitat for the eastern indigo snake.

This Key is subject to revision as the Corps (or other Federal action agency) and Service deem necessary and in particular whenever there is new information on eastern indigo snake biology and effects of proposed projects.

The Key is a tool available to the Corps (or other Federal action agency) for the purposes of expediting section 7 consultations. There is no requirement to use the Key. There will be cases when the use of the Key is not appropriate. These include, but are not limited to: where project specific information is outside of the scope of the Key or instances where there is new biological information about the species. In these cases, we recommend the Corps (or other Federal action agency) initiates traditional consultation pursuant to section 7 of the Act, and identify that consultation is being requested outside of the Key.

Habitat

Habitat use varies seasonally between upland and wetland areas, especially in the more northern parts of the species' range. In southern parts of their range eastern indigo snakes are habitat generalists which use most available habitat types. Movements between habitat types in northern areas of their range may relate to the need for thermal refugia (protection from cold and/or heat).

In northern areas of their range eastern indigo snakes prefer an interspersed of tortoise-inhabited sandhills and wetlands (Landers and Speake 1980). In these northern regions eastern indigo

snakes most often use forested areas rich with gopher tortoise burrows, hollowed root channels, hollow logs, or the burrows of rodents, armadillos, or land crabs as thermal refugia during cooler seasons (Lawler 1977; Moler 1985a; Layne and Steiner 1996). The eastern indigo snake in the northern region is typically classified as a longleaf pine savanna specialist because here, in the northern four-fifths of its range, the eastern indigo snake is typically only found in vicinity of xeric longleaf pine–turkey oak sandhills inhabited by the gopher tortoise (Means 2006).

In the milder climates of central and southern Florida, comprising the remaining one fifth of its range, thermal refugia such as those provided by gopher tortoise burrows may not be as critical to survival of indigo snakes. Consequently, eastern indigo snakes in these regions use a more diverse assemblage of habitats such as pine flatwoods, scrubby flatwoods, floodplain edges, sand ridges, dry glades, tropical hammocks, edges of freshwater marshes, muckland fields, coastal dunes, and xeric sandhill communities; with highest population concentrations of eastern indigo snakes occurring in the sandhill and pineland regions of northern and central Florida (Service 1999). Eastern indigo snakes have also been found on agricultural lands with close proximity to wetlands (Zeigler 2006).

In south Florida, agricultural sites (*e.g.*, sugar cane fields and citrus groves) are occupied by eastern indigo snakes. The use of sugarcane fields by eastern indigo snakes was first documented by Layne and Steiner in 1996. In these areas there is typically an abundance of wetland and upland ecotones (due to the presence of many ditches and canals), which support a diverse prey base for foraging. In fact, some speculate agricultural areas may actually have a higher density of eastern indigo snakes than natural communities due to the increased availability of prey. Gopher tortoise burrows are absent at these locations but there is an abundance of both natural and artificial refugia. Enge and Endries (2009) reporting on the status of the eastern indigo snake included sugarcane fields and citrus groves in a Global Information Systems (GIS)-base map of potential eastern indigo snake habitat. Numerous sightings of eastern indigo snakes within sugarcane fields have been reported within south Florida (Florida Fish and Wildlife Conservation Commission Indigo Snake Database [Enge 2017]). A recent study associated with the Comprehensive Everglades Restoration Plan (CERP) (A-1 FEB Project formerly A-1 Reservoir; Service code: 41420-2006-F-0477) documented eastern indigo snakes within sugarcane fields. The snakes used artificial habitats such as piles of limerock, construction debris, and pump stations. Recent studies also associated with the CERP at the C-44 Project (Service code: 41420-2009-FA-0314), and C-43 Project (Service code: 41420-2007-F-0589) documented eastern indigo snakes within citrus groves. The snakes used artificial habitats such as boards, sheets of tin, construction debris, pipes, drain pipes in abandoned buildings and septic tanks.

In extreme south Florida (*i.e.*, the Everglades and Florida Keys), eastern indigo snakes also utilize tropical hardwood hammocks, pine rocklands, freshwater marshes, abandoned agricultural land, coastal prairie, mangrove swamps, and human-altered habitats. Though eastern indigo snakes have been found in all available habitats of south Florida it is thought they prefer hammocks and pine forests since most observations occur there and use of these areas is disproportionate compared to the relatively small total area of these habitats (Steiner *et al.* 1983).

Even though thermal stress may not be a limiting factor throughout the year in south Florida, eastern indigo snakes still seek and use underground refugia. On the sandy central ridge of central Florida, eastern indigo snakes use gopher tortoise burrows more (62 percent) than other underground refugia (Layne and Steiner 1996). Other underground refugia used include armadillo (*Dasyurus novemcinctus*) burrows near citrus groves, cotton rat (*Sigmodon hispidus*) burrows, and land crab (*Cardisoma guanhumi*) burrows in coastal areas (Layne and Steiner 1996; Wilson and Porras 1983). Natural ground holes, hollows at the base of trees or shrubs, ground litter, trash piles, and crevices of rock-lined ditch walls are also used (Layne and Steiner 1996). These refugia are used most frequently where tortoise burrows are not available, principally in low-lying areas off the central and coastal ridges.

Minimization Measures

The Service developed protection measures for the eastern indigo snake “Standard Protection Measures for the Eastern Indigo Snake” (Service 2013) located at: https://www.fws.gov/verobeach/ReptilesPDFs/20130812_EIS%20Standard%20Protection%20Measures_final.pdf. These protection measures (or the most updated version) are considered a minimization measure for projects proposed within eastern indigo snake habitat.

Determinations

If the use of this Key results in a determination of “**no effect**,” no further consultation is necessary with the SFESO.

If the use of this Key results in a determination of “**NLAA**,” the SFESO concurs with this determination and no further consultation is necessary for the effects of the proposed action on the eastern indigo snake.

For no effect or NLAA determinations, the Corps (or other Federal action agency) should make a note in the project file indicating the pathway used to reach your no effect or NLAA determination.

If a proposed project would impact less than 25 acres of vegetated eastern indigo snake habitat (not urban/ human-altered) completely surrounded by urban development, and an eastern indigo snake has been observed on site, the subsequent Key should not be used. The Service recommends formal consultation for this situation because of the expected increased value of the vegetated habitat within the individual’s home range.

If the use of this Key results in a determination of “**may affect**,” consultation may be concluded informally or formally depending on project effects to eastern indigo snakes. Technical assistance from the Service can assist you in making a determination prior to submitting a request for consultation. In circumstances where the Corps desires to proceed with a consultation request prior to receiving additional technical assistance from the Service, we recommend the Corps document the biological rationale for their determination and proceed with a request accordingly.

A. Project is not located in open water or salt marsh.....go to B

Project is located solely in open water or salt marsh.....no effect

B. Permit will be conditioned for use of the Service's most current guidance for Standard Protection Measures For The Eastern Indigo Snake (currently 2013) during site preparation and project construction.....go to C

Permit will not be conditioned as above for the eastern indigo snake, or it is not known whether an applicant intends to use these measures and consultation with the Service is requested.....may affect

C. The project will impact less than 25 acres of eastern indigo snake habitat (e.g., sandhill, scrub, pine flatwoods, pine rocklands, scrubby flatwoods, high pine, dry prairie, coastal prairie, mangrove swamps, tropical hardwood hammocks, hydric hammocks, edges of freshwater marshes, agricultural fields [including sugar cane fields and active, inactive, or abandoned citrus groves], and coastal dunes).....go to D

The project will impact 25 acres or more of eastern indigo snake habitat (e.g., sandhill, scrub, pine flatwoods, pine rocklands, scrubby flatwoods, high pine, dry prairie, coastal prairie, mangrove swamps, tropical hardwood hammocks, hydric hammocks, edges of freshwater marshes, agricultural fields [including sugar cane fields and active, inactive, or abandoned citrus groves], and coastal dunes).....may affect

D. The project has no known holes, cavities, active or inactive gopher tortoise burrows, or other underground refugia where a snake could be buried, trapped and/or injured during project activities.....NLAA

The project has known holes, cavities, active or inactive gopher tortoise burrows, or other underground refugia where a snake could be buried, trapped and /or injured.....go to E

E. Any permit will be conditioned such that all gopher tortoise burrows, active or inactive, will be excavated prior to site manipulation in the vicinity of the burrow¹. If an eastern indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Any permit will also be conditioned such that holes, cavities, and snake refugia other than gopher tortoise burrows will be inspected each morning before planned site manipulation of a particular area, and, if occupied by an eastern indigo snake, no work will commence until the snake has vacated the vicinity of proposed work.....NLAA²

Permit will not be conditioned as outlined above.....may affect

End Key

¹ If excavating potentially occupied burrows, active or inactive, individuals must first obtain state authorization via a Florida Fish and Wildlife Conservation Commission Authorized Gopher Tortoise Agent permit. The excavation method selected should also minimize the potential for injury of an indigo snake. Applicants should follow the excavation guidance provided within the most current Gopher Tortoise Permitting Guidelines found at <http://myfwc.com/gophertortoise>.

² Please note, if the proposed project will impact less than 25 acres of vegetated eastern indigo snake habitat (not urban/ human-altered) completely surrounded by urban development, and an eastern indigo snake has been observed on site, NLAA is not the appropriate conclusion. The Service recommends formal consultation for this situation because of the expected increased value of the vegetated habitat within the individual's home range

Working with the Fish and Wildlife Foundation of Florida, the Service has established a fund to support conservation and recovery for the eastern indigo snake. Any project that has the potential to affect the eastern indigo snake and/or its habitat is encouraged to make a voluntary contribution to this fund. If you would like additional information about how to make a contribution and how these monies are used to support eastern indigo snake recovery please contact Ashleigh Blackford, Connie Cassler, or José Rivera at 772-562-3559.

This revised Key is effective immediately upon receipt by the Corps. Should circumstances change or new information become available regarding the eastern indigo snake and/or implementation of the Key, the determinations herein may be reconsidered and this Key further revised or amended.

Thank you for your continued cooperation in the effort to conserve fish and wildlife resources. If you have any questions or comments regarding this Key, please contact the SFESO at 772-562-3909.

Sincerely,



Roxanna Hinzman
Field Supervisor
South Florida Ecological Services

Cc:

Corps, Jacksonville, Florida (Dale Beter, Muriel Blaisdell, Ingrid Gilbert, Angela Ryan,
Irene Sadowski, Victoria White, Alisa Zarbo)
Service, Athens, Georgia (Michelle Elmore)
Service, Jacksonville, Florida (Annie Dziergowski)
Service, Panama City, Florida (Sean Blomquist)

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United States Department of the Interior



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South Florida Ecological Services Office
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May 18, 2010

Donnie Kinard
Chief, Regulatory Division
Jacksonville District Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Service Federal Activity Code: 41420-2007-FA-1494
Service Consultation Code: 41420-2007-I-0964
Subject: South Florida Programmatic
Concurrence
Species: Wood Stork

Dear Mr. Kinard:

This letter addresses minor errors identified in our January 25, 2010, wood stork key and as such, supplants the previous key. The key criteria and wood stork biomass foraging assessment methodology have not been affected by these minor revisions.

The Fish and Wildlife Service's (Service) South Florida Ecological Services Office (SFESO) and the U.S. Army Corps of Engineers Jacksonville District (Corps) have been working together to streamline the consultation process for federally listed species associated with the Corps' wetland permitting program. The Service provided letters to the Corps dated March 23, 2007, and October 18, 2007, in response to a request for a multi-county programmatic concurrence with a criteria-based determination of "may affect, not likely to adversely affect" (NLAA) for the threatened eastern indigo snake (*Drymarchon corais couperi*) and the endangered wood stork (*Mycteria americana*) for projects involving freshwater wetland impacts within specified Florida counties. In our letters, we provided effect determination keys for these two federally listed species, with specific criteria for the Service to concur with a determination of NLAA.

The Service has revisited these keys recently and believes new information provides cause to revise these keys. Specifically, the new information relates to foraging efficiencies and prey base assessments for the wood stork and permitting requirements for the eastern indigo snake. This letter addresses the wood stork key and is submitted in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). The eastern indigo snake key will be provided in a separate letter.

Wood stork

Habitat

The wood stork is primarily associated with freshwater and estuarine habitats that are used for nesting, roosting, and foraging. Wood storks typically construct their nests in medium to tall

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trees that occur in stands located either in swamps or on islands surrounded by relatively broad expanses of open water (Ogden 1991, 1996; Rodgers et al. 1996). Successful colonies are those that have limited human disturbance and low exposure to land-based predators. Nesting colonies protected from land-based predators are characterized as those surrounded by large expanses of open water or where the nest trees are inundated at the onset of nesting and remain inundated throughout most of the breeding cycle. These colonies have water depths between 0.9 and 1.5 meters (3 and 5 feet) during the breeding season.

Successful nesting generally involves combinations of average or above-average rainfall during the summer rainy season and an absence of unusually rainy or cold weather during the winter-spring breeding season (Kahl 1964; Rodgers et al. 1987). This pattern produces widespread and prolonged flooding of summer marshes, which maximize production of freshwater fishes, followed by steady drying that concentrate fish during the season when storks nest (Kahl 1964). Successful nesting colonies are those that have a large number of foraging sites. To maintain a wide range of foraging sites, a variety of wetland types should be present, with both short and long hydroperiods. The Service (1999) describes a short hydroperiod as a 1 to 5-month wet/dry cycle, and a long hydroperiod as greater than 5 months. During the wet season, wood storks generally feed in the shallow water of the short-hydroperiod wetlands and in coastal habitats during low tide. During the dry season, foraging shifts to longer hydroperiod interior wetlands as they progressively dry-down (though usually retaining some surface water throughout the dry season).

Wood storks occur in a wide variety of wetland habitats. Typical foraging sites for the wood stork include freshwater marshes and stock ponds, shallow, seasonally flooded roadside and agricultural ditches, narrow tidal creeks and shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. Because of their specialized feeding behavior, wood storks forage most effectively in shallow-water areas with highly concentrated prey. Through tactolocation, or grope feeding, wood storks in south Florida feed almost exclusively on fish between 2 and 25 centimeters [cm] (1 and 10 inches) in length (Ogden et al. 1976). Good foraging conditions are characterized by water that is relatively calm, uncluttered by dense thickets of aquatic vegetation, and having a water depth between 5 and 38 cm (5 and 15 inches) deep, although wood storks may forage in other wetlands. Ideally, preferred foraging wetlands would include a mosaic of emergent and shallow open-water areas. The emergent component provides nursery habitat for small fish, frogs, and other aquatic prey and the shallow, open-water areas provide sites for concentration of the prey during seasonal dry-down of the wetland.

Conservation Measures

The Service routinely concurs with the Corps' "may affect, not likely to adversely affect" determination for individual project effects to the wood stork when project effects are insignificant due to scope or location, or if assurances are given that wetland impacts have been avoided, minimized, and adequately compensated such that there is no net loss in foraging potential. We utilize our *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (Service 1990) (Enclosure 1) (HMG) in project evaluation. The HMG is currently under review and once final will replace the enclosed HMG. There is no designated critical habitat for the wood stork.

The SFESO recognizes a 29.9 kilometer [km] (18.6-mile) core foraging area (CFA) around all known wood stork colonies in south Florida. Enclosure 2 (to be updated as necessary) provides locations of colonies and their CFAs in south Florida that have been documented as active within the last 10 years. The Service believes loss of suitable wetlands within these CFAs may reduce foraging opportunities for the wood stork. To minimize adverse effects to the wood stork, we recommend compensation be provided for impacts to foraging habitat. The compensation should consider wetland type, location, function, and value (hydrology, vegetation, prey utilization) to ensure that wetland functions lost due to the project are adequately offset. Wetlands offered as compensation should be of the same hydroperiod and located within the CFAs of the affected wood stork colonies. The Service may accept, under special circumstances, wetland compensation located outside the CFAs of the affected wood stork nesting colonies. On occasion, wetland credits purchased from a "Service Approved" mitigation bank located outside the CFAs could be acceptable to the Service, depending on location of impacted wetlands relative to the permitted service area of the bank, and whether or not the bank has wetlands having the same hydroperiod as the impacted wetland.

In an effort to reduce correspondence in effect determinations and responses, the Service is providing the Wood Stork Effect Determination Key below. If the use of this key results in a Corps determination of "no effect" for a particular project, the Service supports this determination. If the use of this Key results in a determination of NLAA, the Service concurs with this determination¹. This Key is subject to revisitation as the Corps and Service deem necessary.

The Key is as follows:

- A. Project within 0.76 km (0.47 mile)² of an active colony site³ "may affect"⁴
- Project impacts Suitable Foraging Habitat (SFH)⁵ at a location greater than 0.76 km (0.47 mile) from a colony site..... "go to B"

¹ With an outcome of "no effect" or "NLAA" as outlined in this key, and the project has less than 20.2 hectares (50 acres) of wetland impacts, the requirements of section 7 of the Act are fulfilled for the wood stork and no further action is required. For projects with greater than 20.2 hectares (50 acres) of wetland impacts, written concurrence of NLAA from the Service is necessary.

² Within the secondary zone (the average distance from the border of a colony to the limits of the secondary zone is 0.76 km (2,500 feet, or 0.47 mi).

³ An active colony is defined as a colony that is currently being used for nesting by wood storks or has historically over the last 10 years been used for nesting by wood storks.

⁴ Consultation may be concluded informally or formally depending on project impacts.

