STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

TECHNICAL REPORT COVERSHEET

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ENVIRONMENTAL
MANAGEMENT
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DRAFT NATURAL RESOURCES EVALUATION TECHNICAL MEMORANDUM

Florida Department of Transportation

District Five

SR 535 PD&E Study

Limits of Project: From US 192 to North of World Center Dr

Orange and Osceola Counties, Florida

Financial Management Number: 437174-2

ETDM Number: 14325

Date: May 2024

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022 and executed by the Federal Highway Administration and FDOT.

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Authorized Signature

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Florida Department of
TRANSPORTATION

SR 535 PD&E Study

Natural Resources Evaluation Technical Memorandum

From US 192 to North of World Center Drive (SR 536)

Orange and Osceola Counties, Florida

Contract CA770

FM Number: 437174-2

FDOT

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EXECUTIVE SUMMARY

This Project Development and Environment Study evaluates the potential roadway improvements along a 2.35 mile segment of State Road 535 (SR 535), a four-lane divided minor arterial facility located within unincorporated Osceola and Orange Counties in central Florida. SR 535 is known as Vineland Road in Osceola County and Kissimmee-Vineland Road in Orange County. The proposed improvements are needed to address serious existing and projected capacity and safety deficiencies prevalent within the study corridor. This document presents the existing natural resources in the project area and the potential impacts from the Preferred Alternative on protected species and wetlands.

This project was evaluated for impacts to protected plant and animal species and their habitats in accordance with the FDOT's *PD&E Manual, Part 2, Protected Species and Habitat,* which incorporates the requirements of the National Environmental Policy Act (NEPA) and related federal and state laws. Federal and state listed species with potential to occur in the project corridor were identified through research and coordination with US Fish and Wildlife Service, and the Florida Fish and Wildlife Conservation Commission. There is no Critical Habitat present within the project area. Field investigations of the project area were also conducted on multiple days and in different seasons to evaluate the potential presence of protected species and habitats. No adverse impacts are anticipated to any listed species from the Preferred Alternative, and protected species that may occur in the project area are shown in **Table ES-1** along with effect determinations.

This project was evaluated for impacts to wetlands and other surface waters in accordance with FDOT's *PD&E Manual, Part 2, Wetlands and Other Surface Waters,* which incorporates the requirements of the National Environmental Policy Act (NEPA) and related federal and state laws. There would be no direct impacts to wetlands or other surface waters under the Preferred Alternative.

Under operating agreement with the Florida Department of Environmental Protection, the SFWMD maintains state jurisdiction for Environmental Resource Permit reviews under 62-330 FAC for roadway and transportation projects. SFWMD will coordinate any required Sovereign Submerged Lands easement or lease from the Florida Department of Environmental Protection Bureau of State Lands as part of the ERP permitting process, if necessary.

There are no Federally jurisdictional wetlands that will be impacted under the Preferred Alternative. Therefore, no Section 404 permit is anticipated.

Table ES-1 Species Effect Determinations Under Preferred Alternative

Common Name	Scientific Name	Federal Status	State Status	Occurrence Potential in Project Area	Effect Determination
Fauna Species					
Audubon's crested caracara	Polyborus plancus audubonii	FT	-	Low	No Effect
Blue-tail mole skink	Eumeces egregius lividus	FT	-	Moderate	No Effect
Eastern black rail	Laterallus jamaicensis ssp. jamaicensis	FT	-	Low	No Effect
Eastern indigo snake	Drymarchon corais couperi	FT	-	Low	NLAA
Everglade snail kite	Rostrhamus sociabilis plumbeus	FE	-	Low	No Effect
Florida burrowing owl	Athene cunicularia	-	ST	Low	NAEA
Florida grasshopper sparrow	Ammodramus savannarum floridanus	FE	-	Low	No Effect
Florida pine snake	Pituophis melanoleucus mugitus	-	ST	Low	NAEA
Florida sandhill crane	Grus canadensis pratensis	-	ST	Low	NAEA
Florida sand skink	Neoseps reynoldsi	FT	-	Moderate	NLAA
Florida scrub-jay	Aphelocoma coerulescens	FT	-	Low	No Effect
Gopher tortoise	Gopherus polyphemus	-	ST	Low	NAEA
Little blue heron	Egretta caerulea	-	ST	Low	NAEA
Red-cockaded woodpecker	Picoides borealis	FE	-	Low	No Effect
Roseate spoonbill	Platalea ajaja	-	ST	Low	No Effect Antcipated
Southeastern American kestrel	Falco sparverius paulus	-	ST	Low	NAEA
Tricolored heron	Egretta tricolor	-	ST	Low	No Effect Anticipated
Wood stork	Mycteria americana	FE	-	Low	No Effect
Flora Species					
Beautiful pawpaw	Deeringothamnus pulchellus	FE	-	Low	No Effect
Britton's beargrass	Nolina brittoniana	FE	-	Low	No Effect
Florida greeneyes	Berlandiera subacaulis	FT	-	Low	No Effect
Gray's beaksedge	Rhynchospora grayi	FT	-	Low	No Effect
Lewton's polygala	Polygala lewtonii	FE	-	Low	No Effect

Notes: FE = Federally Endangered, FT = Federally Threatened, ST = State Threatened, NLAA = Not Likely to Adversely Affect, MANLAA = May Affect, Not Likely to Adversely Affect, NAEA = No Adverse Effect Anticipated

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1.0 Introduction

In November 2017, the Florida Department of Transportation (FDOT) District Five (D-5) completed a Corridor Planning Study (CPS) to evaluate State Road 535 (SR 535) from US 192 in Osceola County to I-4 in Orange County. The purpose of the CPS was to identify specific problem areas along the corridor and evaluate multimodal alternatives that will be carried forward into future phases of project development in order to optimize the operations of the existing facility. Improvements identified as a result of the CPS included widening from four to six lanes, TSM&O and multimodal improvements, and intersection improvements (including innovative intersection designs).

FDOT D-5 is conducting a Project Development and Environment (PD&E) Study to evaluate the recommendations from the CPS including the widening of SR 535 from four to six lanes from US 192 in Osceola County to just north of World Center Drive (SR 536) in Orange County, approximately 2.35 miles.

1.1 Project Description

SR 535 is a four-lane divided minor arterial facility located within unincorporated Osceola and Orange Counties in Central Florida. SR 535 is known as Vineland Road in Osceola County and Kissimmee-Vineland Road in Orange County. The project limits extend approximately 2.35 miles from the US 192 intersection in Osceola County to just north of the SR 536 intersection in Orange County, as shown in **Figure 1-1**.

Figure 1-1 - Project Location

1.2 Purpose & Need

The purpose of the project is to accommodate future projected traffic demand and improve safety. The need for the project is based on addressing future transportation demand and safety concerns.

1.2.1 Transportation Demand

In the existing condition, the section of SR 535 from US 192 to Kyngs Heath Road operates at a Level of Service (LOS) D with an Annual Average Daily Traffic (AADT) of 28,300; the section from Kyngs Heath Road to Poinciana Boulevard operates at LOS D with an AADT of 26,900; the section from Poinciana Boulevard to Polynesian Isle Boulevard operates at LOS D with an AADT of 46,800; the section from Polynesian Isle Boulevard to World Center Drive operates at LOS D with an AADT of 44,300.