⁵ Suitable foraging habitat (SFH) includes wetlands that typically have shallow-open water areas that are relatively calm and have a permanent or seasonal water depth between 5 to 38 cm (2 to 15 inches) deep. Other shallow non-wetland water bodies are also SFH. SFH supports and concentrates, or is capable of supporting and concentrating small fish, frogs, and other aquatic prey. Examples of SFH include, but are not limited to freshwater marshes, small ponds, shallow, seasonally flooded roadside or agricultural ditches, seasonally flooded pastures, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs.

Project does not affect SFH.....“no effect”.

B. Project impact to SFH is less than 0.20 hectare (one-half acre)⁶.....NLAA¹”

Project impact to SFH is greater in scope than 0.20 hectare (one-half acre).....go to C

C. Project impacts to SFH not within the CFA (29.9 km, 18.6 miles) of a colony sitego to D

Project impacts to SFH within the CFA of a colony sitego to E

D. Project impacts to SFH have been avoided and minimized to the extent practicable; compensation (Service approved mitigation bank or as provided in accordance with Mitigation Rule 33 CFR Part 332) for unavoidable impacts is proposed in accordance with the CWA section 404(b)(1) guidelines; and habitat compensation replaces the foraging value matching the hydroperiod⁷ of the wetlands affected and provides foraging value similar to, or higher than, that of impacted wetlands. See Enclosure 3 for a detailed discussion of the hydroperiod foraging values, an example, and further guidance⁸..... NLAA¹”

Project not as above..... “may affect⁴”

E. Project provides SFH compensation in accordance with the CWA section 404(b)(1) guidelines and is not contrary to the HMG; habitat compensation is within the appropriate CFA or within the service area of a Service-approved mitigation bank; and habitat compensation replaces foraging value, consisting of wetland enhancement or restoration matching the hydroperiod⁷ of the wetlands affected, and provides foraging value similar

⁶ On an individual basis, SFH impacts to wetlands less than 0.20 hectare (one-half acre) generally will not have a measurable effect on wood storks, although we request that the Corps require mitigation for these losses when appropriate. Wood storks are a wide ranging species, and individually, habitat change from impacts to SFH less than one-half acre are not likely to adversely affect wood storks. However, collectively they may have an effect and therefore regular monitoring and reporting of these effects are important.

⁷ Several researchers (Flemming et al. 1994; Ceilley and Bortone 2000) believe that the short hydroperiod wetlands provide a more important pre-nesting foraging food source and a greater early nestling survivor value for wood storks than the foraging base (grams of fish per square meter) than long hydroperiod wetlands provide. Although the short hydroperiod wetlands may provide less fish, these prey bases historically were more extensive and met the foraging needs of the pre-nesting storks and the early-age nestlings. Nest productivity may suffer as a result of the loss of short hydroperiod wetlands. We believe that most wetland fill and excavation impacts permitted in south Florida are in short hydroperiod wetlands. Therefore, we believe that it is especially important that impacts to these short hydroperiod wetlands within CFAs are avoided, minimized, and compensated for by enhancement/restoration of short hydroperiod wetlands.

⁸ For this Key, the Service requires an analysis of foraging prey base losses and enhancements from the proposed action as shown in the examples in Enclosure 3 for projects with greater than 2.02 hectares (5 acres) of wetland impacts. For projects with less than 2.02 hectares (5 acres) of wetland impacts, an individual foraging prey base analysis is not necessary although type for type wetland compensation is still a requirement of the Key.

to, or higher than, that of impacted wetlands. See Enclosure 3 for a detailed discussion of the hydroperiod foraging values, an example, and further guidance⁸ “NLAA¹”

Project does not satisfy these elements “may affect⁴”

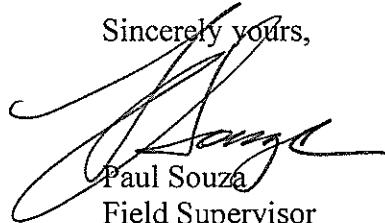
This Key does not apply to Comprehensive Everglades Restoration Plan projects, as they will require project-specific consultations with the Service.

Monitoring and Reporting Effects

For the Service to monitor cumulative effects, it is important for the Corps to monitor the number of permits and provide information to the Service regarding the number of permits issued where the effect determination was: “may affect, not likely to adversely affect.” We request that the Corps send us an annual summary consisting of: project dates, Corps identification numbers, project acreages, project wetland acreages, and project locations in latitude and longitude in decimal degrees.

Thank you for your cooperation and effort in protecting federally listed species. If you have any questions, please contact Allen Webb at extension 246.

Sincerely yours,



Paul Souza
Field Supervisor
South Florida Ecological Services Office

Enclosures

- cc: w/enclosures (electronic only)
- Corps, Jacksonville, Florida (Stu Santos)
- EPA, West Palm Beach, Florida (Richard Harvey)
- FWC, Vero Beach, Florida (Joe Walsh)
- Service, Jacksonville, Florida (Billy Brooks)

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HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION



**HABITAT MANAGEMENT GUIDELINES
FOR THE WOOD STORK IN THE
SOUTHEAST REGION**

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HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Introduction

A number of Federal and state laws and/or regulations prohibit, cumulatively, such acts as harrassing, disturbing, harming, molesting, pursuing, etc., wood storks, or destroying their nests (see Section VII). Although advisory in nature, these guidelines represent a biological interpretation of what would constitute violations of one or more of such prohibited acts. Their purpose is to maintain and/or improve the environmental conditions that are required for the survival and well-being of wood storks in the southeastern United States, and are designed essentially for application in wood stork/human activity conflicts (principally land development and human intrusion into stork use sites). The emphasis is to avoid or minimize detrimental human-related impacts on wood storks. These guidelines were prepared in consultations with state wildlife agencies and wood stork experts in the four southeastern states where the wood stork is listed as Endangered (Alabama, Florida, Georgia, South Carolina).

General

The wood stork is a gregarious species, which nests in colonies (rookeries), and roosts and feeds in flocks, often in association with other species of long-legged water birds. Storks that nest in the southeastern United States appear to represent a distinct population, separate from the nearest breeding population in Mexico. Storks in the southeastern U.S. population have recently (since 1980) nested in colonies scattered throughout Florida, and at several central-southern Georgia and coastal South Carolina sites. Banded and color-marked storks from central and southern Florida colonies have dispersed during non-breeding seasons as far north as southern Georgia, and the coastal counties in South Carolina and southeastern North Carolina, and as far west as central Alabama and northeastern Mississippi. Storks from a colony in south-central Georgia have wintered between southern Georgia and southern Florida. This U.S. nesting population of wood storks was listed as endangered by the U.S. Fish and Wildlife Service on February 28, 1984 (*Federal Register* 49(4):7332-7335).

Wood storks use freshwater and estuarine wetlands as feeding, nesting, and roosting sites. Although storks are not habitat specialists, their needs are exacting enough, and available habitat is limited enough, so that nesting success and the size of regional populations are closely regulated by year-to-year differences in the quality and quantity of suitable habitat. Storks are especially sensitive to environmental conditions at feeding sites; thus, birds may fly relatively long distances either daily or between regions annually, seeking adequate food resources.

All available evidence suggests that regional declines in wood stork numbers have been largely due to the loss or degradation of essential wetland habitat. An understanding of the qualities of good stork habitat should help to focus protection efforts on those sites

that are seasonally important to regional populations of wood storks. Characteristics of feeding, nesting, and roosting habitat, and management guidelines for each, are presented here by habitat type.

I. Feeding habitat.

A major reason for the wood stork decline has been the loss and degradation of feeding habitat. Storks are especially sensitive to any manipulation of a wetland site that results in either reduced amounts or changes in the timing of food availability.

Storks feed primarily (often almost exclusively) on small fish between 1 and 8 inches in length. Successful foraging sites are those where the water is between 2 and 15 inches deep. Good feeding conditions usually occur where water is relatively calm and uncluttered by dense thickets of aquatic vegetation. Often a dropping water level is necessary to concentrate fish at suitable densities. Conversely, a rise in water, especially when it occurs abruptly, disperses fish and reduces the value of a site as feeding habitat.

The types of wetland sites that provide good feeding conditions for storks include: drying marshes or stock ponds, shallow roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, and depressions in cypress heads or swamp sloughs. In fact, almost any shallow wetland depression where fish tend to become concentrated, either through local reproduction or the consequences of area drying, may be used by storks.

Nesting wood storks do most of their feeding in wetlands between 5 and 40 miles from the colony, and occasionally at distances as great as 75 miles. Within this colony foraging range and for the 110-150 day life of the colony, and depending on the size of the colony and the nature of the surrounding wetlands, anywhere from 50 to 200 different feeding sites may be used during the breeding season.

Non-breeding storks are free to travel much greater distances and remain in a region only for as long as sufficient food is available. Whether used by breeders or non-breeders, any single feeding site may at one time have small or large numbers of storks (1 to 100+), and be used for one to many days, depending on the quality and quantity of available food. Obviously, feeding sites used by relatively large numbers of storks, and/or frequently used areas, potentially are the more important sites necessary for the maintenance of a regional population of birds.

Differences between years in the seasonal distribution and amount of rainfall usually mean that storks will differ between years in where and when they feed. Successful nesting colonies are those that have a large number of feeding site options, including sites that may be suitable only in years of rainfall extremes. To maintain the wide range of feeding site options requires that many different wetlands, with both relatively short and long annual hydroperiods, be preserved. For example, protecting only the larger wetlands, or those with longer annual hydroperiods, will result in the eventual loss of smaller, seemingly less important wetlands. However, these small scale wetlands are crucial as the only available feeding sites during the wetter periods when the larger habitats are too deeply flooded to be used by storks.

II. Nesting habitat.

Wood storks nest in colonies, and will return to the same colony site for many years so long as that site and surrounding feeding habitat continue to supply the needs of the birds. Storks require between 110 and 150 days for the annual nesting cycle, from the period of courtship until the nestlings become independent. Nesting activity may begin as early as December or as late as March in southern Florida colonies, and between late February and April in colonies located between central Florida and South Carolina. Thus, full term colonies may be active until June-July in south Florida, and as late as July-August at more northern sites. Colony sites may also be used for roosting by storks during other times of the year.

Almost all recent nesting colonies in the southeastern U.S. have been located either in woody vegetation over standing water, or on islands surrounded by broad expanses of open water. The most dominant vegetation in swamp colonies has been cypress, although storks also nest in swamp hardwoods and willows. Nests in island colonies may be in more diverse vegetation, including mangroves (coastal), exotic species such as Australian pine (*Casuarina*) and Brazilian Pepper (*Schinus*), or in low thickets of cactus (*Opuntia*). Nests are usually located 15-75 feet above ground, but may be much lower, especially on island sites when vegetation is low.

Since at least the early 1970's, many colonies in the southeastern U.S. have been located in swamps where water has been impounded due to the construction of levees or roadways. Storks have also nested in dead and dying trees in flooded phosphate surface mines, or in low, woody vegetation on mounded, dredge islands. The use of these altered wetlands or completely "artificial" sites suggests that in some regions or years storks are unable to locate natural nesting habitat that is adequately flooded during the normal breeding season. The readiness with which storks will utilize water impoundments for nesting also suggests that colony sites could be intentionally created and maintained through long-term site management plans. Almost all impoundment sites used by storks become suitable for nesting only fortuitously, and therefore, these sites often do not remain available to storks for many years.

In addition to the irreversible impacts of drainage and destruction of nesting habitat, the greatest threats to colony sites are from human disturbance and predation. Nesting storks show some variation in the levels of human activity they will tolerate near a colony. In general, nesting storks are more tolerant of low levels of human activity near a colony when nests are high in trees than when they are low, and when nests contain partially or completely feathered young than during the period between nest construction and the early nestling period (adults still brooding). When adult storks are forced to leave their nests, eggs or downy young may die quickly (<20 minutes) when exposed to direct sun or rain.

Colonies located in flooded environments must remain flooded if they are to be successful. Often water is between 3 and 5 feet deep in successful colonies during the nesting season. Storks rarely form colonies, even in traditional nesting sites, when they are dry, and may abandon nests if sites become dry during the nesting period. Flooding in colonies may be most important as a defense against mammalian predators. Studies of stork colonies in Georgia and

Florida have shown high rates of raccoon predation when sites dried during the nesting period. A reasonably high water level in an active colony is also a deterrent against both human and domestic animal intrusions.

Although nesting wood storks usually do most feeding away from the colony site (>5 miles), considerable stork activity does occur close to the colony during two periods in the nesting cycle. Adult storks collect almost all nesting material in and near the colony, usually within 2500 feet. Newly fledged storks, near the end of the nesting cycle, spend from 1-4 weeks during the fledging process flying locally in the colony area, and perched in nearby trees or marshy spots on the ground. These birds return daily to their nests to be fed. It is essential that these fledging birds have little or no disturbance as far out as one-half mile within at least one or two quadrants from the colony. Both the adults, while collecting nesting material, and the inexperienced fledglings, do much low, flapping flight within this radius of the colony. At these times, storks potentially are much more likely to strike nearby towers or utility lines.

Colony sites are not necessarily used annually. Regional populations of storks shift nesting locations between years, in response to year-to-year differences in food resources. Thus, regional populations require a range of options for nesting sites, in order to successfully respond to food availability. Protection of colony sites should continue, therefore, for sites that are not used in a given year.

III. Roosting habitat.

Although wood storks tend to roost at sites that are similar to those used for nesting, they also use a wider range of site types for roosting than for nesting. Non-breeding storks, for example, may frequently change roosting sites in response to changing feeding locations, and in the process, are inclined to accept a broad range of relatively temporary roosting sites. Included in the list of frequently used roosting locations are cypress "heads" or swamps (not necessarily flooded if trees are tall), mangrove islands, expansive willow thickets or small, isolated willow "islands" in broad marshes, and on the ground either on levees or in open marshes.

Daily activity patterns at a roost vary depending on the status of the storks using the site. Non-breeding adults or immature birds may remain in roosts during major portions of some days. When storks are feeding close to a roost, they may remain on the feeding grounds until almost dark before making the short flight. Nesting storks traveling long distances (>40 miles) to feeding sites may roost at or near the latter, and return to the colony the next morning. Storks leaving roosts, especially when going long distances, tend to wait for mid-morning thermals to develop before departing.

IV. Management zones and guidelines for feeding sites.

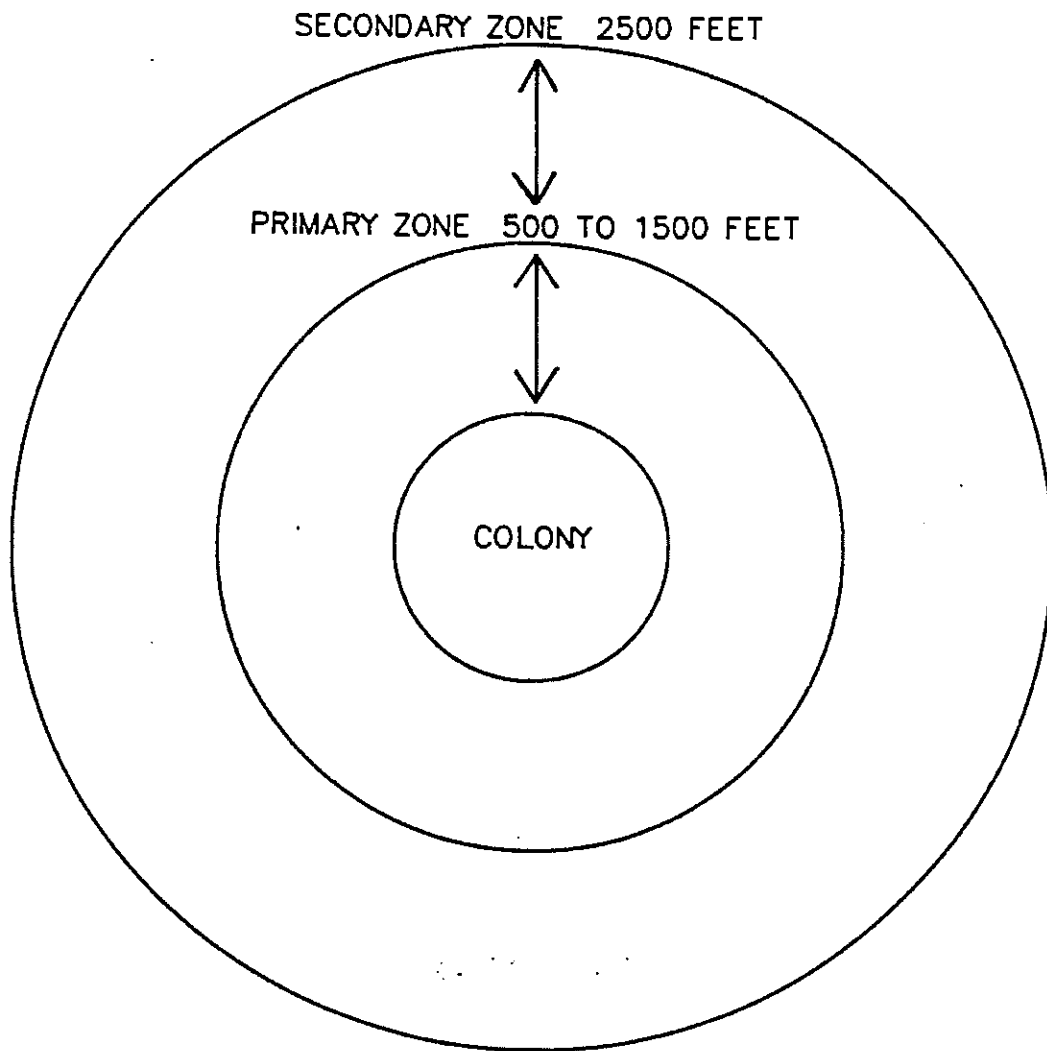
To the maximum extent possible, feeding sites should be protected by adherence to the following protection zones and guidelines:

- A. There should be no human intrusion into feeding sites when storks are present. Depending upon the amount of screening vegetation, human activity should be no closer than between 300 feet (where solid vegetation screens exist) and 750 feet (no vegetation screen).