In the future year (2045) No-Build condition, the section of SR 535 from US 192 and Kyngs Heath Road is projected to operate at LOS F with an AADT of 42,000; the section from Kyngs Heath Road to Poinciana Boulevard is projected to operate at LOS E with an AADT of 40,000; the section from Poinciana Boulevard to Polynesian Isle Boulevard is projected to operate at LOS F with an AADT

of 69,000; the section from Polynesian Isle Boulevard to World Center Drive is projected to operate at LOS F with an AADT of 66,000.

1.2.2 Safety

A total of 981 crashes were reported on SR 535 from US 192 to Lake Bryan Beach Boulevard in the five-year period from 2014 through 2018. Of those reported crashes, 463 (47%) resulted in injury and four (4) resulted in a fatality. The most frequent crash type was rear end with 605 (62%) total crashes, indicating congestion. Sideswipe crashes were the second highest with 106 (11%), followed by left-turn with 93 (9%) total crashes. Of the 981 crashes, 602 (61%) crashes occurred during daylight conditions. The crash rates along this segment of SR 535 exceed the FDOT statewide averages for similar facilities.

1.3 Project Status

The project is within the jurisdiction of MetroPlan Orlando. The MetroPlan Orlando 2045 Cost Feasible Plan (CFP) includes widening of SR 535 from US 192 in Osceola County to SR 536 in Orange County in years 2031 to 2035 (construction). The SR 535 improvements are funded for design in the Florida Department of Transportation (FDOT) 2024-2029 Five-Year Work Program and MetroPlan Orlando 2023-2028 Transportation Improvement Program (TIP). This project was screened in the Efficient Transportation Decision Making (ETDM) system as ETDM #14325.

1.4 Alternatives Analysis Summary

The following alternatives were evaluated during the study:

- 'No-Build' Alternative
- Construction ('Build') Alternatives
  The build alternative consists of widening SR 535 from four to six lanes. The study evaluated a range of typical section and intersection alternatives including inside widening and outside widening of the existing roadway. The build alternative analysis included the evaluation of open and closed stormwater drainage conveyance systems together with the evaluation of pond site locations. The study also evaluated Transportation System Management and Operations (TSMO) and multimodal improvements.

1.5 Description of Preferred Alternative

The Preferred Alternative consists of inside widening from four to six lanes with a shared use path along both sides, and intersection improvements. The Preferred Alternative is shown on **Figure 1-2**.

The Preferred Alternative has a design speed of 45-miles per hour (mph) and consists of full reconstruction with the additional lanes constructed towards the median. The typical section consists of three (3) 11-foot travel lanes in each direction separated by a 32-foot to 47-foot

median with a 14-foot shared use path on the west side and a 12-foot shared use path on the east side of the roadway. The Preferred Alternative will be constructed within the existing right-of-way width of 200-feet to 224-feet. Swales with ditch bottom inlets in conjunction with flume inlets at the curb line will be provided for drainage conveyance. Stormwater attenuation and floodplain compensation will be provided.

Figure 1-2 - Preferred Alternative Typical Section

1.5.1 Intersection Improvements

The Preferred Alternative will also implement intersection improvements including the following innovative intersection concepts.

- Polynesian Isle Boulevard Partial Median U-Turn (PMUT): Implementation of the PMUT involves the removal of northbound and southbound direct left turn movements from SR 535 to Polynesian Isle Boulevard and the addition of signalized U-turns at the existing median openings located just north and south of the intersection along SR 535 to accommodate vehicles wishing to travel east or west on Polynesian Isle Boulevard.
- International Drive Partial Displaced Left Turn (PDLT). Implementation of the PDLT involves the removal of direct eastbound and westbound left turns from Internation Drive at SR 535 with the displaced left turns installed on both legs International Drive. The northbound and southbound left turn movements for SR 535 continue to take place at the main intersection.
- SR 536 (World Center Drive) Partial Displaced Left Turn (PDLT). Implementation of the PDLT involves the removal and replacement of direct northbound and southbound left turns from SR 535 at SR 536 with the displaced left turns installed on both legs of SR 535. The eastbound and westbound left turn movements for the SR 536/World Center Drive continue to take place at the main intersection.

1.5.2 Drainage

There are 4 basins in the existing and proposed condition, and all basins drain to permitted stormwater systems in the existing condition (see **Table 1-1)**. Where feasible, stormwater

management facilities have been recommended within existing FDOT or County right-of-way (R/W). Below is a summary of the preferred pond alternatives (see **Figure 1-3**).

- Basin 1: Alternative 1A is the Preferred Alternative for Basin 1. Alternative 1A consists of an existing wet detention pond (identified as Exist. Pond 1-1) within FDOT R/W to provide the required water quality treatment and attenuation volumes.
- Basin 2: Alternative 2A is the Preferred Alternative for Basin 2. Alternative 2A consists of 2 ponds, one existing wet detention pond within existing FDOT R/W (identified as Exist. Pond 2-1) interconnected with a second wet detention pond (identified as Pond 2-2) to provide the required water quality treatment and attenuation volumes. Since there is insufficient area within the existing FDOT R/W to provide a stormwater management alternative to meet water quality treatment and attenuation requirements, Pond Alternative 2A will require acquisition of R/W.
- Basin 3: Alternative 3A is the Preferred Alternative for Basin 3. Alternative 3A consists of 2 ponds, one existing wet detention pond within existing FDOT R/W (identified as Exist. Pond 3-1) interconnected with a second wet detention pond (identified as Pond 3-2) to provide the required water quality treatment and attenuation volumes. Since there is insufficient area within the existing FDOT R/W to provide a stormwater management alternative to meet water quality treatment and attenuation requirements, Pond Alternative 3A will require acquisition of R/W.
- Basin 4: Alternative 4A is the Preferred Alternative for Basin 4. Alternative 4A consists of an existing wet detention pond (identified as Exist. Pond 4-1) within existing R/W and easement to provide the required water quality treatment and attenuation volumes.