- B. Feeding sites should not be subjected to water management practices that alter traditional water levels or the seasonally normal drying patterns and rates. Sharp rises in water levels are especially disruptive to feeding storks.
- C. The introduction of contaminants, fertilizers, or herbicides into wetlands that contain stork feeding sites should be avoided, especially those compounds that could adversely alter the diversity and numbers of native fishes, or that could substantially change the characteristics of aquatic vegetation. Increase in the density and height of emergent vegetation can degrade or destroy sites as feeding habitat.
- D. Construction of tall towers (especially with guy wires) within three miles, or high power lines (especially across long stretches of open country) within one mile of major feeding sites should be avoided.

V. Management zones and guidelines for nesting colonies.

- A. Primary zone: This is the most critical area, and must be managed according to recommended guidelines to insure that a colony site survives.
 - 1. Size: The primary zone must extend between 1000 and 1500 feet in all directions from the actual colony boundaries when there are no visual or broad aquatic barriers, and never less than 500 feet even when there are strong visual or aquatic barriers. The exact width of the primary zone in each direction from the colony can vary within this range, depending on the amount of visual screen (tall trees) surrounding the colony, the amount of relatively deep, open water between the colony and the nearest human activity, and the nature of the nearest human activity. In general, storks forming new colonies are more tolerant of existing human activity, than they will be of new human activity that begins after the colony has formed.
 - 2. Recommended Restrictions:
 - a. Any of the following activities within the primary zone, at any time of the year, are likely to be detrimental to the colony:
 - (1) Any lumbering or other removal of vegetation, and
 - (2) Any activity that reduces the area, depth, or length of flooding in wetlands under and surrounding the colony, except where periodic (less than annual) water control may be required to maintain the health of the aquatic, woody vegetation, and
 - (3) The construction of any building, roadway, tower, power line, canal, etc.
 - b. The following activities within the primary zone are likely to be detrimental to a colony if they occur when the colony is active:
 - (1) Any unauthorized human entry closer than 300 feet of the colony, and



- (2) Any increase or irregular pattern in human activity anywhere in the primary zone, and
 - (3) Any increase or irregular pattern in activity by animals, including livestock or pets, in the colony, and
 - (4) Any aircraft operation closer than 500 feet of the colony.
- B. Secondary Zone: Restrictions in this zone are needed to minimize disturbances that might impact the primary zone, and to protect essential areas outside of the primary zone. The secondary zone may be used by storks for collecting nesting material, for roosting, loafing, and feeding (especially important to newly fledged young), and may be important as a screen between the colony and areas of relatively intense human activities.
- 1. Size: The secondary zone should range outward from the primary zone 1000-2000 feet, or to a radius of 2500 feet of the outer edge of the colony.
 - 2. Recommended Restrictions:
 - a. Activities in the secondary zone which may be detrimental to nesting wood storks include:
 - (1) Any increase in human activities above the level that existed in the year when the colony first formed, especially when visual screens are lacking, and
 - (2) Any alteration in the area's hydrology that might cause changes in the primary zone, and
 - (3) Any substantial (>20 percent) decrease in the area of wetlands and woods of potential value to storks for roosting and feeding.
 - b. In addition, the probability that low flying storks, or inexperienced, newly-fledged young will strike tall obstructions, requires that high-tension power lines be no closer than one mile (especially across open country or in wetlands) and tall transmission towers no closer than 3 miles from active colonies. Other activities, including busy highways and commercial and residential buildings may be present in limited portions of the secondary zone at the time that a new colony first forms. Although storks may tolerate existing levels of human activities, it is important that these human activities not expand substantially.

VI. Roosting site guidelines.

The general characteristics and temporary use-patterns of many stork roosting sites limit the number of specific management recommendations that are possible:

- A. Avoid human activities within 500-1000 feet of roost sites during seasons of the year and times of the day when storks may be present. Nocturnal activities in active roosts may be especially disruptive.

- B. Protect the vegetative and hydrological characteristics of the more important roosting sites--those used annually and/or used by flocks of 25 or more storks. Potentially, roosting sites may, some day, become nesting sites.

VII. Legal Considerations.

A. Federal Statutes

The U.S. breeding population of the wood stork is protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)(Act). The population was listed as endangered on February 28, 1984 (49 Federal Register 7332); wood storks breeding in Alabama, Florida, Georgia, and South Carolina are protected by the Act.

Section 9 of the Endangered Species Act of 1973, as amended, states that it is unlawful for any person subject to the jurisdiction of the United States to take (defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.") any listed species anywhere within the United States.

The wood stork is also federally protected by its listing (50 CFR 10.13) under the Migratory Bird Treaty Act (167 U.S.C. 703-711), which prohibits the taking, killing or possession of migratory birds except as permitted.

B. State Statutes

1. State of Alabama

Section 9-11-232 of Alabama's Fish, Game, and Wildlife regulations curtails the possession, sale, and purchase of wild birds. "Any person, firm, association, or corporation who takes, catches, kills or has in possession at any time, living or dead, any protected wild bird not a game bird or who sells or offers for sale, buys, purchases or offers to buy or purchase any such bird or exchange same for anything of value or who shall sell or expose for sale or buy any part of the plumage, skin, or body of any bird protected by the laws of this state or who shall take or willfully destroy the nests of any wild bird or who shall have such nests or eggs of such birds in his possession, except as otherwise provided by law, shall be guilty of a misdemeanor..."

Section 1 of the Alabama Nongame Species Regulation (Regulation 87-GF-7) includes the wood stork in the list of nongame species covered by paragraph (4). " It shall be unlawful to take, capture, kill, possess, sell, trade for anything of monetary value, or offer to sell or trade for anything of monetary value, the following nongame wildlife species (or any parts or reproductive products of such species) without a scientific collection permit and written permission from the Commissioner, Department of Conservation and Natural Resources,..."

2. State of Florida

Rule 39-4.001 of the Florida Wildlife Code prohibits "taking, attempting to take, pursuing, hunting, molesting, capturing, or killing (collectively defined as "taking"), transporting, storing, serving, buying, selling,

possessing, or wantonly or willingly wasting any wildlife or freshwater fish or their nests, eggs, young, homes, or dens except as specifically provided for in other rules of Chapter 39, Florida Administrative Code.

Rule 39-27.011 of the Florida Wildlife Code prohibits "killing, attempting to kill, or wounding any endangered species." The "Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida" dated 1 July 1988, includes the wood stork, listed as "endangered" by the Florida Game and Fresh Water Fish Commission.

3. State of Georgia

Section 27-1-28 of the Conservation and Natural Resources Code states that "Except as otherwise provided by law, rule, or regulation, it shall be unlawful to hunt, trap, fish, take, possess, or transport any nongame species of wildlife..."

Section 27-1-30 states that, "Except as otherwise provided by law or regulation, it shall be unlawful to disturb, mutilate, or destroy the dens, holes, or homes of any wildlife; "

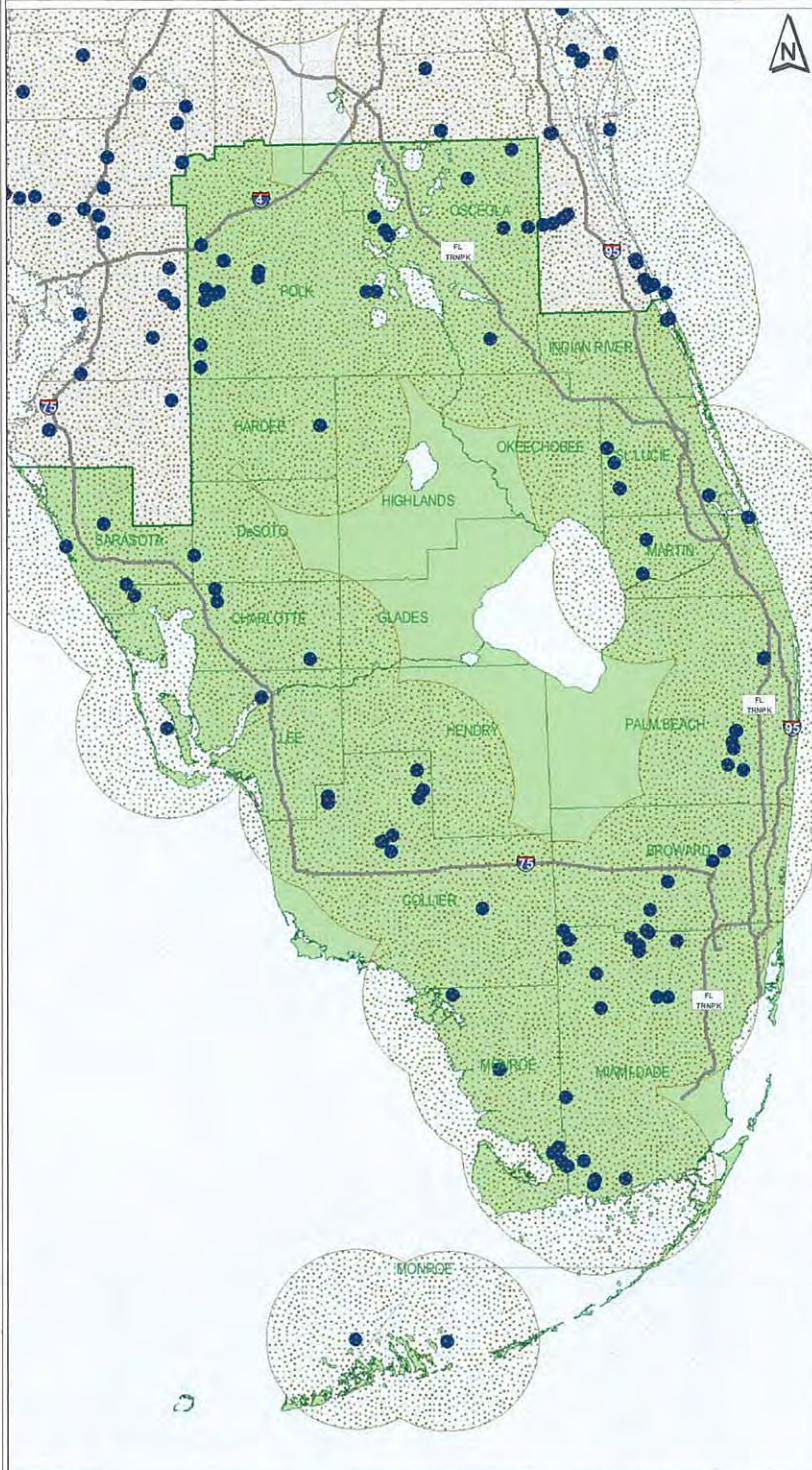
Section 27-3-22 states, in part, "It shall be unlawful for any person to hunt, trap, take, possess, sell, purchase, ship, or transport any hawk, eagle, owl, or any other bird or any part, nest, or egg thereof..."

The wood stork is listed as endangered pursuant to the Endangered Wildlife Act of 1973 (Section 27-3-130 of the Code). Section 391-4-13-.06 of the Rules and Regulations of the Georgia Department of Natural Resources prohibits harassment, capture, sale, killing, or other actions which directly cause the death of animal species protected under the Endangered Wildlife Act. The destruction of habitat of protected species on public lands is also prohibited.

4. State of South Carolina

Section 50-15-40 of the South Carolina Nongame and Endangered Species Conservation Act states, "Except as otherwise provided in this chapter, it shall be unlawful for any person to take, possess, transport, export, process, sell, or offer of sale or ship, and for any common or contract carrier knowingly to transport or receive for shipment any species or subspecies of wildlife appearing on any of the following lists: (1) the list of wildlife indigenous to the State, determined to be endangered within the State...(2) the United States' List of Endangered Native Fish and Wildlife... (3) the United States' List of Endangered Foreign Fish and Wildlife ..."

Wood Stork



Nesting Colonies Core Foraging Areas

1999 to 2005

- Colony Location
- ▨ Core Foraging Area
- South Florida Service Area



Produced by:
South Florida Ecological Services Office
<http://verobeach.fws.gov>
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Enclosure 3

Wood Stork Foraging Analysis: Excerpts of concepts and procedure as presented by the Service in this appendix may be viewed in detail in any one of our recent Biological Opinions for project related impacts to the wood stork. These documents can be found at the internet website address <http://www.fws.gov/filedownloads/ftp%5verobeach>.

Foraging Habitat

Researchers have shown that wood storks forage most efficiently and effectively in habitats where prey densities are high and the water shallow and canopy open enough to hunt successfully (Ogden et al. 1978, Browder 1984, Coulter 1987). Prey availability to wood storks is dependent on a composite variable consisting of density (number or biomass/m²) and the vulnerability of the prey items to capture (Gawlik 2002). For wood storks, prey vulnerability appears to be largely controlled by physical access to the foraging site, water depth, the density of submerged vegetation, and the species-specific characteristics of the prey. For example, fish populations may be very dense, but not available (vulnerable) because the water depth is too deep (greater than 30 cm) for storks or the tree canopy at the site is too dense for storks to land. Calm water, about 5-40 cm (2-16 in) in depth, and free of dense aquatic vegetation is ideal (Coulter and Bryan 1993).

Coulter and Bryan's (1993) study suggested that wood storks preferred ponds and marshes, and visited areas with little or no canopy more frequently. Even in foraging sites in swamps, the canopy tended to be sparse. They suggested that open canopies may have contributed to detection of the sites and more importantly may have allowed the storks to negotiate landing more easily than at closed-canopy sites. In their study, the median amount of canopy cover where wood stork foraging was observed was 32 percent. Other researchers (P.C. Frederick, University of Florida, personal communication 2006; J.A. Rodgers, FWC, personal communication 2006) also confirm that wood storks will forage in woodlands, though the woodlands have to be fairly open and vegetation not very dense. Furthermore, the canopies must be open enough for wood storks to take flight quickly to avoid predators.

Melaleuca-infested Wetlands: As discussed previously, wetland suitability for wood stork foraging is partially dependent on vegetation density. Melaleuca is a dense-stand growth plant species, effectively producing a closed canopy and dense understory growth pattern that generally limits a site's accessibility to foraging by wading birds. However, O'Hare and Dalrymple (1997) suggest moderate infestations of melaleuca may have little effect on some species' productivity (*i.e.*, amphibians and reptiles) as long as critical abiotic factors such as hydrology remain. They also note as the levels of infestation increase, usage by wetland dependent species decreases. Their studies also showed that the number of fish species present in a wetland system remain stable at certain levels of melaleuca. However, the availability of the prey base for wood storks and other foraging wading birds is reduced by the restriction of access caused from dense and thick exotic vegetation. Wood storks and other wading birds can forage in these systems in open area pockets (*e.g.*, wind blow-downs), provided multiple conditions are optimal (*e.g.*, water depth, prey density). In O'Hare and Dalrymple's study (1997), they identify five cover types (Table 1) and

provide information on the number of wetland dependent bird species and the number of individuals observed within each of these vegetation classes (Table 2).

Table 1: Vegetation classes

DMM	75-100 percent mature dense melaleuca coverage
DMS or (SDM)	75-100 percent sapling dense melaleuca coverage
P75	50-75 percent melaleuca coverage
P50	0-50 percent melaleuca coverage
MAR (Marsh)	0-10 percent melaleuca coverage

The number of wetland-dependent species and individuals observed per cover type is shown below in columns 1, 2, and 3 (Table 2). To develop an estimate of the importance a particular wetland type may have (based on density and aerial coverage by exotic species) to wetland dependent species, we developed a foraging suitability value using observational data from O'Hare and Dalrymple (1997). The Foraging Suitability Value as shown in column 5 (Table 2) is calculated by multiplying the number of species by the number of individuals and dividing this value by the maximum number of species and individuals combined ($12 \times 132 = 1584$). The results are shown below for each of the cover types in O'Hare and Dalrymple (1997) study (Table 1). As an example, for the P50 cover type, the foraging suitability is calculated by multiplying 11 species times 92 individuals for a total of 1,012. Divide this value by 1,584, which is the maximum number of species times the maximum number of individuals ($12 \times 132 = 1,584$). The resultant is 0.6389 or 64 percent $11 \times 92 = 1012 / 1584 \times 100 = 63.89$.

Table 2: Habitat Foraging Suitability

Cover Type	# of Species (S)	# of Individuals (I)	S*I	Foraging Suitability
DMM	1	2	2	0.001
DMS	4	10	40	0.025
P75	10	59	590	0.372
P50	11	92	1,012	0.639
MAR	12	132	1,584	1.000

This approach was developed to provide us with a method of assessing wetland acreages and their relationship to prey densities and prey availability. We consider wetland dependent bird use to be a general index of food availability. Based on this assessment we developed an exotic foraging suitability index (Table 3):

Table 3. Foraging Suitability Percentages

Exotic Percentage	Foraging Suitability (percent)
Between 0 and 25 percent exotics	100
Between 25 and 50 percent exotics	64
Between 50 and 75 percent exotics	37
Between 75 and 90 percent exotics	3
Between 90 and 100 percent exotics	0

In our assessment however, we consider DMM to represent all exotic species densities between 90 and 100 percent and DMS to represent all exotic species densities between 75 and 90 percent. In our evaluation of a habitat's suitability, the field distinction between an exotic coverage of

90 percent and 100 percent in many situations is not definable, therefore unless otherwise noted in the field reports and in our analysis; we consider a suitability value of 3 percent to represent both densities.

Hydroperiod: The hydroperiod of a wetland can affect the prey densities in a wetland. For instance, research on Everglades fish populations using a variety of quantitative sampling techniques (pull traps, throw traps, block nets) have shown that the density of small forage fish increases with hydroperiod. Marshes inundated for less than 120 days of the year average ± 4 fish/m²; whereas, those flooded for more than 340 days of the year average ± 25 fish/m² (Loftus and Eklund 1994, Trexler et al. 2002).

The Service (1999) described a short hydroperiod wetland as wetlands with between 0 and 180-day inundation, and long hydroperiod wetlands as those with greater than 180-day inundation. However, Trexler et al. (2002) defined short hydroperiod wetlands as systems with less than 300 days per year inundation. In our discussion of hydroperiods, we are considering short hydroperiod wetlands to be those that have an inundation of 180 days or fewer.

The most current information on hydroperiods in south Florida was developed by the SFWMD for evaluation of various restoration projects throughout the Everglades Protection Area. In their modeling efforts, they identified the following seven hydroperiods:

Table 4. SFWMD Hydroperiod Classes – Everglades Protection Area

Hydroperiod Class	Days Inundated
Class 1	0-60
Class 2	60-120
Class 3	120-180
Class 4	180-240
Class 5	240-300
Class 6	300-330
Class 7	330-365

Fish Density per Hydroperiod: In the Service’s assessment of project related impacts to wood storks, the importance of fish data specific to individual hydroperiods is the principle basis of our assessment. In order to determine the fish density per individual hydroperiod, the Service relied on the number of fish per hydroperiod developed from throw-trap data in Trexler et al.’s (2002) study and did not use the electrofishing data also presented in Trexler et al.’s study that defined fish densities in catch per unit effort, which is not hydroperiod specific. Although the throw-trap sampling generally only samples fish 8 cm or less, the Service believes the data can be used as a surrogate representation of all fish, including those larger than 8 cm, which are typically sampled by either electrofishing or block net sampling.

We base this evaluation on the following assessment. Trexler et al.’s (2002) study included electrofishing data targeting fish greater than 8 cm, the data is recorded in catch per unit effort and in general is not hydroperiod specific. However, Trexler et al. (2002) notes in their assessment of the electrofishing data that in general there is a correlation with the number of fish per unit effort per changes in water depth. In literature reviews of electrofishing data by Chick et

al. (1999 and 2004), they note that electrofishing data provides a useful index of the abundance of larger fish in shallow, vegetated habitat, but length, frequency, and species compositional data should be interpreted with caution. Chick et al. (2004) also noted that electrofishing data for large fish (> 8cm) provided a positive correlation of the number of fish per unit effort (abundance) per changes in hydroperiod. The data in general show that as the hydroperiod decreases, the abundance of larger fishes also decreases.

Studies by Turner et al. (1999), Turner and Trexler (1997), and Carlson and Duever (1979) also noted this abundance trend for fish species sampled. We also noted in our assessment of prey consumption by wood storks in the Ogden et al. (1976) study (Figure 4) (discussed below), that the wood stork's general preference is for fish measuring 1.5 cm to 9 cm, although we also acknowledged that wood storks consume fish larger than the limits discussed in the Ogden et al. (1976) study. A similar assessment is reference by Trexler and Goss (2009) noting a diversity of size ranges of prey available for wading birds to consume, with fish ranging from 6 to 8 cm being the preferred prey for larger species of wading birds, particularly wood storks (Kushlan et al. 1975).

Therefore, since data were not available to quantify densities (biomass) of fish larger than 8 cm to a specific hydroperiod, and Ogden et al.'s (1976) study notes that the wood stork's general preference is for fish measuring 1.5 cm to 9 cm, and that empirical data on fish densities per unit effort correlated positively with changes in water depth, we believe that the Trexler et al. (2002) throw-trap data represents a surrogate assessment tool to predict the changes in total fish density and the corresponding biomass per hydroperiod for our wood stork assessment.

In consideration of this assessment, the Service used the data presented in Trexler et al.'s (2002) study on the number of fish per square-meter per hydroperiod for fish 8 cm or less to be applicable for estimating the total biomass per square-meter per hydroperiod for all fish. In determining the biomass of fish per square-meter per hydroperiod, the Service relied on the summary data provided by Turner et al. (1999), which provides an estimated fish biomass of 6.5 g/m² for a Class 7 hydroperiod for all fish and used the number of fish per square-meter per hydroperiod from Trexler et al.'s data to extrapolate biomass values per individual hydroperiods.

Trexler et al.'s (2002) studies in the Everglades provided densities, calculated as the square-root of the number of fish per square meter, for only six hydroperiods; although these cover the same range of hydroperiods developed by the SFWMD. Based on the throw-trap data and Trexler et al.'s (2002) hydroperiods, the square-root fish densities are:

Table 5. Fish Densities per Hydroperiod from Trexler et al. (2002)

Hydroperiod Class	Days Inundated	Fish Density
Class 1	0-120	2.0
Class 2	120-180	3.0
Class 3	180-240	4.0
Class 4	240-300	4.5
Class 5	300-330	4.8
Class 6	330-365	5.0

Trexler et al.'s (2002) fish densities are provided as the square root of the number of fish per square meter. For our assessment, we squared these numbers to provide fish per square meter, a simpler calculation when other prey density factors are included in our evaluation of adverse effects to listed species from the proposed action. We also extrapolated the densities over seven hydroperiods, which is the same number of hydroperiods characterized by the SFWMD. For example, Trexler et al.'s (2002) square-root density of a Class 2 wetland with three fish would equate to a SFWMD Model Class 3 wetland with nine fish. Based on the above discussion, the following mean annual fish densities were extrapolated to the seven SFWMD Model hydroperiods:

Table 6. Extrapolated Fish Densities for SFWMD Hydroperiods

Hydroperiod Class	Days Inundated	Extrapolated Fish Density
Class 1	0-60	2 fish/m ²
Class 2	60-120	4 fish/m ²
Class 3	120-180	9 fish/m ²
Class 4	180-240	16 fish/m ²
Class 5	240-300	20 fish/m ²
Class 6	300-330	23 fish/m ²
Class 7	330-365	25 fish/m ²

Fish Biomass per Hydroperiod: A more important parameter than fish per square-meter in defining fish densities is the biomass these fish provide. In the ENP and WCA-3, based on studies by Turner et al. (1999), Turner and Trexler (1997), and Carlson and Duever (1979), the standing stock (biomass) of large and small fishes combined in unenriched Class 5 and 6 hydroperiod wetlands averaged between 5.5 to 6.5 grams-wet-mass/m². In these studies, the data was provided in g/m² dry-weight and was converted to g/m² wet-weight following the procedures referenced in Kushlan et al. (1986) and also referenced in Turner et al. (1999). The fish density data provided in Turner et al. (1999) included both data from samples representing fish 8 cm or smaller and fish larger than 8 cm and included summaries of Turner and Trexler (1997) data, Carlson and Duever (1979) data, and Loftus and Eklund (1994) data. These data sets also reflected a 0.6 g/m² dry-weight correction estimate for fish greater than 8 cm based on Turner et al.'s (1999) block-net rotenone samples.

Relating this information to the hydroperiod classes developed by the SFWMD, we estimated the mean annual biomass densities per hydroperiod. For our assessment, we considered Class 7 hydroperiod wetlands based on Turner et al. (1999) and Trexler et al. (2002) studies to have a mean annual biomass of 6.5 grams-wet-mass/m² and to be composed of 25 fish/m². The remaining biomass weights per hydroperiod were determined as a direct proportion of the number of fish per total weight of fish for a Class 7 hydroperiod (6.5 grams divided by 25 fish equals 0.26 grams per fish).

For example, given that a Class 3 hydroperiod has a mean annual fish density of 9 fish/m², with an average weight of 0.26 grams per fish, the biomass of a Class 3 hydroperiod would be 2.3 grams/m² (9*0.26 = 2.3). Based on the above discussion, the biomass per hydroperiod class is:

Table 7. Extrapolated Mean Annual Fish Biomass for SFWMD Hydroperiods

Hydroperiod Class	Days Inundated	Extrapolated Fish Biomass
Class 1	0-60	0.5 gram/m ²
Class 2	60-120	1.0 gram/m ²
Class 3	120-180	2.3 grams/m ²
Class 4	180-240	4.2 grams/m ²
Class 5	240-300	5.2 grams/m ²
Class 6	300-330	6.0 grams/m ²
Class 7	330-365	6.5 grams/m ²

Wood stork suitable prey size: Wood storks are highly selective in their feeding habits and in studies on fish consumed by wood storks, five species of fish comprised over 85 percent of the number and 84 percent of the biomass of over 3,000 prey items collected from adult and nestling wood storks (Ogden et al. 1976). Table 8 lists the fish species consumed by wood storks in Ogden et al. (1976).

Table 8. Primary Fish Species consumed by Wood Storks from Ogden et al. (1976)

Common name	Scientific name	Percent Individuals	Percent Biomass
Sunfishes	<i>Centrarchidae</i>	14	44
Yellow bullhead	<i>Italurus natalis</i>	2	12
Marsh killifish	<i>Fundulus confluentus</i>	18	11
Flagfish	<i>Jordenella floridae</i>	32	7
Sailfin molly	<i>Poecilia latipinna</i>	20	11

These species were also observed to be consumed in much greater proportions than they occur at feeding sites, and abundant smaller species [e.g., mosquitofish (*Gambusia affinis*), least killifish (*Heterandria formosa*), bluefin killifish (*Lucania goodei*)] are under-represented, which the researchers believed was probably because their small size did not elicit a bill-snapping reflex in these tactile feeders (Coulter et al. 1999). Their studies also showed that, in addition to selecting larger species of fish, wood storks consumed individuals that are significantly larger (>3.5 cm) than the mean size available (2.5 cm), and many were greater than 1-year old (Ogden et al. 1976, Coulter et al. 1999). However, Ogden et al. (1976) also found that wood storks most likely consumed fish that were between 1.5 and 9.0 cm in length (Figure 4 in Ogden et al. 1976).

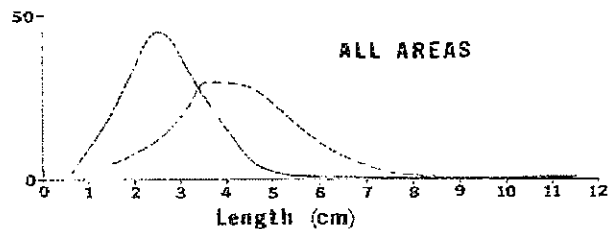


FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

In Ogden et al.'s (1976) Figure 4, the dotted line is the distribution of fish consumed and the solid line is the available fish. Straight interpretation of the area under the dotted line curve

represents the size classes of fish most likely consumed by wood storks and is the basis of our determination of the amount of biomass that is within the size range of fish most likely consumed by wood storks, which in this example is a range size of 1.5 to 9.0 cm in length.

Wood stork suitable prey base (biomass per hydroperiod): To estimate that fraction of the available fish biomass that might be consumed by wood storks, the following analysis was conducted. Trexler et al.'s (2002) 2-year throw trap data of absolute and relative fish abundance per hydroperiod distributed across 20 study sites in the ENP and the WCAs was considered to be representative of the Everglades fish assemblage available to wood storks (n = 37,718 specimens of 33 species). Although Trexler et al.'s (2002) data was based on throw-trap data and representative of fish 8 cm or smaller, the Service believes the data set can be used to predict the biomass/m² for total fish (those both smaller and larger than 8 cm). This approach is also supported, based on our assessment of prey consumption by wood storks in Ogden et al.'s (1976) study (Figure 4), that the wood storks general preference is for fish measuring 1.5 cm to 9 cm and is generally inclusive of Trexler et al.'s (2002) throw-trap data of fish 8 cm or smaller.

To estimate the fraction of the fish biomass that might be consumed by wood storks, the Service, using Trexler et al.'s (2002) throw-trap data set, determined the mean biomass of each fish species that fell within the wood stork prey size limits of 1.5 to 9.0 cm. The mean biomass of each fish species was estimated from the length and wet mass relationships for Everglades' ichthyofauna developed by Kushlan et al. (1986). The proportion of each species that was outside of this prey length and biomass range was estimated using the species mean and variance provided in Table 1 in Kushlan et al. (1986). These biomass estimates assumed the length and mass distributions of each species was normally distributed and the fish biomass could be estimated by eliminating that portion of each species outside of this size range. These biomass estimates of available fish prey were then standardized to a sum of 6.5 g/m² for Class 7 hydroperiod wetlands (Service 2009).

For example, Kushlan et al. (1986) lists the warmouth (*Lepomis gulosus*) with a mean average biomass of 36.76 g. In fish samples collected by Trexler et al. (2002), this species accounted for 0.048 percent ($18/37,715=0.000477$) of the Everglades freshwater ichthyofauna. Based on an average biomass of 36.76 g (Kushlan et al. 1986), the 0.048 percent representation from Trexler et al. (2002) is equivalent to an average biomass of 1.75 g ($36.76*0.048$) or 6.57 percent ($1.75/26.715$) of the estimated average biomass (26.715 g) of Trexler et al.'s (2002) samples (Service 2009).

Standardizing these data to a sample size of 6.5 g/m², the warmouth biomass for long hydroperiod wetlands would be about 0.427 g (Service 2009). However, the size frequency distribution (assumed normal) for warmouth (Kushlan et al. 1986) indicate 48 percent are too large for wood storks and 0.6 percent are too small (outside the 1.5 cm to 9 cm size range most likely consumed), so the warmouth biomass within the wood stork's most likely consumed size range is only 0.208 g ($0.427*(0.48+0.006)=0.2075$) in a 6.5 g/m² sample. Using this approach summed over all species in long hydroperiod wetlands, only 3.685 g/m² of the 6.5 g/m² sample consists of fish within the size range likely consumed by wood storks or about 57 percent ($3.685/6.5*100=56.7$) of the total biomass available.

An alternative approach to estimate the available biomass is based on Ogden et al. (1976). In their study (Table 8), the sunfishes and four other species that accounted for 84 percent of the biomass eaten by wood storks totaled 2.522 g of the 6.5 g/m² sample (Service 2009). Adding the remaining 16 percent from other species in the sample, the total biomass would suggest that 2.97 g of a 6.5 g/m² sample are most likely to be consumed by wood storks or about 45.7 percent (2.97/6.5=0.4569)

The mean of these two estimates is 3.33g/m² for long hydroperiod wetlands (3.685 + 2.97 = 6.655/ 2 = 3.33). This proportion of available fish prey of a suitable size (3.33 g/m² / 6.5 g/m² = 0.51 or 51 percent) was then multiplied by the total fish biomass in each hydroperiod class to provide an estimate of the total biomass of a hydroperiod that is the appropriate size and species composition most likely consumed by wood storks.

As an example, a Class 3 SFWMD model hydroperiod wetland with a biomass of 2.3 grams/m², adjusted by 51 percent for appropriate size and species composition, provides an available biomass of 1.196 grams/m². Following this approach, the biomass per hydroperiod potentially available to predation by wood storks based on size and species composition is:

Table 9. Wood Stork Suitable Prey Base (fish biomass per hydroperiod)

Hydroperiod Class	Days Inundated	Fish Biomass
Class 1	0-60	0.26 gram/m ²
Class 2	60-120	0.52 gram/m ²
Class 3	120-180	1.196 grams/m ²
Class 4	180-240	2.184 grams/m ²
Class 5	240-300	2.704 grams/m ²
Class 6	300-330	3.12 grams/m ²
Class 7	330-365	3.38 grams/m ²

Wood Stork-Wading Bird Prey Consumption Competition: In 2006, (Service 2006), the Service developed an assessment approach that provided a foraging efficiency estimate that 55 percent of the available biomass was actually consumed by wood storks. Since the implementation of this assessment approach, the Service has received comments from various sources concerning the Service’s understanding of Fleming et al.’s (1994) assessment of prey base consumed by wood storks versus prey base assumed available to wood stork and the factors included in the 90 percent prey reduction value.

In our original assessment, we noted that, “Fleming et al. (1994) provided an estimate of 10 percent of the total biomass in their studies of wood stork foraging as the amount that is actually consumed by the storks. However, the Fleming et al. (1994) estimate also includes a second factor, the suitability of the foraging site for wood storks, a factor that we have calculated separately. In their assessment, these two factors accounted for a 90 percent reduction in the biomass actually consumed by the storks. We consider these two factors as equally important and are treated as equal components in the 90 percent reduction; therefore, we consider each factor to represent 45 percent of the reduction. In consideration of this approach, Fleming et al.’s (1994) estimate that 10 percent of the biomass would actually be consumed by the storks would be added to the 45 percent value for an estimate that 55 percent (10 percent plus the remaining 45 percent) of the available biomass would actually be consumed by the storks and is the factor we believe represents the amount of the prey base that is actually consumed by the stork.”