Table 1-1 - Preferred Pond Alternatives

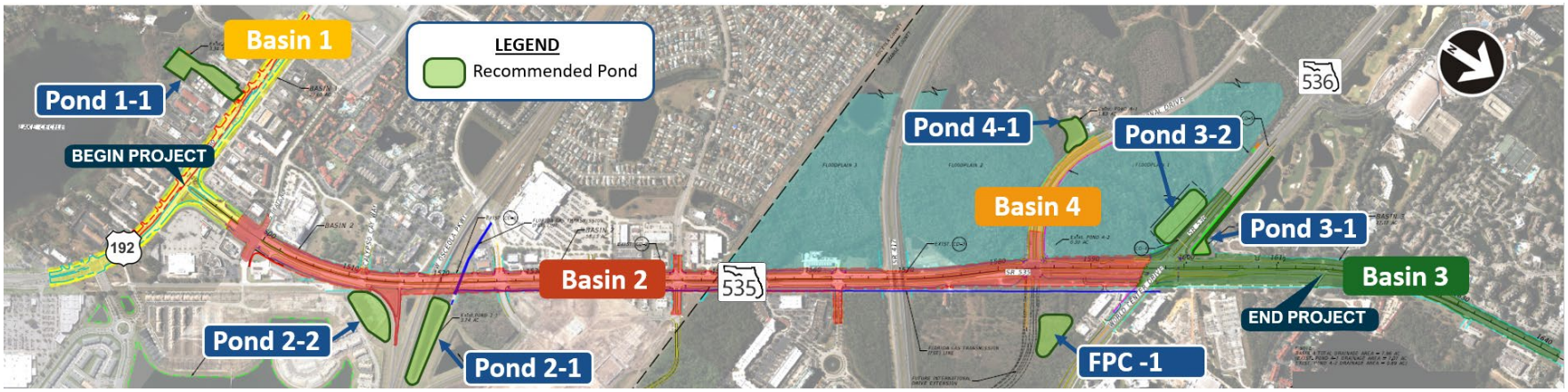
Basin	Preferred Alternative	Ponds	Type	R/W Req'd.	Remarks
1	1A	Exist. Pond 1-1	Wet	0.0	Exist. pond sufficient. Reduced drainage area (30.94 ac to 29.16 ac) from exist. to proposed conditions. Increased freeboard in exist. pond. Pond within exist. R/W
2	2A	Exist. Pond 2-1 and Pond 2-2	Wet	4.3	Interconnected ponds to provide required water quality treatment and attenuation. Utilize Exist. Pond 2-1 outfall to Shingle Creek. Exist. Pond 2-1 within exist. R/W. Estimated R/W needs for Pond 2-2 provided (excluding public R/W used for pond).
3	3A	Exist. Pond 3-1 and Pond 3-2	Wet	3.5	Interconnected ponds to provide required water quality treatment and attenuation. Utilize Exist. Pond 3-1 and Pond 3-2 outfalls to Shingle Creek. Exist. Pond 3-1 within exist. R/W. Estimated R/W needs for Pond 3-2 provided (excluding public R/W used for pond).
4	4A	Exist. Pond 4-1	Wet	0.0	Exist. pond sufficient. Reduced drainage area (8.70 ac to 7.63 ac) from exist. to proposed conditions. Increased freeboard in exist. pond. Pond within exist. R/W

An analysis of floodplain impacts and Floodplain Compensation (FPC) alternatives was performed. Project improvements will impact the 100-year floodplain as a result of longitudinal impacts and transverse impacts. The preferred FPC alternative and anticipated right of way needs associated with the preferred alternative are provided in **Table 1-2**.

Table 1-2 - Preferred FPC Site

Name	Floodplain Impacts (ac-ft)	Floodplain compensation Volume Provided (ac-ft)	Estimated Pond R/W Req'd. (including access) (ac)
FPC-1	8.89	14.45	4.3

Figure 1-3 - Recommended Ponds



1.6 Project Area Description

The project is located in both Osceola and Orange Counties, northeast of the community of Celebration, Florida. The term "project corridor" is used in this document to represent a smaller area that encompasses the existing S.R. 535 right-of-way and the footprint of the Build Alternative. The term "project area" represents a larger expanse that encompasses the project corridor as well as all land within 500 feet of the centerline of S.R. 535. The project corridor is 2.2 miles in length.

Within the Osceola County portion of the project area, the predominant land use is commercial and services including hotels and vacation rentals, retail strip malls and supermarkets, restaurants, and gas stations. Select areas within this southern half of the project remain undeveloped, including cleared land east of SR 535 immediately south of the county line and vegetated parcels south of N Poinciana Blvd east of SR 535 and south of Calypso Cay Way west of SR 535.

The Orange County portion of the project is predominantly upland vegetated land uses, including pine flatwoods and mixed hardwood forests, and some forested wetland land uses. Commercial services, including shopping centers located just north of the county line east of SR 535, and a strip mall including a gas station and pharmacy at the southeast corner of the SR 535 and SR 536 intersection. The northern extent of the project area includes residential neighborhoods on both the east and west sides of SR 535 as well as a golf course located northwest of the SR 535 and SR 536 intersection.

Throughout the project area, there are stormwater swales located on either side of the SR 535. The southernmost 1/3 of the project contains mostly sodded swales which are within the maintained ROW. From south of the county line moving towards the northern limits of the project, the swales have canopy coverage and appear to be frequently inundated facilitating wildlife usage. At the county line and east of SR 535, there is a canal that runs perpendicular to SR 535 within the Osceola County portion of the project and parallel to SR 535 within Orange County. This canal appears to be connected to the west side of SR 535 via culverts.

1.7 Land Use

Land use cover descriptions provided for both uplands and wetlands are classified utilizing the *Florida Land Use Cover and Forms Classifications System* (FLUCCS) designations. Previous and existing land uses in the project area were initially determined utilizing US Geological Survey (USGS) maps, historical images, aerial photographs, and land use mapping from the South Florida Water Management District (SFWMD) (2017-2019). Land use categories in the project area reported by SFWMD were verified in the field. Field reviews generally confirmed the SFWMD land use mapping with very minor adjustments. Land use categories in the project area as mapped by SFWMD are shown in **Figures 1-4** and **1-5** and each land use category in the project area is described below.