In a follow-up review of Fleming et al.'s (1994) report, we noted that the 10 percent reference is to prey available to wood storks, not prey consumed by wood storks. We also noted the 90 percent reduction also includes an assessment of prey size, an assessment of prey available by water level (hydroperiod), an assessment of suitability of habitat for foraging (openness), and an assessment for competition with other species, not just the two factors considered originally by the Service (suitability and competition). Therefore, in re-evaluating of our approach, we identified four factors in the 90 percent biomass reduction and not two as we previously considered. We believe these four factors are represented as equal proportions of the 90 percent reduction, which corresponds to an equal split of 22.5 percent for each factor. Since we have accounted previously for three of these factors in our approach (prey size, habitat suitability, and hydroperiod) and they are treated separately in our assessment, we consider a more appropriate foraging efficiency to represent the original 10 percent and the remaining 22.5 percent from the 90 percent reduction discussed above. Following this revised assessment, our competition factor would be 32.5 percent, not the initial estimate of 55 percent.

Other comments reference the methodology's lack of sensitivity to limiting factors, i.e., is there sufficient habitat available across all hydroperiods during critical life stages of wood stork nesting and does this approach over emphasize the foraging biomass of long hydroperiod wetlands with a corresponding under valuation of short hydroperiod wetlands. The Service is aware of these questions and is examining alternative ways to assess these concerns. However, until further research is generated to refine our approach, we continue to support the assessment tool as outlined.

Following this approach, Table 10 has been adjusted to reflect the competition factor and represents the amount of biomass consumed by wood storks and is the basis of our effects assessments (Class 1 hydroperiod with a biomass 0.26 g, multiplied by 0.325, results in a value of 0.08 g [0.25*.325=0.08]) (Table 10).

Table 10 Actual Biomass Consumed by Wood Storks

Hydroperiod Class	Days Inundated	Fish Biomass
Class 1	0-60	0.08 gram/m ²
Class 2	60-120	0.17 gram/m ²
Class 3	120-180	0.39 grams/m ²
Class 4	180-240	0.71 grams/m ²
Class 5	240-300	0.88 grams/m ²
Class 6	300-330	1.01 grams/m ²
Class 7	330-365	1.10 grams/m ²

Sample Project of Biomass Calculations and Corresponding Concurrence Determination

Example 1:

An applicant is proposing to construct a residential development with unavoidable impacts to 5 acres of wetlands and is proposing to restore and preserve 3 acres of wetlands onsite. Data on the onsite wetlands classified these systems as exotic impacted wetlands with greater than 50

percent but less than 75 percent exotics (Table 3) with an average hydroperiod of 120-180 days of inundation.

The equation to calculate the biomass lost is: The number of acres, converted to square-meters, times the amount of actual biomass consumed by the wood stork (Table 10), times the exotic foraging suitability index (Table 3), equals the amount of grams lost, which is converted to kg.

Biomass lost $(5 * 4,047 * 0.39 \text{ (Table 10)} * 0.37 \text{ (Table 3)}) = 2,919.9 \text{ grams or } 2.92 \text{ kg}$

In the example provided, the 5 acres of wetlands, converted to square-meters (1 acre = 4,047 m²) would provide 2.9 kg of biomass ($5 * 4,047 * 0.39 \text{ (Table 10)} * 0.37 \text{ (Table 3)} = 2,919.9 \text{ grams or } 2.9 \text{ kg}$), which would be lost from development.

The equation to calculate the biomass from the preserve is the same, except two calculations are needed, one for the existing biomass available and one for the biomass available after restoration.

Biomass Pre: $(3 * 4,047 * 0.39 \text{ (Table 10)} * 0.37 \text{ (Table 3)}) = 1,751.95 \text{ grams or } 1.75 \text{ kg}$

Biomass Post: $(3 * 4,047 * 0.39 \text{ (Table 10)} * 1 \text{ (Table 3)}) = 4,734.99 \text{ grams or } 4.74 \text{ kg}$

Net increase: $4.74 \text{ kg} - 1.75 \text{ kg} = 2.98 \text{ kg Compensation Site}$

Project Site Balance $2.98 \text{ kg} - 2.92 \text{ kg} = 0.07 \text{ kg}$

The compensation proposed is 3 acres, which is within the same hydroperiod and has the same level of exotics. Following the calculations for the 5 acres, the 3 acres in its current habitat state, provides 1.75 kg ($3 * 4,047 * 0.39 \text{ (Table 10)} * 0.37 \text{ (Table 3)} = 1,751.95 \text{ grams or } 1.75 \text{ kg}$) and following restoration provides 4.74 kg ($3 * 4,047 * 0.39 \text{ (Table 10)} * 1 \text{ (Table 3)} = 4,734.99 \text{ grams or } 4.74 \text{ kg}$), a net increase in biomass of 2.98 kg ($4.74 - 1.75 = 2.98$).

Example 1: 5 acre wetland loss, 3 acre wetland enhanced – same hydroperiod - NLAA

Hydroperiod	Existing Footprint		On-site Preserve Area				Net Change*	
			Pre Enhancement		Post Enhancement			
	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams
Class 1 - 0 to 60 Days								
Class 2 - 60 to 120 Days								
Class 3 - 120 to 180 Days	5	2.92	3	1.75	3	4.74	(5)	0.07
Class 4 - 180 to 240 Days								
Class 5 - 240 to 300 Days								
Class 6 - 300 to 330 Days								
Class 7 - 330 to 365 days								
TOTAL	5	2.92	3	1.75	3	4.74	(5)	0.07

*Since the net increase in biomass from the restoration provides 2.98 kg and the loss is 2.92 kg, there is a positive outcome (4.74-1.75-2.92=0.07) in the same hydroperiod and Service concurrence with a NLAA is appropriate.

Example 2:

In the above example, if the onsite preserve wetlands were a class 4 hydroperiod, which has a value of 0.71. grams/m² instead of a class 3 hydroperiod with a 0.39 grams/m² [Table 10]), there would be a loss of 2.92 kg of short hydroperiod wetlands (as above) and a net gain of 8.62 kg of long-hydroperiod wetlands.

Biomass lost: (5*4,047*0.39 (Table 10)*0.37 (Table 3)=2,919.9 grams or 2.92 kg)

The current habitat state of the preserve provides 3.19 kg (3*4,047*0.71 (Table 10)*0.37 (Table 3)=3,189.44 grams or 3.19 kg) and following restoration the preserve provides 8.62 kg (3*4,047*0.71 (Table 10)*1(Table 3)= 8,620.11 grams or 8.62 kg, thus providing a net increase in class 4 hydroperiod biomass of 5.43 kg (8.62-3.19=5.43).

Biomass Pre: (3*4,047*0.71(Table 10)*0.37 (Table 3) = 3,189.44 grams or 3.19 kg)

Biomass Post: (3*4,047*0.71 (Table 10)*1(Table 3)=8,620.11 grams or 8.62 kg)

Net increase: 8.62 kg-3.19 kg = 5.43 kg

Project Site Balance 5.43 kg- 2.92 kg = 2.51 kg

Example 2: 5 acre wetland loss, 3 acre wetland enhanced – different hydroperiod – May Affect

Hydroperiod	Existing Footprint		On-site Preserve Area				Net Change*	
			Pre Enhancement		Post Enhancement			
	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams
Class 1 - 0 to 60 Days								
Class 2 - 60 to 120 Days								
Class 3 - 120 to 180 Days	5	2.92					(5)	-2.92
Class 4 - 180 to 240 Days			3	3.19	3	8.62	0	5.43
Class 5 - 240 to 300 Days								
Class 6 - 300 to 330 Days								
Class 7 - 330 to 365 days								
TOTAL	5	2.92	3	3.19	3	8.62	(5)	2.51

In this second example, even though there is an overall increase in biomass, the biomass loss is a different hydroperiod than the biomass gain from restoration, therefore, the Service could not concur with a NLAA and further coordination with the Service is appropriate.

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Eagle Technical Assistance

Construction or Development Activities

You have determined that your activity is one of the following:

- Building construction, 1 or 2 story, with a project footprint of 1/2 acre or less.
- Construction of roads, trails, canals, power lines, and other linear utilities.
- Agriculture or aquaculture operations - new or expanded. Alteration of shoreline or wetlands.
- Installation of docks or moorings.
- Water impoundment.

You have determined that the bald eagle nest (active or alternate) can be seen from the project site and that there is no similar activity within 660 feet of the nest. To avoid disturbing nesting eagles and their young, we recommend that you:

1. Maintain a buffer of at least 660 feet (200 meters) between your activities and the nest (including active and alternate nests);
2. maintain any established landscape buffers;
3. if possible, create additional landscape buffers to screen the new activity from the nest.

Determination

If you can meet these guidelines and do not wish to apply for a permit at this time, keep these guidelines as your final determination

If you cannot meet these guidelines visit the [eagle permit application page](#).

Species Conservation Guidelines

South Florida

Red-cockaded Woodpecker

The Species Conservation Guidelines for the red-cockaded woodpecker (*Picoides borealis*) provide a tool to determine if a project may adversely affect the red-cockaded woodpecker. Here we describe what actions might have a detrimental impact on red-cockaded woodpeckers and how these effects can be avoided or minimized.

Life History

The Fish and Wildlife Service (Service) federally listed the red-cockaded woodpecker in 1970 and classified it as endangered in Florida due to destruction and degradation of its habitat. The *Revised Recovery Plan for the Red-cockaded Woodpecker* (Recovery Plan) (Service 2003) provides information on habitat needs, territory sizes, and species biology. The Service also views this guidance as applicable to section 7 and 10 consultations as a tool to minimize adverse effects to the red-cockaded woodpecker. In addition, the *South Florida Multi-Species Recovery Plan* (Service 1999) provides a synopsis of red-cockaded woodpecker ecology in this area.

Habitat

The red-cockaded woodpecker is non-migratory, territorial, and lives in cooperative breeding social units called groups. It uses mature pine trees to develop nest cavities and is the only North American woodpecker that excavates its roost and nest cavities in living trees. Active cavities can be easily identified by their resin flow pattern (Wood 1996). Cavities are the most valuable habitat property as they can take 3 years or more to excavate (Service 1999). Cavities are periodically abandoned and reoccupied (Doerr et al. 1989). If a cavity is abandoned for more than 5 years there is a low probability of reoccupation. Cavity trees tend to be aggregated into areas known as "clusters." The cluster is made up of active (in use) and inactive (previously used) cavity trees within an area defended by a single group (Walters et al. 1988). Suitable nesting habitat for the red-cockaded woodpecker include pine stands, or pine-dominated pine/hardwood stands, with a low or sparse understory and ample old-growth pines (Service 1999). Trees must be more than 60 years old to be suitable for cavity construction. Longleaf pine (*Pinus palustris*) is preferred where available, however, cavities are also constructed in all other pine trees in Florida with the exception of sand pine (*Pinus clausa*) and spruce pine (*Pinus glabra*) (Hovis and Labisky 1985). South of the longleaf pine range, red-cockaded woodpeckers typically use slash pine (*Pinus elliottii*) (Beever and Dryden 1992). Other habitats, such as areas with sparse pine canopies, melaleuca (*Melaleuca quinquenervia*) or Brazilian pepper (*Schinus terebinthifolius*) invasion, mixed pine/cypress habitats, cypress heads, and very young pine

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habitats, are used in south Florida, although this habitat use may not be typical throughout its range. In south Florida, red-cockaded woodpeckers will also forage in young pine trees and traverse open prairie-type habitats to reach forage areas (Beever and Dryden 1992). Home ranges for red-cockaded woodpeckers average 141-162 ha (350-400 acres) in southern and central Florida, and can exceed 200 ha (494 acres) in southwest Florida due to low productivity of this area (Beever and Dryden 1992). Red-cockaded woodpeckers frequently disperse up to 5 km (3.1 mi) from their natal cluster to form new clusters (Walters 1990).

Distribution

Red-cockaded woodpecker populations are widespread, but small and disjunct in the south Florida region. Substantial clusters of red-cockaded woodpeckers occur in Three Lakes Wildlife Management Area (Osceola County), Avon Park Air Force Range (Highlands County), Cecil M. Webb Wildlife Management Area (Charlotte County), and Big Cypress National Preserve (Collier and Monroe Counties) with scattered small populations throughout the service area. There is no designated critical habitat for the red-cockaded woodpecker.

Determination

To help in determining whether your project may affect the red-cockaded woodpecker the SLOPES flowchart for the red-cockaded woodpecker can be used as a guide (Fig. 1). The first step requires project-specific information that generally includes a project description, habitat maps, and project location. Though nest sites may be off the property if the red-cockaded woodpecker uses the property as a foraging area the Service considers it occupied because the habitat fulfills the species life history needs. The Service uses a 200-ha (494 acres) circular area as the furthest point that would allow for overlap of an off-site territory onto the property. As such, a 0.8-km (0.5 mi) buffer around the project should be identified on the habitat maps and considered in habitat use.

Suitable habitat for red-cockaded woodpeckers would include FLUCCS categories Upland Coniferous Forest (410), Pine flatwoods (411), Longleaf Pine - Xeric Oak (412), and Pine - Mesic Oak (414). Hydric slash pine flatwoods can be difficult to identify from aerial and FLUCCS maps. In these habitats only mature pines (greater than 60 years old) are important as nesting trees (Beever and Dryden 1992), but these can be as small as 15.2 cm (6 in) dbh.

You can check occurrence records of red-cockaded woodpeckers in your area through the Florida Natural Areas Inventory (<http://www.fnai.org/>).

If no suitable habitat [mature pines greater than 15.2 cm (6 in) dbh is present in the project area and buffer, then no effect to red-cockaded woodpeckers is anticipated and other Federal action can proceed.

If suitable habitat is present the red-cockaded woodpecker is likely to be adversely affected. There are two options available. **Option a** provides for the use of surveys of the property to determine the presence or presumed absence of red-cockaded woodpecker. While **option b** assumes that suitable habitat support red-cockaded woodpecker.

Two types of surveys are needed for the red-cockaded woodpecker: cavity tree and foraging area. See the survey protocols in Appendix A for more details. These protocols are the minimum level of effort the Service believes necessary to determine the presence or absence of this species in the area. If surveys do not detect the presence of the red-cockaded woodpecker on the property and buffer, then the project is no likely to adversely affect red-cockaded woodpeckers.

If surveys detect the red-cockaded woodpecker, suitable habitats are assumed to support the species (**option b**), or it is known to be present on the property, then the project may affect the red-cockaded woodpecker and conservation measures should be implemented to minimize adverse effects.

Conservation Measures

To facilitate conservation, management is based on the cluster. For this purpose the cluster is the minimum convex polygon containing all cavity trees in use by a group of red-cockaded woodpeckers and a surrounding 61-m (200 ft) wide area of continuous forest. The occupied habitat consists of the cluster and foraging area, a 0.8- km (0.5 mi) wide area surrounding the cluster.

The Service encourages users to use the Recovery Plan (Service 2003) for any on-site preservation, enhancement, or management actions they propose that may have an effect on the red-cockaded woodpecker. The Recovery Plan also provides guidance for off-site compensation needs for occupied habitat losses.

The Service strongly recommends that occupied habitats be avoided and preserved. The first measure is to modify the project footprint to avoid direct impacts to red-cockaded woodpecker habitat. This habitat could be designated as an environmentally sensitive area and set aside by deed restriction, easement, or other protective covenant. If the occupied habitat on the property exceeds 2 ha (5 acres), then a habitat management plan is also recommended. The incorporation of these recommendations into the project design and documented in the habitat management plan can result in the project not likely to adversely affect the red-cockaded woodpecker.

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On-site habitat enhancements are recommended by the Service in situations where a project proposes to impact occupied red-cockaded woodpecker habitat. If the site has been physically altered by exotic species invasion, lack of fire, or other anthropogenic actions. These alterations have produced on-site habitat conditions that have resulted in marginally suitable habitats for the survival and propagation of the red-cockaded woodpecker. The planned action, through project redesign, has avoided impacting a substantial portion of the habitat; however some habitat loss will still occur. The project proposes on-site habitat enhancements and management actions that provide habitat quality improvements that balance losses of small amounts of marginally suitable habitats. The incorporation of these recommendations into the project and documented in a habitat management plan can result in the project not likely to adversely affect the red-cockaded woodpecker.

The remaining measures available to minimize adverse effects to the red-cockaded woodpecker are those associated with projects where on-site habitat avoidance, preservation, or enhancement are insufficient or are not appropriate and take of red-cockaded woodpecker is likely. If on-site habitat modifications reduce suitable habitats below 200 ha (494 acres) (including off-site area) then take is likely. When take is likely, the project is likely to adversely affect the red-cockaded woodpecker and compensation is a possible option. The Service has developed measures that are applicable to projects where compensation for adverse effects is appropriate. These measures, which further the Service's goals for conservation and recovery of the species, are discussed in detail in the Recovery Plan (Service 2003: 119). The Service prefers compensation on site or nearby. If these option are not available then compensation at the nearest red-cockaded woodpecker conservation area is a second option. Contact the Service at the earliest possible time to discuss these compensation options.