Figure 1-4 - Land Use in Orange County Project Area

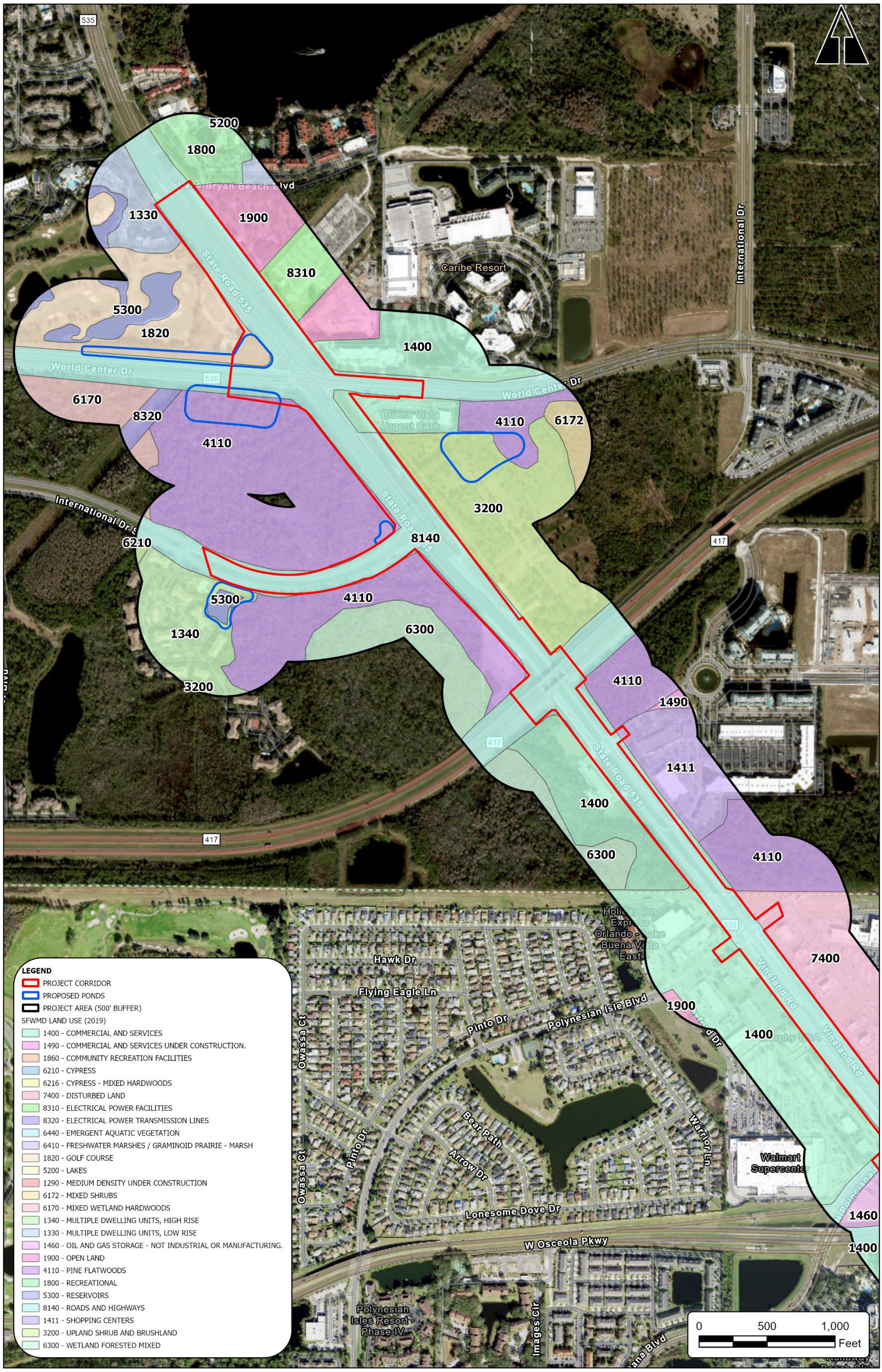
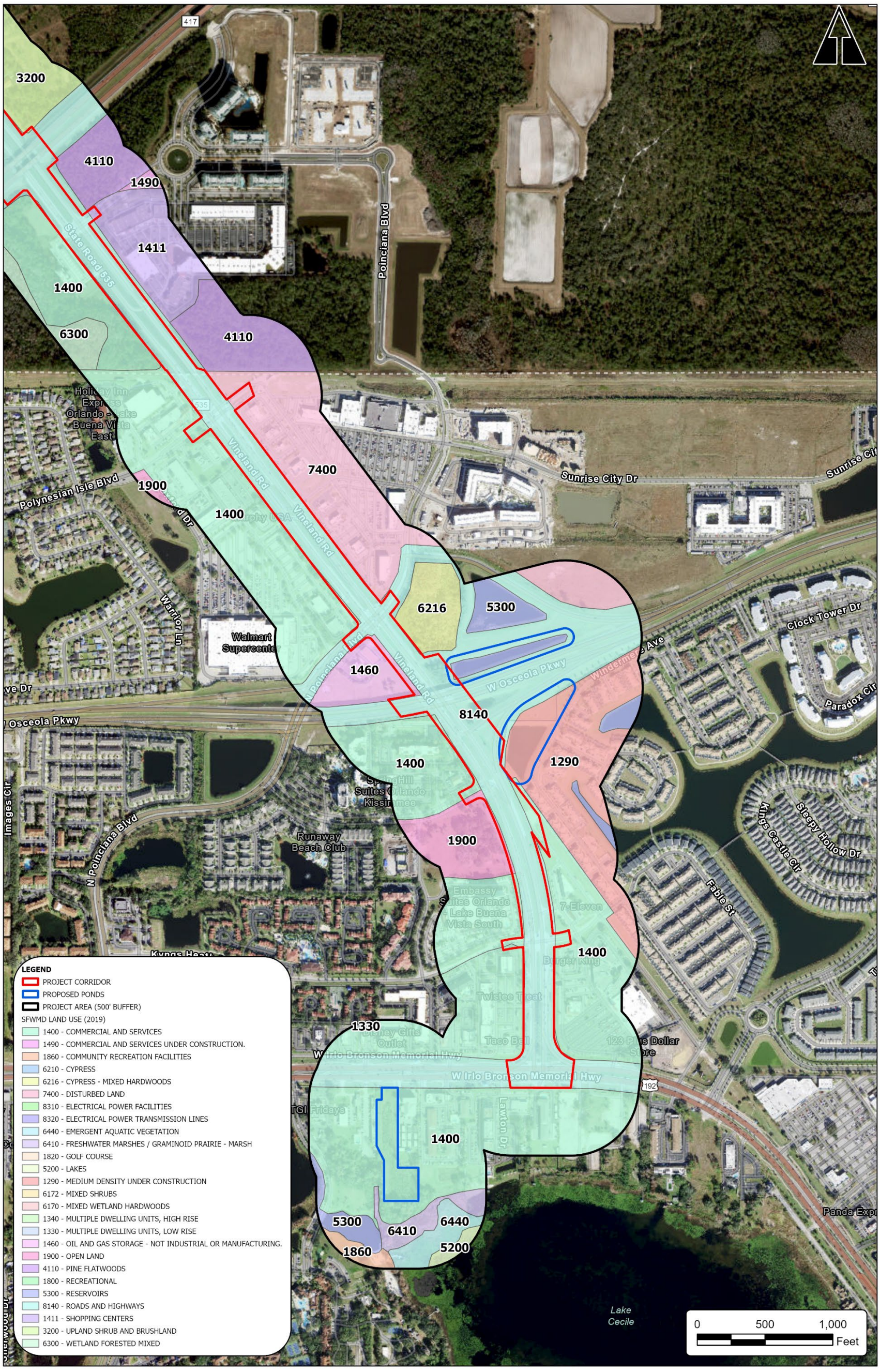


Figure 1-5 - Land Use in Osceola County Project Area



Residential, Medium Density Under Construction (FLUCCS – 1290)

This category refers to a residential areas in the process of construction with a dwelling density of 2 to 5 per acre once completed. If more than 2/3 of the construction if completed, then the area should be coded by the 1200 FLUCCS for medium density residential. This land use type occurs immediately southeast of the on-ramp to eastbound Osceola Parkway from northbound SR 535.

Residential High Density, Multiple Dwelling Units (FLUCCS – 1330)

This category refers to a density of six or more dwelling units per acre. This land use category includes two-story town homes, duplexes, and other low-rise residential structures. Low-rise residential areas are newer developments which are commonly located on the urban fringe. This class is found in one location in the project area at the northwestern limits of the study area northwest of the SR 535 and World Center Drive intersection.

Commercial and Services (FLUCCS – 1400)

This is an active land use category that includes a broad range of uses and operations providing diverse products and services which often occur in complex mixtures. Subclasses include retail and wholesale, professional, cultural and entertainment, and tourist services, as well as others. The 1400 class includes shopping centers, commercial strip developments, warehouses, junk yards, campgrounds, and amusement parks. These areas are usually located along main transportation routes or at the intersections of secondary transportation corridors. This land use category accounts for a large portion of the study area and is found in several locations. This includes the southern portion of the project located south of SR 417 to south of US 192, aside from one area of 1900 Open Land and one area of 1290 Residential, Under Construction. This category is also located west of SR 535 from north of Osceola Parkway to SR 417 and east of SR 535 north and south of the World Center Drive intersection near the project's northern terminus.

Shopping Centers (FLUCCS – 1411)

This land use category includes varying sizes and shapes of buildings which share common parking facilities for customers. These include both connected and unconnected buildings commercial and retail facilities. This land use is found in one location of the project corridor at the outlet stores located south of LBV Factory Stores Drive north of the Osceola-Orange County Line and south of SR 417.

Oil and Gas Storage (FLUCCS – 1460)

This land use category includes storage facilities for petroleum, oil, and lubricant product retail and wholesale sales. This category can be identified by tanks, spill enclosures, internal roads/railroads, spurs, embankments, piers, and maintenance facilities. This land use is found in one location in the project area, west of SR 535 from north of W Osceola Parkway to south of Poinciana Blvd.

Recreational (FLUCCS – 1800)

This land use category is used for outdoor activities such as community sports, open-air performances, and fairgrounds. This includes well organized grounds with parking facilities, which are typically not paved. This land use is found in one location at the northeast limits of the study area in association with the adjacent resort complexes on Lake Bryan around Lake Bryan Beach Blvd.

Golf Course (FLUCCS – 1820)

Golf courses are easily recognizable by their distinctive well-maintained grass areas, fairways, and ponds. Golf courses are typically constructed in low-lying areas such as pine flatwoods and may be adjacent to, or displace wetlands. These wetlands would not be broken out of the 1820 Golf Course land use classification unless they meet the two acre minimum mapping unit criteria. This land use is associated with the Hawk's Landing Golf Club located northwest of the World Center Drive and SR 535 intersection.

Open Land (FLUCCS – 1900)

This land use category includes open, undeveloped land within urban areas which are typically interpreted as transitional or uncertain land uses. This land use does not include forests or wetlands, unless they occur as small areas which do not meet the mapping unit criteria within the 1900 land use. This open land category is found in one location within the study area, south of the Calypso Cay Way to the west of SR 535.

Upland Shrub and Brushland (FLUCCS – 3200)

This category is for upland non-agricultural, non-forested lands which exhibit no evidence of cattle grazing. This class includes areas where tree species are regenerating naturally after clear cutting or fire but are less than 20 feet tall. This includes native hardwood and coniferous species but does not apply to plantations. This land use type occurs in one location in the study area to the east of SR 535 from SR 417 to the commercial land uses immediately south of World Center Drive.

Pine Flatwoods (FLUCCS – 4110)

This class is for naturally generated pine flatwoods. The canopy closure must be 25 percent or more and the trees must average over 20 feet tall. The pine flatwoods class is dominated by slash pine, longleaf pine, or both. Common understory species include saw palmetto, wax myrtle, gallberry, and a wide variety of herbs and brush. Pine flatwoods are the most prevalent community in natural areas. Most pine flatwoods occur on broad, low, flat areas with seasonal high-water tables but not on hydric soils. They transition into mesic flatwood and hardwood communities on higher ground and into hydric flatwoods, cypress, and other wetlands on the lower edges. Pine flatwoods are found in four places in the project area. One area is located to the east of SR 535 from the county line to south of the factory outlets at LBV Factory Stores Dr

and another area is located north of the LBV Factory Stores Dr to south of SR 417. The other two areas are located to the west of SR 535 from SR 417 to World Center Drive and are separated by International Drive S.

Reservoirs (FLUCCS – 5300)

This class is for artificial impoundments of water, or water bodies that have been significantly modified from the natural state. They are used for irrigation, flood control, municipal and rural water supplies, stormwater treatment, recreation, and hydro-electric power generation. Reservoirs are found in multiple places throughout the project area. Reservoirs land use is found in one location in the study area, to the east of SR 535 immediately north of Osceola Parkway.

Cypress – Mixed Hardwoods (FLUCCS – 6216)

This class is used for forested wetland communities dominated by a mix of pond or bald cypress and hardwood swamps. This land use type is found in one location in the study area, immediately south of Poinciana Blvd to the east of SR 535.

Disturbed Land (FLUCCS – 7400)

This land use class is used for areas where soil or substrate has been altered or removed by human activity, whether or not the cause is known. The Level 1 Barren Land category, including this 7400 Disturbed Land sublevel, is only applied to upland areas. This land use type is found in one location in the study area, to the east of SR 535 from north of Poinciana Blvd to south of the county line.

Roads and Highways (FLUCCS – 8140)

This class includes those highways exceeding 100 feet in width, with 4 or more lanes and median strips. The intent of this data layer is to include only the major transportation corridors. This land use type is mapped for SR 535, US 192, Osceola Parkway, Poinciana Boulevard, SR 417, International Drive South, and World Center Drive.

Electrical Power Facilities (FLUCCS – 8310)

Electrical power facility land uses include fossil fuel and nuclear plants. Associated facilities include transformer yards, cooling ponds or towers, and fuel storage. One electrical power facility is found within the project area approximately 500 feet north of the World Center Drive and SR 535 intersection, to the east of SR 535.

1.8 Elevation, Hydrology, and Drainage

The study area is located on relatively flat land with a ground elevation ranging between approximately 81 and 101 feet. There is a rise in elevation from south to north along the project corridor, with the highest elevations found at the northern end of the project. The National Resources Conservation Service (NRCS) reports the depth to water table in the project area is between 0 and 42 inches. **Figure 1-6** shows an elevation map created with data collected by

NOAA and the U.S. Department of Commerce in 2007 using Light Detection and Ranging (LIDAR) in North American Datum 1983 (NAD 83).