Reports**Habitat Management Plan**

A Habitat Management Plan is necessary when a project may affect the red-cockaded woodpecker. In general, the plan includes a biological report, compensation options, and any land preservation covenants. Habitat management options are listed in the Recovery Plan (Service 2003: 71). If habitat enhancements are proposed, the management plan needs to include a habitat monitoring component. Population and habitat monitoring is an essential aspect of the red-cockaded woodpecker management and recovery. Only through accurate monitoring can we determine the success and failure of our management actions, and adapt these actions accordingly. Appropriate intensity of monitoring varies with population size, role in recovery, and management objectives. Sections 3A, 8C, 8D, and Appendix 2 of the Recovery Plan (Service 2003) describes basic monitoring techniques.

Biological Report

In general, the report should include a project introduction, proposed action, project habitat descriptions, project effects, recommendations to minimize species effects, conclusions, and commitments. The report should also include the survey report, survey data sheets, and territorial boundaries of the cluster, if red-cockaded woodpeckers are present. Refer to Service (2004) for a more detailed discussion of report requirements, format, explanations of common ESA questions, and level of detail needed in the report.

Literature Cited

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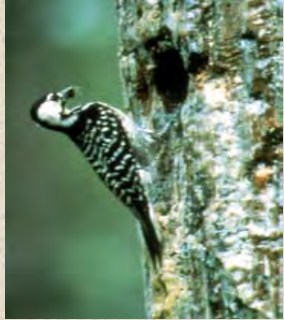
Walters, J.R., P.D. Doerr, and J.H. Carter III. 1988. The cooperative breeding system of the redcockaded woodpecker. Ethology 78:275-305.

Wood, D.A. 1996. Promoting red-cockaded woodpecker welfare in Florida. Florida Game and Fresh Water Fish Commission. Nongame Wildlife Management Bulletin No 1.

GIS Data

None available.

**Standard Local Operating Procedures for Endangered Species
Red-cockaded Woodpecker**



Start Here

STEP 1

- Project Description
- Habitat Description
- Checked County List?

STEP 2

- ✓ Check Consultation Area Map
- ✓ Check Suitable Habitat

Proceed with Action

STEP 4

STEP 3

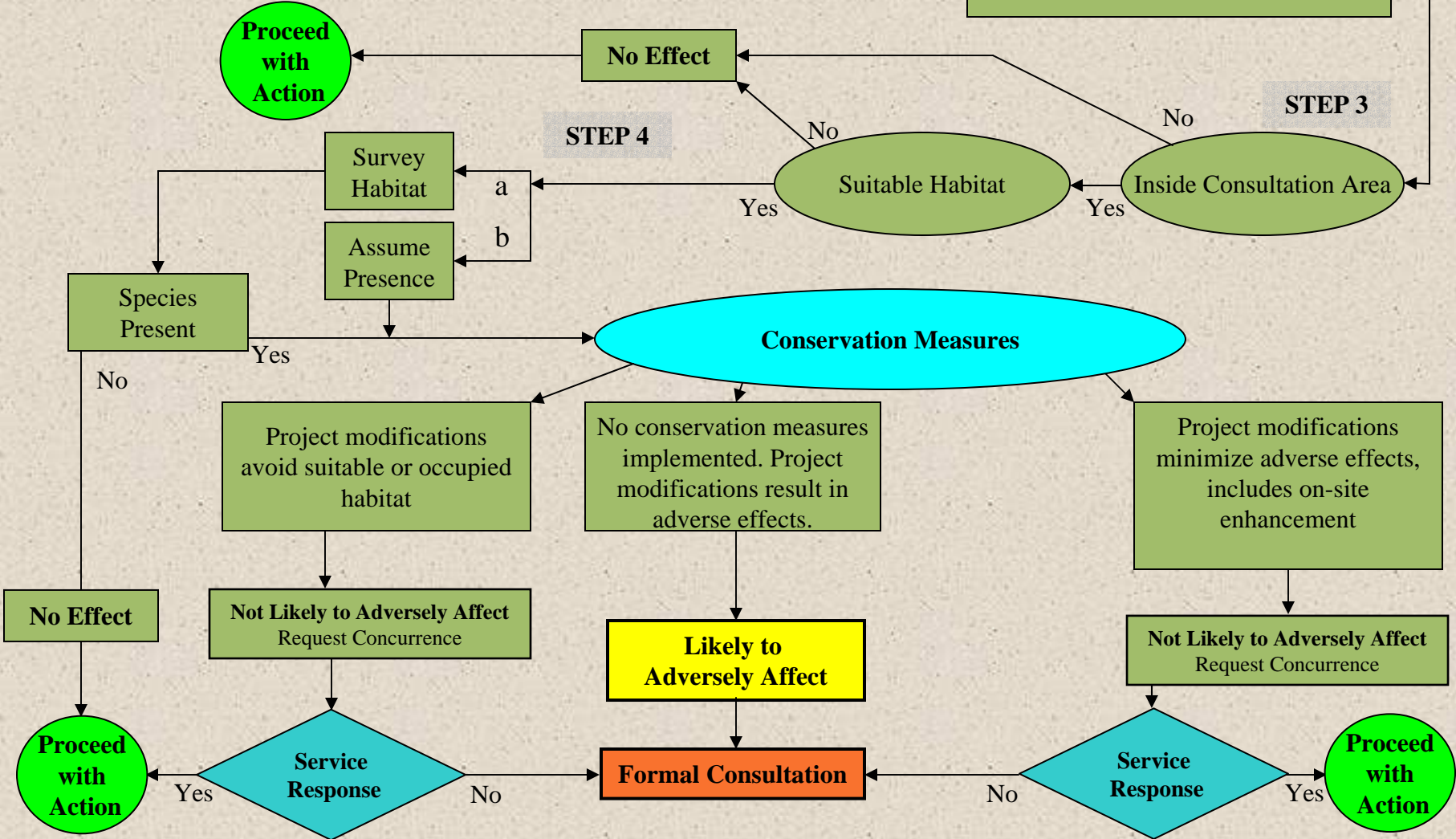


Figure 2.

Red-cockaded Woodpecker

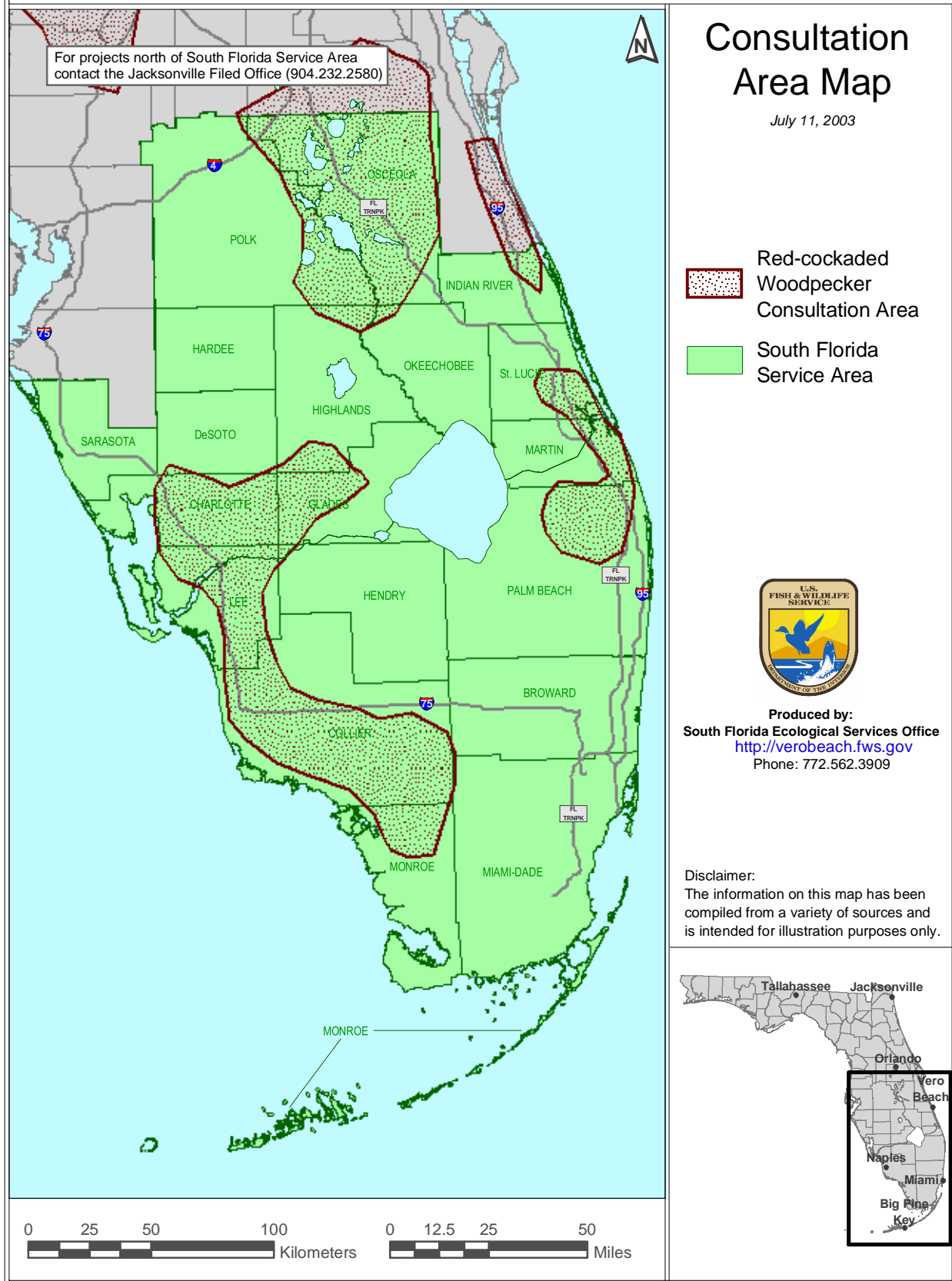


Figure 1.

South Florida Ecological Services Office
DRAFT
July 12, 2004

APPENDIX A

Red-cockaded Woodpecker

South Florida

Survey Protocol

Red-cockaded Woodpecker

South Florida

Survey Protocol

(Adapted from Service 2003)

Nesting and Foraging Habitat

Surveys are used to determine whether the nesting and/or foraging habitat of a red-cockaded woodpecker group will be adversely impacted by a proposed project. This is an important part of the conservation and management of this endangered species, and therefore the Fish and Wildlife Service has developed standard survey and analysis procedures for such determinations. These determinations must be undertaken prior to the initiation of any project within the southeastern United States that calls for removal of pine trees 60 years or older; typically such trees will be at least 25.4 cm (10 in) dbh (diameter at breast height) or larger. In south Florida slash pines as small as 15.2 cm (6 in) dbh can be this old. The procedure is also used following new land acquisition by state and federal agencies in the southeast or any other circumstance in which the presence or absence of red-cockaded woodpeckers is to be assessed.

The first step in the survey procedure is to determine if suitable nesting or foraging habitat exists within the area to be impacted by the project. If no suitable nesting or foraging habitat is present within the project impact area, further assessment is unnecessary and no effect to the red-cockaded woodpecker is anticipated. If no suitable nesting habitat is present within the project impact area, but suitable foraging habitat is present and will be impacted, potential use of this foraging habitat by groups outside the project boundaries must be determined. This is accomplished by identifying any potential nesting habitat within 0.8 km (0.5 mi) of the suitable foraging habitat that would be impacted by the project. Any potential nesting habitat is then surveyed for cavity trees. This procedure is described in greater detail below. If no active clusters are found, then the red-cockaded woodpecker is anticipated. If one or more active clusters are found, a foraging habitat analysis is conducted (see below) to determine whether sufficient amounts of foraging habitat will remain for each group post-project.

For nesting and foraging habitat surveys within project impact areas and within 0.8 km (0.5 mi) of the project site, potential habitat is assessed at the level of the stand. A stand is a term used to refer to a wooded area receiving past or current silvicultural treatment as a single management unit. Here we expand the term to include any subset of a tract of wooded land, divided by biological community type, management history, or any other reasonable approach. A small tract of land may be considered a single stand or part of a large stand.

Identification of Suitable Foraging Habitat

For the purpose of surveying, suitable foraging habitat consists of a pine or pine/hardwood stand of forest, woodland, or savannah in which 50 percent or more of the dominant trees are pines and

the dominant pine trees are generally 60 years in age or older. These characteristics do not necessarily describe good quality foraging habitat; rather, this is a conservative description of potentially suitable habitat. Identification of pine and pine/hardwood stands can be made using cover maps that identify pine and pine/hardwood stands, aerial photographs interpreted by standard techniques, or a field survey conducted by an experienced forester or biologist. Age of stands can be determined by aging representative dominant pines in the stands using an increment-borer and counting annual growth rings. Stand data describing size classes may be substituted for age if the average size of 60 year-old pines is known for the local area and habitat type.

If no suitable foraging habitat is present within the project area (that is, no pines 60 years or older will be impacted), then further evaluation is unnecessary and red-cockaded woodpeckers can be presumed absent. If the project area contains any suitable foraging habitat that will be impacted by the project, that habitat, if it contains any 60 year old trees or older, and all other suitable nesting habitat within 0.8 km (0.5 mi) of the project site, regardless of ownership, must be surveyed for the presence of red-cockaded woodpeckers.

Identification of Suitable Nesting Habitat

For the purpose of surveying, suitable nesting habitat consists of pine, pine/hardwood, and hardwood/pine stands that contain pines 60 years in age or older and that are within 0.8 km (0.5 mi) of the suitable foraging habitat to be impacted at the project site (see above). Additionally, pines 60 years in age or older may be scattered or clumped within younger stands; these older trees within younger stands must also be examined for the presence of red-cockaded woodpecker cavities. These characteristics do not necessarily describe good quality nesting habitat; rather, this is a conservative description of potential nesting habitat.

Determination of suitable nesting habitat may be based on existing stand data, aerial photo interpretation, or field reconnaissance. Trees should either be aged or assumed suitable if greater than 15.2 cm (6 in) dbh. All stands meeting the above description, regardless of ownership, should be surveyed for cavity trees.

Cavity Tree Survey

Once suitable nesting habitat is identified (above), it must be surveyed for cavity trees of red-cockaded woodpeckers by personnel experienced in management and monitoring of the species. Potential nesting habitat is surveyed by running line transects through stands and visually inspecting all medium-sized and large pines for evidence of cavity excavation by red-cockaded woodpeckers. Transects must be spaced so that all trees are inspected. Necessary spacing will vary with habitat structure and season from a maximum of 91 m (300 ft) between transects in very open pine stands to 46 m (150 ft) or less in areas with dense midstory. Transects are run north-south, because many cavity entrances are oriented in a westerly direction, and can be set using a hand compass. While surveying for cavities look and listen for red-cockaded woodpeckers. If any are observed record their location and behavior.

When cavity trees are found, their location is recorded in the field using a Global Positioning System (GPS) unit, aerial photograph, or field map. Activity status, cavity stage (start, advanced start, or complete cavity), and any entrance enlargement are assessed and recorded at this time. A cavity can only be considered abandoned if inactive for five consecutive years. Again, it is extremely important to have all surveys and cavity tree assessments performed by experienced personnel. If cavity trees are found, more intense surveying within 457 m (1,500 ft) of each cavity tree is conducted to locate all cavity trees in the area. Cavity trees are later assigned into clusters based on observations of red-cockaded woodpeckers as described in Service (2003, section 3A).

Foraging Area Survey

When a known red-cockaded woodpecker cluster is located on site or within off site, but within 0.8 km (0.5 mi) of the project site a forage area survey is needed to determine if birds are foraging on site. If the off-site buffer can not be surveyed then the nearest known active cluster should be determined. If an active cluster occurs within 5 km (3.1 km) of the site then a forage survey should be conducted.

Surveys for foraging area boundaries require both breeding season surveys (April 15 through June 15) and non-nesting season (fall) surveys (October 15 through December 15). Surveys should be conducted during the morning hours, from 1 hour prior to sunrise to four hours past sunrise. Surveys outside of these time frames can be inconclusive. Only calm, clear days should be surveyed as red-cockaded woodpecker activity is limited on windy and rainy days. The foraging area surveys require 14 days of survey over the season. Two methods of identifying foraging area boundaries are provided depending on the circumstances.

If there are active red-cockaded woodpecker cavities on the property the territory is considered a 0.8-km (0.5 mi) radius area surrounding the cluster. This can be modified if a foraging area survey is conducted to determine the area boundaries. A foraging area survey commences with observations of the red-cockaded woodpeckers when they leave their roosts. The surveyor documents the number of birds and tracks the birds as they forage through the adjacent habitats. Data should be collected at half hour intervals, recorded on maps, or documented with GPS coordinates for later mapping. If the red-cockaded woodpecker moves to a new location while being observed, the flight direction and the location where the red-cockaded woodpecker lands should be noted. Behavior and vocalizations should be noted, especially behavior that would indicate courtship or nesting.

If there are no active red-cockaded woodpecker cavities on the property a meandering pedestrian transect should be conducted through all suitable habitat. The observer should stop every 3 to 5 minutes, look, and listen for red-cockaded woodpecker activity. Since these birds are territorial and will defend their territory from intrusion by other individuals, the use of red-cockaded woodpecker vocal recordings can facilitate observation. Therefore, at each of the stops, play 30

seconds of continuous red-cockaded woodpecker vocal calls. Tapes of red-cockaded woodpecker vocalizations are available from Audubon and Peterson field guide series.