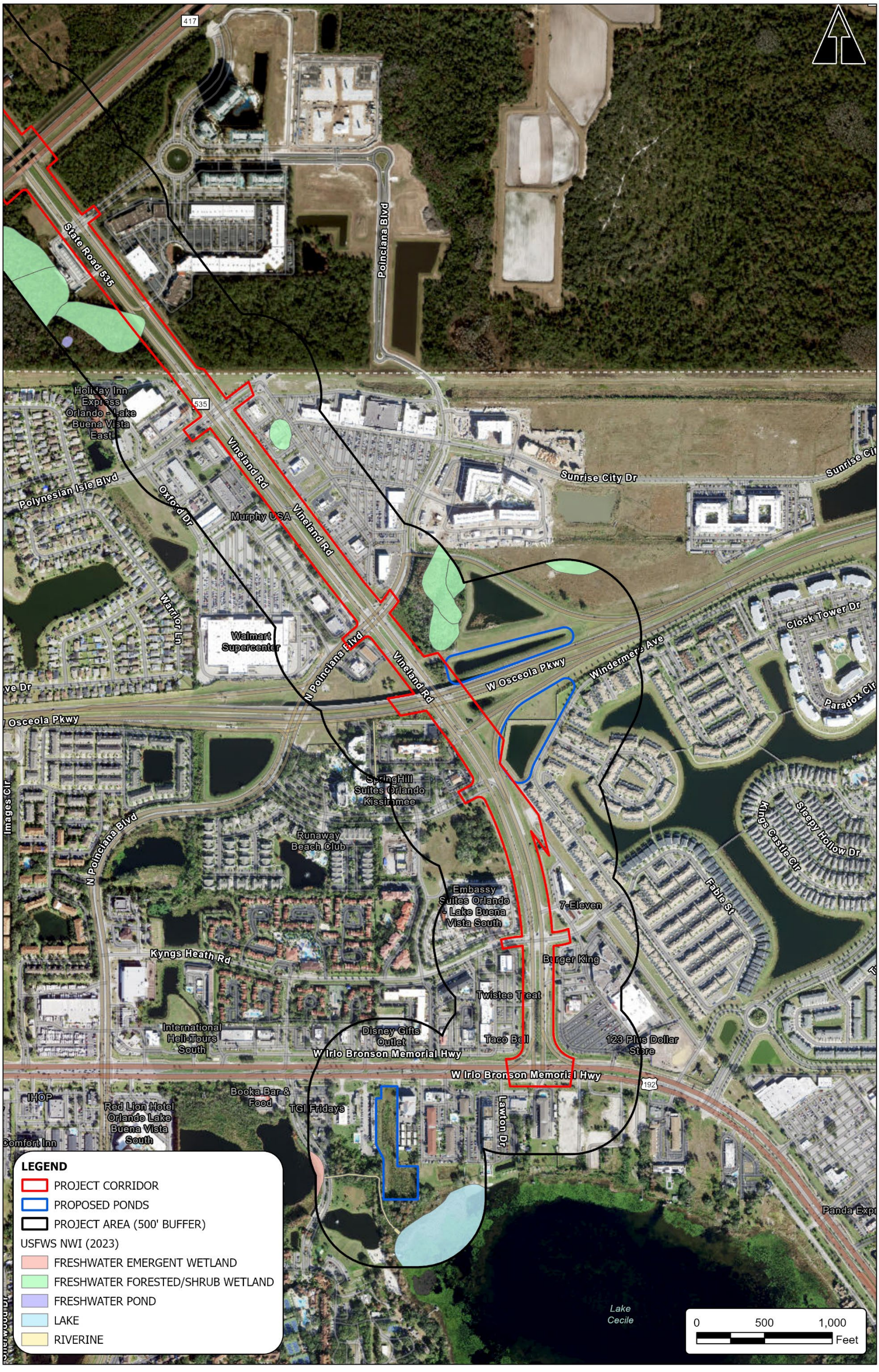
Major hydrologic features and wetlands mapped by the USFWS National Wetlands Inventory (NWI) in the project area are shown in **Figure 1-7** and **1-8**. A freshwater pond within a golf course is located north of S.R. 536 and west of S.R. 535 that intersects a small portion of the project area. There are also two patches of freshwater forested/shrub wetland that intersect the project area; one patch is located south of International Drive and stretches down south of S.R. 417 to the border of Orange and Osceola County. There is also a patch of wetlands mapped north of West Osceola Parkway and east of S.R. 535, but this area has already been developed and is no longer wetland.

The project sits atop the Biscayne Aquifer, a Sole Source Aquifer as identified by the U.S. Environmental Protection Agency (USEPA). This project is located within the SFWMD's Reedy Creek and Shingle Creek Basins. According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (updated September 25, 2009), a portion of the project area in the northwest is located within the 500-year floodplain (Zone A). The remaining project area is categorized as Zone X, which is an area of minimal flood hazard.

Figure 1-6 - Elevation Map

Figure 1-7 - Surface Hydrology in Orange County Project Area

Figure 1-8 - Surface Hydrology in Osceola County Project Area



1.9 Soils

The Natural Resources Conservation Service (NRCS) (2017) indicates 12 soil types occur in the project area (**Figures 1-9** and **1-10**). The soil types in the project area are listed in **Table 1-2** along with descriptions and ratings from NRCS. Nine hydric soils are known to occur in the project area: Basinger fine sand, Hontoon muck, Immokalee fine sand, Myakka fine sand, Ona fine sand, Placid find sand, Sanibel muck, Smyrna, and Zolfo fine sand. Four soil types within the project area are classified as Farmlands of Unique Importance and include Myakka fine sand, Narcoossee fine sand, Tavares fine sand, and Zolfo fine sand. There are no Prime Farmland soil types within the project area.

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Figure 1-9 - Soil Types in the Orange County Project Area