Report

A final survey report should include the following, as applicable:

A. Field data sheets that include:

1. dates and starting and ending times of all surveys conducted;
2. weather conditions during all surveys, including temperature, wind speed and direction, visibility, and precipitation; and
3. the total number of red-cockaded woodpeckers observed and number of red-cockaded woodpecker clusters.

Red-cockaded woodpecker activity and cavity tree information should be submitted in a survey report to the South Florida Ecological Services Office, 1339 20th Str., Vero Beach, FL 32960.

Literature Cited

U.S. Fish and Wildlife Service (Service). 2003. Revised recovery plan for the red-cockaded woodpecker (*Picoides borealis*). 2nd revision. Atlanta, Georgia.
<http://rcwrecovery.fws.gov/recoveryplan.htm>

Florida Pine Snake

Pituophis melanoleucus mugitus



Photograph by Kevin Enge, FWC.

Species Overview

Status: Listed as state Threatened on Florida's Endangered and Threatened Species List.

Current Protections

- 68A-27.003(a), F.A.C. No person shall take, possess, or sell any of the endangered or threatened species included in this subsection, or parts thereof or their nests or eggs except as allowed by specific federal or state permit or authorization.
- 68A-25.002(10), F.A.C. No person shall buy, sell or possess for sale any Florida pine snake (*Pituophis melanoleucus mugitus*), nor shall any person possess more than one Florida pine snake, except that said restrictions shall not apply to amelanistic (albino) specimens.
- 68A-27.001(4), F.A.C. Take – to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct. The term “harm” in the definition of take means an act which actually kills or injures fish or wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering. The term “harass” in the definition of take means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering.

Cryptic Species

Cryptic species are those that may be difficult to detect due to behavior, habitat, or physical features, even when using standardized survey techniques in occupied habitat. Interpretation of when harm or harassment may occur is difficult without a clear understanding of essential behavioral patterns of the species or habitat features that may support those behavioral patterns. The documented difficulties in detecting cryptic species and the lack of a reliable detection methodology leads to different considerations for take due to harm.

- The [policy](#) on permitting standards for incidental take of cryptic species in Florida's [Imperiled Species Management Plan](#) identifies the Florida pine snake as a cryptic species. Due to low detectability, little is known about the full range wide distribution or life history of Florida pine snakes.
- Permitting standards for the Florida pine snake focus on cooperation and acquiring information, with the understanding that as information is gained, permitting standards may change.
- For Florida pine snakes, information on distribution and habitat use may constitute a [scientific benefit](#). Even if surveys are conducted, detection is difficult because of the fossorial (adapted to dig and spend time underground) nature of this animal, therefore, surveys for Florida pine snakes are not recommended. Thorough and intensive surveys would be needed to determine Florida pine snake presence, and should be performed in coordination with FWC.

Biological Background

This section describes the biological background for this species and provides context for the following sections. It focuses on the habitats that support essential behaviors for the Florida pine snake, threats faced by the species, and what constitutes significant disruption of essential behaviors.

Florida pine snakes are 1 of 3 subspecies of pine snake (*P. melanoleucus*) found in the United States and occur from southern South Carolina, through peninsular Florida, and westward through the Florida panhandle to the Escambia River ([see map](#)). West of the Escambia River, Florida pine snakes may intergrade with black pine snakes (*Pituophis m. lodingi*) and will appear darker overall (Franz 1992). Black pine snakes occur from the extreme western Florida panhandle, through southern Alabama and Mississippi, and into eastern Louisiana. Florida pine snakes are large, non-venomous, heavy bodied snakes that can attain lengths nearing 228 cm (7.5 feet), although most average 122- to 168 cm (4-5.5 feet). These snakes occupy a variety of upland habitats (see [Habitat Features that Support Essential Behavioral Patterns](#) below), but prefer dry habitats with moderate to open canopy cover and well-drained sandy soils. Florida pine snakes are most active from March through October (Franz 1992), although they are a highly cryptic and fossorial (adapted to dig and spend time underground) species (Enge 1997, Franz 1992, Franz 2005, Miller et al. 2012). Here, cryptic is defined as those species not easily observed, tracked or surveyed due to camouflage or behavior rather than rarity. These adaptations include a modified rostral (nose) scale and a cone shaped head, which facilitate digging and excavating loose soil. When encountered, Florida pine snakes may vigorously vibrate their tail, inflate the body, hiss loudly, and exhibit bluff striking (Tuberville and Mason 2008).

Preferred landscapes have a moderate to mostly open canopy cover of primarily pine trees (*Pinus* spp.) and scrubby oaks (*Quercus* spp.; Franz 1992, Hipes et al. 2000, Bartlett and Bartlett 2003). Florida pine snakes spend a majority of their time in underground refugia and when available use southeastern pocket gopher (*Geomys pinetis*) burrows (Franz 1992, Miller et al. 2012). Females are believed to lay eggs inside the burrows of pocket gophers and other animals (Lee 1967, Franz 2005) in May and June (Franz 1992). Hatching occurs in September and October (Franz 1992). Florida pine snake prey generally consists of pocket gophers, small mammals including mice and rats, and ground dwelling birds and their eggs. Their estimated home range size is 70.1 ha (173 ac) for males and 37.5 ha (93 ac) for females (Franz 2005, Miller 2012).

Further background information pertaining to the Florida pine snake may be found in the [Biological Status Review Report for the Florida Pine Snake](#) (FWC 2011) and a [Species Action Plan for the Florida Pine Snake](#) (FWC 2013).

Habitat Features that Support Essential Behavioral Patterns

Florida pine snakes are typically found on large tracts of land comprised of sandhill, scrub or xeric pine savanna habitat that contain high densities of pocket gophers and gopher tortoises (Allen and Neill 1952, Franz 1992, Franz 2005, Miller et al. 2012). Uncompact xeric sandy soils are important landscape features for Florida pine snakes, although pine snakes will use wetlands during times of drought (Franz 1992). Florida pine snakes are sometimes also encountered in xeric hammock, scrubby flatwoods, mesic pine flatwoods, dry prairie with dry soils, and old fields and pastures (Allen and Neill 1952, Enge 1997, Ernst and Ernst 2003, Franz 1992, Hipes et al. 2000, Franz 2005).

Southeastern pocket gopher colonies are important to sustaining populations of Florida pine snakes. Florida pine snakes often prey on pocket gophers (Franz 1992, FWC 2011), primarily use pocket gopher burrows as refugia (Miller et al. 2012) and, where available, may use pocket gopher burrows as egg deposition sites (Franz 2005). Areas without pocket gophers also support pine snakes. In these areas, pine snakes may use gopher tortoise burrows, nine-banded armadillo (*Dasypus novemcinctus*) burrows, and stump holes as refugia (Means 2005, Smith 2011, Miller et al. 2012).



Figure 1. Pine upland habitat used by pine snakes. Photograph by FWC.

Florida pine snakes may spend over 75% of their time in underground refugia (Franz 1992, Miller et al. 2012).

Threats

Population declines of Florida pine snakes have been suspected since the 1970s (Franz 1992). As habitat specialists, Florida pine snakes are dependent on habitat structure associated with the longleaf pine forest, such as an open forest canopy, a reduced midstory and understory, and robust groundcover. However, the current distribution of longleaf pine forest has been reduced to about 3% of its historic range (Ware et al. 1993), including significant losses of sandhill and scrub habitat within Florida (Kautz et al. 1993, Enge et al 2003). Because the Florida pine snake has specific habitat requirements, continued habitat loss due to land development and conversion may further imperil this species.



Figure 2: Pocket gopher mounds in pine snake habitat. Photograph by Bradley O'Hanlon.

Because large tracts of intact uplands are important for pine snake conservation, proper fire management is essential. Although pine snakes may be tolerant to varying degrees of habitat degradation (Franz 2005, Miller 2008), insufficient fire management may render areas unsuitable. In addition to fire suppression, stump removal and soil compaction may negatively affect populations of Florida pine snakes.

Habitat fragmentation may also have negative effects on pine snake behavior. Miller et al. (2012) found that Florida pine snakes were sensitive to improved roads (i.e., paved and graded dirt), and no Florida pine snakes were detected on improved roads during surveys in appropriate habitat in southern Georgia (Stevenson et al. 2016). Habitat fragmentation may lead to isolation of pine snake populations and in turn, reduce range wide gene flow.

Florida pine snakes are dependent on underground refugia, and therefore are vulnerable to the decline and loss of southeastern pocket gophers and gopher tortoises. In Florida, gopher tortoise populations have declined by over 50% from the 1920's to 2005 (Enge et al. 2006), and populations of pocket gophers are suspected to be in decline as well (Georgia Department of Natural Resources 2008). These declines could be problematic as pocket gopher burrows are preferred refugia to pine snakes (Franz 1992, Franz 2005, Miller et al. 2012).

Snake fungal disease is an emergent threat to wild snakes, and has been documented in at least 10 states, including Florida (Sleeman 2013, Glorioso 2016). In New Hampshire, snake fungal disease may have been a factor in the 50% decline of an imperiled population of timber rattlesnakes (*Crotalus horridus*; Clark et al. 2010, Sleeman 2013). Because little is known about snake fungal disease, and pine snakes are difficult to monitor, any effects of snake fungal disease may be difficult to quantify. Providing any dead specimens to FWC will help monitor for this disease.



Figure 3. Using heavy machinery to excavate gopher tortoise burrows is an example of an activity that will compact soils and may take pine snakes. Photograph by Bradley O'Hanlon.

Potential to Significantly Impair Essential Behavioral Patterns

Florida pine snakes rely on intact tracts of properly managed uplands, thus actions that result in the loss,

degradation or fragmentation of those lands may impair or disrupt the essential behavioral patterns of Florida pine snakes (Hipes et al. 2000, FWC 2011). Activities that may degrade or fragment pine snake habitat include land clearing, development, and road widening or improvement. Additionally, because burrows and underground refugia are essential for Florida pine snake nesting and sheltering, activities that would eliminate or impact habitat features such as stump removal, tortoise burrow excavation, subsurface root raking and soil compaction from heavy equipment have the potential to cause incidental take of pine snakes (Diemer and Moler 1982, Means 2005, Smith et al. 2015, Andelt and Case 2016).

Distribution and Survey Methodology

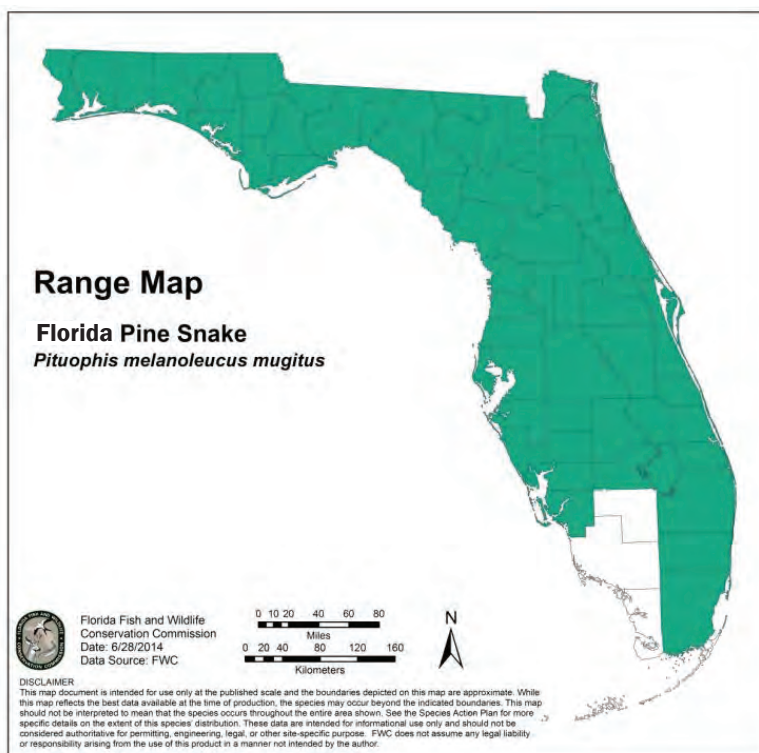
The range map (right) represents the principle geographic range of the Florida pine snake, including intervening areas of unoccupied habitat. This map is for informational purposes only and not for regulatory use.

Counties: All counties except for Monroe, Collier, and Hendry.

Recommended Survey Methodology

FWC does not recommend Florida pine snake surveys for most activities unless as a component of scientific benefit (see [Scientific Benefit](#)). Any surveys performed during the project planning phase should be coordinated with FWC. Because this is a cryptic species, surveys conducted in accordance with the methodology described below may not detect this species. Surveys are not required. Any activity that requires handling a Florida pine snake in any capacity requires a permit. Opportunistic encounters that require identification of an animal without handling it may prove difficult as the Florida pine snake may be confused with other species (e.g., gray rat snake (*Pantherophis spiloides*; Figure 4 below). Surveys that may disturb any gopher tortoise burrow (active or inactive) will require a permit.

- Florida pine snakes are cryptic and fossorial, thus traditional methods such as road-cruising surveys and opportunistic visual encounter surveys are not effective for this animal (e.g., Stevenson et al. [2016] drove over 6,000 km (3,728 miles) in suitable Florida pine snake habitat and did not observe a single animal).
- The most effective survey methodology is long term site monitoring using appropriate drift fence arrays for large snakes. Brief surveys using temporary drift fence arrays may not be effective at documenting Florida pine snakes (Stevenson et al. 2016). All trapping operations will require a scientific collecting permit. Burgdorf et al. (2005) contains methodology for long term monitoring and appropriate trap design.
- Long term monitoring using Burgdorf-style traps is the recommended survey protocol for Florida pine snakes, however, this methodology is labor intensive. Because surveys may be suspended after



the first snake is observed, FWC does not recommend Florida pine snake surveys for most activities unless as a component of scientific benefit (see [Scientific Benefit](#)).

- If long term trapping is used, traps should be checked minimally every 2-3 days. Here, long term trapping is defined as a minimum commitment of 6 months. Trapping should encompass the main Florida pine snake active season (May–October). For best results, multiple traps should be deployed within a site.
- There will be considerable bi-catch when using drift fence traps that target large snakes. Other potential snake species that may be captured include federally-threatened eastern indigo snakes (*Drymarchon couperi*) and numerous species of venomous snakes, including eastern diamondback (*Crotalus adamanteus*) and timber rattlesnakes. Therefore, drift fence operators should be trained and permitted to handle these species.
- Surveys for pocket gopher mounds and gopher tortoise burrows will provide an indication of potential Florida pine snake habitat and essential breeding locations. These surveys will help meet the guidelines for minimization of impacts and can help to identify conservation or scientific benefit (see [Information Options](#) under Mitigation). Surveys that will impact gopher tortoise burrows will require a Scientific Collecting permit or certification as an Authorized Agent (see gopher tortoise permitting guidelines; FWC 2008).
- Florida pine snakes may be opportunistically detected within gopher tortoise burrows when using a burrow scoping system. If this methodology is used, the applicant must have either a Scientific Collecting permit or certification as an Authorized Agent to scope burrows.
- If Florida pine snakes are detected on site, the applicant should coordinate with FWC.



Figure 4: Gray rat snakes (top), typically found in the Florida panhandle, are similar in size and appearance to Florida pine snakes (bottom). Photographs by Michelina Dziadzio and Bradley O’Hanlon.

A geographic information system (GIS) review of recent (post-2000) Florida pine snake sightings may aid in determining the presence of Florida pine snakes. Because the Florida pine snake is a cryptic species, GIS and/or crowdsourced databases may not have complete occurrence data and should not be solely relied on if there are no documented occurrences near a project. As Florida pine snakes have large home ranges and may persist in degraded habitat, care should be taken to not misinterpret GIS data. This GIS data may be available upon request from the FWC.

Recommended Conservation Practices

Recommendations are general measures that could benefit the species but are not required. No FWC permit is required to conduct these activities.

- Refrain from fragmenting upland habitats, such as sandhills, scrub, xeric hammock, scrubby

flatwoods, mesic pine flatwoods, pinewoods, and dry prairie with dry soils.

- Design projects to minimize loss of upland habitats containing well drained soils by minimizing the size of the project footprint where possible.
- Establish conservation easements that maximize the conservation of upland habitat.
- If road construction is necessary, use unimproved dirt roads to the maximum extent possible. Guidelines for minimizing erosion and runoff from roadways can be found in the State of Florida Best Management Practices (BMP's) for [stormwater runoff](#) and within the Florida Department of Agriculture Consumer Services (FDACS) [silviculture BMP's](#).
- Develop a prescribed fire regime that promotes forests with an open canopy layer and diverse ground cover. Encourage regimes that maintain ecologically natural fire frequency, intensity, and seasonality.
- Avoid habitat management procedures that will compact or disturb soil, such as using roller choppers or roller drums in suitable habitat, except as needed for habitat restoration.
- Avoid or minimize soil compaction, especially in areas where southeastern pocket gophers or gopher tortoises are present.
- Avoid disruptive activities such as road construction and lot clearing during peak movement times and the breeding season (May–October).
- The [FDACS BMP's for state imperiled species](#) as they relate to the gopher tortoise would benefit the Florida pine snake. When using herbicides to control herbaceous ground cover (herbaceous weed control) for newly established pines, a banded application is preferable over broadcast applications.

Measures to Avoid Take

Avoidance Measures that Eliminate the Need for FWC Take Permitting

This section describes all measures that would avoid the need for an applicant to apply for an FWC take permit.

- Avoid conversion of upland habitats used by Florida pine snakes. Specifically, avoid fragmenting large tracts of land.