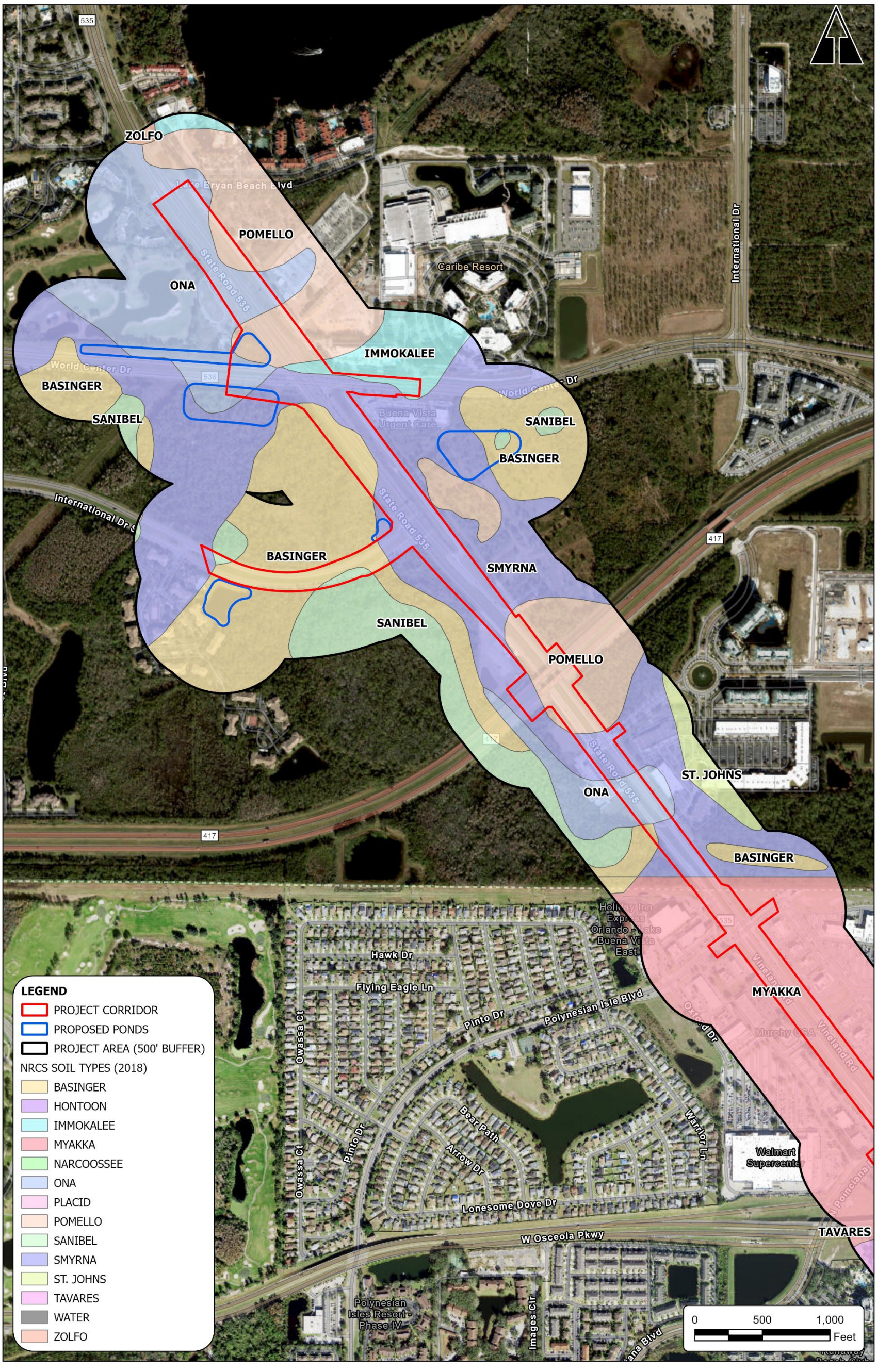

Figure 1-10 - Soil Types in Osceola County Project Area

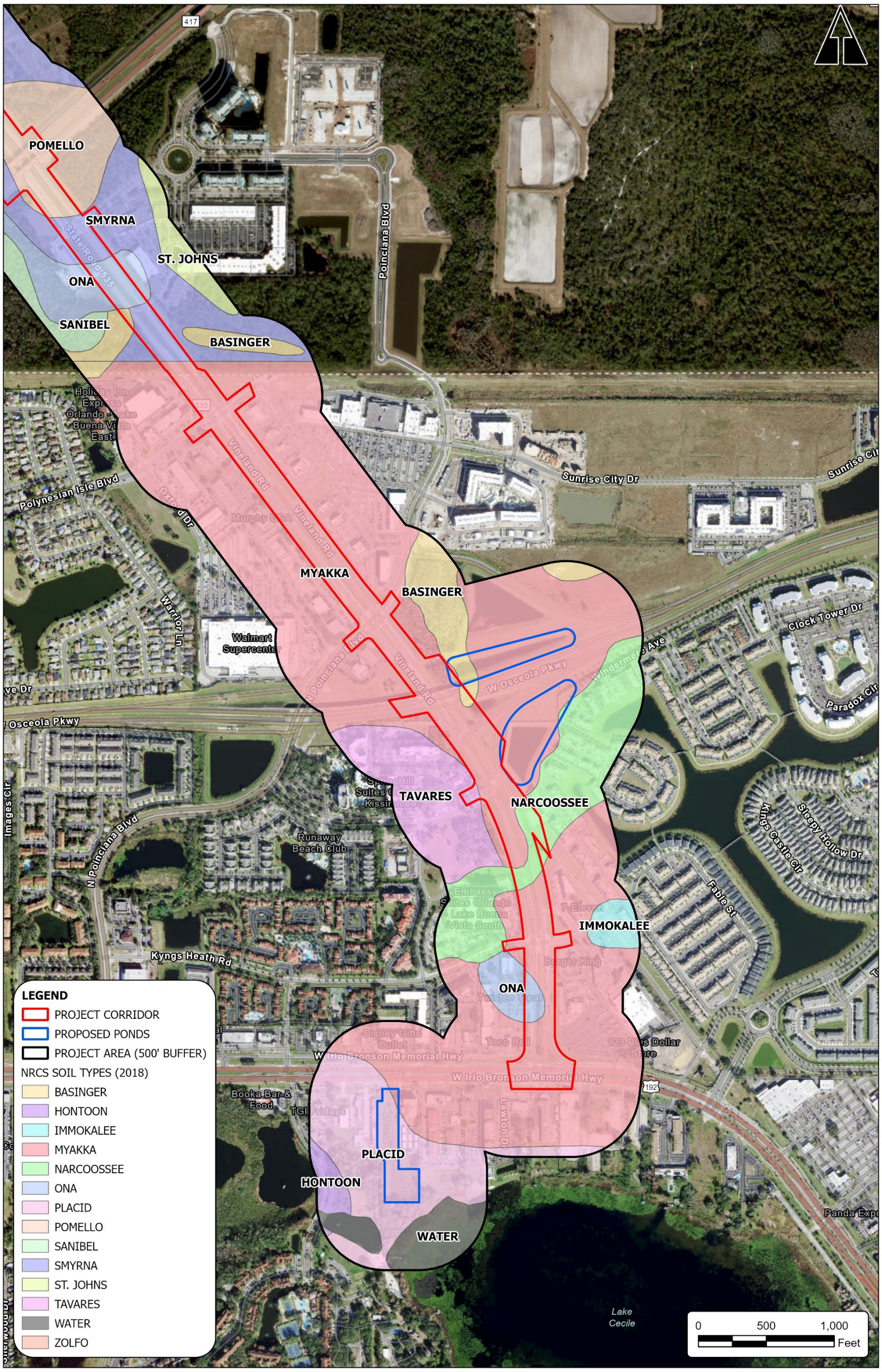

Table 1-3 Soils in Project Area

Soil Type	Environmental Association	Percent of Project Area
Basinger Fine Sand	This soil type consists of very deep, poorly drained, rapidly permeable soil in low flats, sloughs, depressions, and poorly defined drainageways that formed in sandy marine sediments. They are found in Peninsular Florida. **This is a hydric soil**.	11.50%
Hontoon Muck	This soil type consists of deep, very poorly drained, organic soils that formed in more than 130 centimeters (51 inches) of well decomposed, hydrophytic, herbaceous plant remains. They are found in depressions, freshwater marshes, swamps, and drainageways in Peninsular Florida. **This is a hydric soil.**	0.40%
Immokalee Fine Sand	This soil type consists of very deep, very poorly, and poorly drained soils that formed in sandy marine sediments. They are found on flatwoods and low broad flats on marine terraces. **This is a hydric soil.**	2.92%
Myakka Fine Sand*	This soil type consists of very deep, very poorly drained, moderately permeable soil that formed in sandy marine deposits. They are found primarily in mesic flatwoods of Peninsular Florida. **This is a hydric soil**.	33.92%
Narcoossee Fine Sand*	This soil type consists of very deep, somewhat poorly drained soils that formed in thick sandy sediments of marine origin. These soils are on low knolls and ridges in the flatwoods of central and southern Peninsular Florida. This is not a hydric soil.	3.18%
Ona Fine Sand	This soil type consists of poorly drained, moderately permeable soils that formed in thick sandy marine sediments. They are in the flatwood areas of central and southern Florida. **This is a hydric soil**.	10.09%
Placid Fine Sand	This soil type consists of very deep, very poorly drained, rapidly permeable soil in low broad flats, depressions, drainageways, and floodplains that formed in sandy marine sediments. They are found in the flatwoods of central and southern Peninsular Florida. **This is a hydric soil.**	0.29%
Pomello Fine Sand	This soil type consists of very deep, moderately well to somewhat poorly drained soils that formed in sandy marine sediments. Pomello soils are on ridges, hills, and knolls in the flatwoods on marine terraces. This is not a hydric soil.	10.02%
Sanibel Muck	This soil type consists of very poorly drained sandy soils with organic surfaces. They formed in rapidly permeable marine sediments. The soils occur on nearly level to depressional areas with slopes less than 2 percent. **This is a hydric soil.**	4.57%
Smyrna	This soil type consists of very deep, poorly to very poorly drained soils formed in thick deposits of sandy marine materials. Permeability is rapid in the A, E and C horizons and moderate or moderately rapid in the Bh horizons. **This is a hydric soil.**	18.66%
St Johns Fine Sand	This soil type consists of very deep, very poorly or poorly drained, moderately permeable soils on broad flats and depressional areas of the lower Coastal Plain. They formed in sandy marine sediments. This is not a hydric soil.	0.93%
Tavares Fine Sand*	This soil type consists of very deep, moderately well drained soils that formed in sandy marine or eolian deposits. Tavares soils are on hills, ridges and knolls of the lower Coastal Plain. This is not a hydric soil.	3.42%
Zolfo Fine Sand*	This soil type consists of very deep, somewhat poorly drained soils that formed in sandy marine sediments. Zolfo soils are on ridges, rises, and knolls on adjacent flatwoods on marine terraces. **This is a hydric soil.**	0.10%