Examples of Activities Not Expected to Cause Take

This list is not an exhaustive list of exempt actions. Please contact the FWC if you are concerned that you could potentially cause take.

- Activities that occur in areas not consistent with Florida pine snake habitat.
- Activities that avoid compacting soils, and that do not crush or harm pocket gopher mounds, gopher tortoise burrows, and that allow tree stumps to remain in the ground.
- Routine maintenance of vegetation in existing linear utility and highway right of ways.

Florida Forestry Wildlife BMP's and Florida Agricultural Wildlife BMP's

- The [FDACS BMP's for State Imperiled Species](#) does not include the Florida Pine Snake, however, the BMP's as they relate to the gopher tortoise would benefit the Florida pine snake.

Other authorizations for Take

- As described in Rule 68A-27.007(2)(c), F.A.C., land management activities (e.g., prescribed fire, mechanical removal of invasive species, and herbicide application) that benefit wildlife and are not inconsistent with FWC Management Plans are authorized and do not require a permit authorizing incidental take.
- When activities associated with normal and customary forestry and silvicultural practices are conducted in a manner where direct year-round contact with known and visibly apparent pocket

gopher villages are avoided and tree stumps are left, take is avoided. Normal and customary practices are generally accepted agricultural (silvicultural) activities for the type of operation and the region, 5M-15.001 (2) F.A.C.

- In cases where there is an immediate danger to the public's health and/or safety, including imminent or existing power outages that threaten public safety, or in direct response to an official declaration of a state of emergency by the Governor of Florida or a local governmental entity, power restoration activities and non-routine removal or trimming of vegetation within linear right of way in accordance with a vegetation management plan that meets applicable federal and state standards does not require an incidental take permit from the state.

The Florida pine snake is listed as a priority commensal species of gopher tortoises within the [Interim FWC Policy on the Relocation of Priority Commensals](#) (FWC 2015). Take via harassment (i.e., non-lethal relocation) may occur when gopher tortoises are relocated and their burrows are collapsed. If applicants follow the guidance in Table 1, this take is authorized.

Table 1. Interim guidance for limited relocation of Florida pine snake based on post-development site characteristics.

Post Development Site Characteristics	If a gopher tortoise burrow will be impacted from development and some habitat will remain on-site	If a gopher tortoise burrow will be impacted from development activities and adjacent habitat is available	If a gopher tortoise burrow will be impacted/destroyed from development and no habitat will remain
Florida Pine Snake	Any incidentally captured pine snake should be released on-site or allowed to escape unharmed if some habitat will remain post-development activities.	Any incidentally captured pine snake should be released on-site or allowed to escape unharmed if some habitat will remain post-development activities.	Any incidentally captured pine snake should be allowed to escape unharmed or donated to a facility for educational or research purposes (permit required for receiving facility).

Coordination with Other State and Federal Agencies

The FWC participates in other state and federal regulatory programs as a review agency. During review, FWC identifies and recommends measures to address fish and wildlife resources to be incorporated into other agencies' regulatory processes. For example, the FWC commented on the Candidate Conservation Agreement with Assurances for Multiple At Risk Species in North Florida (CCAA) for the Camp Blanding Joint Training Center. This CCAA directly addresses the Florida pine snake and highlights the importance of conserving flatwoods, sandhill, and scrub habitat, as well as removing or reducing threats to other candidate and at-risk species.

FWC provides recommendations for addressing potential impacts to state listed species in permits issued by other agencies. If permits issued by other agencies adequately address all of the requirements for issuing a state-Threatened species take permit, FWC will consider those regulatory processes to fulfill the requirements of Chapter 68A-27, F.A.C., with no additional application process. This may be accomplished by issuing a concurrent take permit from FWC, by a memorandum of understanding with the cooperating agency, or by a programmatic permit issued by another agency. These permits would be issued based on the understanding that the implementation of project commitments will satisfy the requirements of 68A-27.003 and 68A-27.007, F.A.C.

Review of Land and Water Conversion projects with State-Listed Species Conditions for Avoidance, Minimization and Mitigation of Take

- FWC staff, in coordination with other state agencies, provides comments to federal agencies (e.g., the Army Corps of Engineers) on federal actions, such as projects initiated by a federal agency or permits being approved by a federal agency.
- FWC staff works with landowners, local jurisdictions, and state agencies such as the Department of Economic Opportunity on large-scale land use decisions, including long-term planning projects like sector plans, projects in Areas of Critical State Concern, and large-scale comprehensive plan amendments.
- FWC staff coordinates with state agencies such as the Department of Environmental Protection (DEP) and the five Water Management Districts on the Environmental Resource Permitting (ERP) program, which regulates activities such as dredging and filling in wetlands, flood protection, stormwater management, site grading, building dams and reservoirs, waste facilities, power plant development, power and natural gas transmission projects, mining, oil and natural gas drilling projects, port facility expansion projects, some navigational dredging projects, some docking facilities, and single-family developments such as for homes, boat ramps, and artificial reefs.
- FWC staff provides technical assistance for early review of proposed projects.

FWC Permitting: Incidental Take

As defined in Rule 68A-27.001, F.A.C., incidental take is take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Activities that result in impacts to Florida pine snakes can require an Incidental Take Permit from the FWC (see above for actions that do not require a permit). Permits may be issued when there is a scientific or conservation benefit to the species and only upon showing by the applicant that that the permitted activity will not have a negative impact on the survival potential of the species. Scientific benefit, conservation benefit, and negative impacts are evaluated by considering the factors listed in Rule 68A-27.007(2)(b), F.A.C. These conditions are usually accomplished through a combination of avoiding take when practicable, minimizing take that will occur, and mitigating for the permitted take. This section describes the minimization measures and mitigation options available as part of the Incidental Take Permit process for take of this species. This list is not an exhaustive list of options.

Minimization Measure Options

The suite of options below can help to reduce or minimize take of the species, and lessen the mitigation necessary to counterbalance take. All of the options below assume that adhering to avoidance measures that eliminate the need for FWC permitting described above is not possible, and that some level of take may occur. These options can lessen the impact of activities, and ultimately may reduce what is needed to achieve a conservation or scientific benefit (see below). FWC does not recommend Florida pine snake surveys unless as a component of scientific benefit. Surveys for pocket gopher and gopher tortoise burrows will provide an indication of potential Florida pine snake habitat and essential breeding locations. These surveys will help identify actions to minimize impacts (see [Scientific Benefit](#)).

Seasonal, Temporal, and Buffer Measures

- Florida pine snakes nest and hatch from eggs from June-October. Destruction or disturbance of pocket gopher mounds or other underground refugia (such as gopher tortoise burrows) should be avoided during this period to prevent disturbance to potential nests and eggs. Activities such as land clearing and conversion during the peak movement season, May, June, July and October should be avoided.
- A 7.6 m (25-foot ft) buffer in all directions around the mouth of a gopher tortoise burrow (as described the [Gopher Tortoise Permitting Guidelines](#); FWC 2008) can minimize impacts to

Florida pine snakes.

- There are no recommendations for buffer zones around other refugia, including clusters of pocket gopher mounds, although a similar buffer to gopher tortoise burrows would be beneficial.

Design Modification

- Minimize loss and disturbance of suitable large tracts of uplands, including sandhill, scrub, xeric hammock, scrubby flatwoods, mesic pine flatwoods and dry prairie with dry soils.
- Minimize fragmentation of habitat within suitable large tracts of land (i.e., maintain connectivity among upland habitats). Avoid sensitive areas with high densities of pocket gopher mounds and/or gopher tortoise burrows.
- Design projects that minimize soil compaction within pine snake habitat and for projects that occur near pocket gopher villages.
- Design projects that will not affect prescribed fire regimes, or the ability to use prescribed fire in adjacent habitat.
- Minimize the number of primary and upgraded roadways within suitable Florida pine snake habitat.

Method Modification

- When activities must occur within habitat occupied by the Florida pine snake, refer to the Seasonal and Temporal Restrictions above to minimize take.
- Allow animals observed during construction activities to move safely away from an area by ceasing activity until the animal has moved away. All sightings should be immediately reported to the FWC and accompanied by GPS coordinates and photographs for species verification.
- Provide identification information to project personnel and avoiding directly crushing the Florida Pine snake and other cryptic species found in similar habitats.
- Flagging of pocket gopher mounds and gopher tortoise burrows when feasible, and where possible avoid impacting those mounds and burrows to the maximum extent possible.

Mitigation Options

Mitigation is scalable depending on the impact, with mitigation options for significant impairment or disruption of essential behavioral patterns constituting take. The Florida pine snake is a cryptic species. Therefore, the permittee can satisfy mitigation requirements selecting options under scientific benefit. Potential options for mitigation are described below. References to specific actions within the [Species Action Plan](#) (Actions) are provided.

Scientific Benefit

This section describes research and monitoring activities that provide scientific benefit, per Rule 68A-27.007, F.A.C. Conducting or funding these activities can be the sole form of mitigation for a project. Since this species is cryptic and there is limited information available, the options provided below are subject to change as new information becomes available. Projects that help to improve existing survey methodology for the Florida pine snake would need to be conducted with FWC cooperation (Action 3).

- Sharing sightings data (live and dead observations) with FWC, including latitude and longitude and photographs (Action 5) by email to Imperiled@MyFWC.com.
- Scientific studies following established survey methods, projects to fill data gaps related to information on species reproduction including nest behavior and location, habitat requirements in different natural communities, diet and refuge use in areas without pocket gophers, relationships between Florida pine snake densities and gopher tortoise and pocket gopher

abundance, impact of habitat fragmentation and patch size on population, and population demographic parameters (i.e., productivity, survivorship, and mortality rates; Actions 4, 5, 6). All scientific studies should be coordinated with input from FWC. It is possible that, through funding options, the FWC may provide support to scientific studies.

- Scientific studies (e.g., radio-telemetry studies) can help address life history questions. Collecting movement data and habitat use will help re-evaluate the Florida pine snake habitat suitability model (Action 7), or evaluate the effects of translocation on Florida pine snakes (Action 9). These projects should be designed and conducted with input from FWC to ensure that they provide scientific benefit.
- Identifying causes and underlying issues of southeastern pocket gopher declines (Action 8).

Habitat

Habitat acquisition or management may be a mitigation option.

- Maintaining connectivity of contiguous upland habitats is preferred. Easements and/or land use agreements that would help to establish connectivity for upland habitats is a desired outcome (Action 1).
- Upland habitat restoration options could include application of prescribed fire, hardwood reduction in overgrown habitats, pine thinning and decreasing habitat fragmentation by eliminating or decreasing roads within Florida pine snake habitat (Action 2).
- Removal and treatment of non-native invasive plant species and replacement with native plant species may be a mitigation option (Action 3).

Funding

- No funding option has been identified at this time. However, funding options as part of mitigation will be considered on a case by case basis.

Information

- Sharing sightings data (live and dead observations) with FWC, including latitude and longitude and photographs (required for verification purposes; Action 5) by email to Imperiled@MyFWC.com.
- Providing dead specimens to FWC for location vouchers, snake fungal disease screening, and future genetics work (Action 6). Arrangements for the transport or shipping of vouchers may be arranged by contacting Imperiled@MyFWC.com.
- The information option for this cryptic species may rise to the level of scientific benefit for the Florida pine snake, and is based on the most current knowledge of the species distribution.

Programmatic Options

- FWC's landowner Assistance Program is a voluntary program that can offer financial assistance to landowners who implement conservation plans. This program would allow the FWC opportunities to gather information on private lands slated for development, and the FWC would provide assistance in evaluating development practices and create suitable avoidance, minimization and mitigation options for specific properties.

Multispecies Options

- Florida pine snake range overlaps that of several other sandhill and upland habitats. Measures that will benefit the Florida pine snake, particularly those focused on maintaining connectivity across the landscape, will also benefit other species. Multi-species sandhill habitat measures are being drafted (Actions 2 and 3).
- State and federally listed species, as well as species included in Florida's ISMP, that have overlapping ranges and habitat preferences with the Florida pine snake include but are not

limited to: red-cockaded woodpecker (*Picoides borealis*), eastern indigo, Florida scrub jay, Southeastern American kestrel (*Falco sparverius paulus*), gopher tortoise, Florida mouse (*Podomys floridanus*), and gopher frog (*Lithobates capito*). Actions that benefit these species may have direct benefit to pine snakes.

- Other land management activities, for example safe harbor agreements for the red-cockaded woodpecker may benefit the Florida pine snake (Actions 2 and 3).

FWC Permitting: Intentional Take

Intentional take is not incidental to otherwise lawful activities. Per Rule 68A-27, F.A.C., intentional take is prohibited and requires a permit. For state-Threatened species, intentional take permits may only be considered for scientific or conservation purposes (defined as activities that further the conservation or survival of the species taken). Permits are issued for state-Threatened species following guidance in Rule 68A-27.007(2)(a), F.A.C.

Intentional take for human safety

- Permits will be issued only under limited and specific circumstances, in cases where there is an immediate danger to the public's health and/or safety, including imminent or existing power outages that threaten public safety, or in direct response to an official declaration of a state of emergency by the Governor of Florida or a local governmental entity. Applications submitted for this permit must include all information that is required from any other applicant seeking a permit, along with a copy of the official declaration of a state of emergency, if any. This permit process may be handled after the fact or at least after construction activities have already started. An intentional take permit may be issued for such purposes.

Aversive Conditioning

- Not applicable for the Florida pine snake.

Permits Issued for Harassment

- Not applicable for the Florida pine snake.

Scientific Collecting and Conservation Permits

- Scientific Collecting permits may be issued for the Florida pine snake using guidance found in Rule 68A-27.007(2)(a), F.A.C. Activities requiring a permit include any research that involves capturing, handling, or marking wildlife; conducting biological sampling; or other research that may cause take.
- A Scientific Collecting permit will not be issued for the sole purpose of removing a snake from the wild to use for education or outreach. Animals used for outreach may occasionally be available from wildlife rehabilitation facilities, or in scenarios where relocation is not an option. Florida pine snakes originating from the wild with a Scientific Collecting Permit used for educational and outreach purposes should be used for a minimum of 12 educational engagements equating to a minimum of 48 hours of contact time per year. Owners of pine snakes used for education and outreach must have a [Class III Exhibition License](#) and follow all caging requirements ([68A-6.004, F.A.C.](#)).

Considerations for Issuing a Scientific Collecting Permit

- 1) Is the purpose adequate to justify removing the species (if the project requires this)?
 - Permits will be issued if the identified project is consistent with the goal of the [Species Action Plan for the Florida Pine Snake](#) (i.e., improvement in status that leads to removal

from Florida's Endangered and Threatened Species List), or addresses an identified data gap important for the conservation of the species.

- 2) Is there be a direct or indirect effect of issuing the permit on the wild population?
- 3) Will the permit conflict with program intended to enhance survival of species?
- 4) Will purpose of permit reduce likelihood of extinction?
 - Projects consistent with the goal of the Species Action Plan for the Florida Pine Snake or that fill identified data gaps in species life history or management may reduce the likelihood of extinction. Applications should clearly explain how the proposed research will provide a scientific or conservation purpose for the species.
- 5) Have the opinions or views of other scientists or other persons or organizations having expertise concerning the species been sought?
- 6) Is applicant expertise sufficient?
 - Applicants must have prior documented experience with this or similar species; applicants should have met all conditions of previously issued permits; and applicants should have a letter of reference that supports their ability to handle the species.

Relevant to all Scientific Collecting Permits for Florida pine snakes

- Walking, visual encounter surveys, and opportunistic encounters that do not involve touching the animals, altering the microhabitat, or disturbing gopher tortoise burrows do not require a permit.
- Any activity that requires trapping or handling a Florida pine snake requires a permit. For example, these activities include taking a scale or tail clip for taxonomic analyses.
- Applications must include a proposal that clearly states the objectives and scope of work of the project, including a justification of how the project will result in a conservation benefit to the species. The proposal also must include a thorough description of the project's methods, time frame and final disposition of all individuals. Permit amendment and renewal applications must be "stand alone" (i.e., include all relevant information on objectives and methods).
- Permits may be issued to display a specimen if the specimen was obtained via rehabilitation facility or was encountered dead.
- Permits may be issued for captive possession (removal from the wild) if the individual is deemed non-releasable.
- Capturing and handling protocols, and a justification of methods, must be included in the permit application and should identify measures to lessen stress for captured snakes.
- Methodologies for any surgical procedures, including radio transmitter implantation, should be clearly spelled out, including measures taken to reduce stress and injury to the snakes. Surgical procedures should be performed by a qualified veterinarian.
- Methodologies for any collection of tissues such as blood and scale clips should be clearly spelled out, including measures taken to reduce stress and injury to the snakes.
- Disposition involving captive possession for any period of time must include a full explanation of whether the facility has appropriate resources for accomplishing the project objectives and for maintaining the animals in a safe and humane manner.
- Any mortality should be reported immediately to the FWC at the contact information below. The FWC will provide guidance on proper disposition of specimens.
- Geographical or visual data gathered must be provided to FWC in the specified format.
- A final report should be provided to the FWC in the format specified in the permit conditions.

Additional information

Information on Economic Assessment of this guideline can be found at <http://myfwc.com/wildlifehabitats/imperiled/management-plans/>

Contact

For more species-specific information or related permitting questions, contact the FWC at (850) 921-5990 or WildlifePermits@myfwc.com. For regional information, visit <http://myfwc.com/contact/fwc-staff/regional-offices>.

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