Source: NRCS 2017; USDA 1998: 21,22,24,25,27,28,31,32,34-36,39,41,51,52; * indicates 'Farmland of Unique Importance' designation in NRCS 2018 Soil Data

2.0 Protected Species and Habitat

This project was evaluated for impacts to protected plant and animal species and their habitats in accordance with FDOT's *PD&E Manual, Part 2, Protected Species and Habitat,* which incorporates the requirements of the National Environmental Policy Act (NEPA) and related federal and state laws. The Endangered Species Act of 1973, as amended, and the Florida Endangered and Threatened Species Act, Section 379.2291, Florida Statues, grant the USFWS and FWC, respectively, authority to regulate certain wildlife species. Federal agencies are required to consult with USFWS and/or NMFS to ensure federal actions are not likely to jeopardize the continued existence of federally endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. The Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act apply additional protections to many bird species. In Florida, all bat species are protected by FWC.

2.1 Prior Coordination and Methodology

Preliminary data collection utilized literature reviews, the ETDM system, database reviews, and agency coordination to identify federal and state listed species, wetlands, and EFH with potential to occur in or near the project corridor. Soil maps, land use maps, and aerial imagery were also used. Specific information sources and databases utilized for assessment of potential impacts include the following:

- ETDM Summary Report for S.R. 535 (Project # 14325)
- US Fish and Wildlife Service (USFWS) Environmental Conservation Online System
- Florida Fish and Wildlife Conservation Service (FWC) databases
- FWC Integrated Wildlife Habitat Ranking System
- USFWS National Wetland Inventory (NWI) maps
- FWC Water Bird Colony Location Data (http://atoll.floridamarine.org/waterBirds/)
- FWC Bald Eagle Nest Data
- USFWS wood stork (*Mycteria americana*) nesting colonies map tool
- USFWS Species Recovery Plans
- SFWMD land use GIS layers
- FNAI Land Use GIS Layers
- U.S. Department of Agriculture NRCS Web Soil Survey

The protected species addressed in this document are listed in **Tables 2-1** and **2-2**. Federal and state listed species with potential to occur in the project area were identified through research and coordination with USFWS and FWC, particularly through the ETDM process and using data from the FDOT Environmental Screening Tool and the USFWS IPaC tool. Known habitat associations of species with potential to occur in the vicinity of the project were compared to habitats present in the project area to further evaluate potential species involvement.

The probability of occurrence of a species in the project area is broadly categorized according to the following definitions. A probability of occurrence of No indicates that potential habitat within the range of the species does not occur in the project area. A Low probability of occurrence indicates that while the project area is in the species range (or within a USFWS Consultation Area for that species), potential habitat is so minimal or low quality that it is unlikely the species would be present. A Moderate probability of occurrence indicates that the project area contains suitable habitat within the species range and within reasonable proximity to source populations.

Table 2-1 Listed Wildlife Species Potentially Occurring in Project Area

Common Name	Scientific Name	Federal Status	State Status	Occurrence Potential in Project Area	Effect Determination
Audubon's crested caracara	Polyborus plancus audubonii	FT	-	No	No Effect
Blue-tail mole skink	Eumeces egregius lividus	FT	-	No	No Effect
Eastern black rail	Laterallus jamaicensis ssp. jamaicensis	FT	-	NO	No Effect
Eastern indigo snake	Drymarchon corais couperi	FT	-	Low	NLAA
Everglade snail kite	Rostrhamus sociabilis plumbeus	FE	-	No	No Effect
Florida burrowing owl	Athene cunicularia	-	ST	Low	NAEA
Florida grasshopper sparrow	Ammodramus savannarum floridanus	FE	-	Low	No Effect
Florida pine snake	Pituophis melanoleucus mugitus	-	ST	Low	NAEA
Florida sandhill crane	Grus canadensis pratensis	-	ST	Low	NAEA
Florida sand skink	Neoseps reynoldsi	FT	-	Moderate	NLAA
Florida scrub-jay	Aphelocoma coerulescens	FT	-	Low	No Effect
Gopher tortoise	Gopherus polyphemus	-	ST	Low	NAEA
Little blue heron	Egretta caerulea	-	ST	Low	NAEA
Red-cockaded woodpecker	Picoides borealis	FE	-	Low	No Effect
Roseate spoonbill	Platalea ajaja	-	ST	Low	No Effect Anticipated
Southeastern American kestrel	Falco sparverius paulus	-	ST	Low	NAEA
Tricolored heron	Egretta tricolor	-	ST	Low	No Effect Anticipated
Wood stork	Mycteria americana	FE	-	Low	No Effect

Notes: FE = Federally Endangered, FT = Federally Threatened, ST = State Threatened, NLAA = Not Likely to Adversely Affect, MANLAA = May Affect, Not Likely to Adversely Affect, NAEA = No Adverse Effect Anticipated

Table 2-2 Listed Plant Species Potentially Occurring in Project Area

Common Name	Scientific Name	Federal Status	State Status	Occurrence Potential in Project Area	Effect Determination
Beautiful pawpaw	Deeringothamnus pulchellus	FE	-	Low	No Effect
Britton's beargrass	Nolina brittoniana	FE	-	Low	No Effect
Florida greeneyes	Berlandiera subacaulis	FT	-	Low	No Effect
Gray's beaksedge	Rhynchospora grayi	FT	-	Low	No Effect
Lewton's polygala	Polygala lewtonii	FE	-	Low	No Effect
Papery Whitlow-wort	Paronychia chartacea	FT	-	No	No Effect
Scrub plum	Prunus geniculata	FT	-	Low	No Effect

A High probability of occurrence indicates the project area is near known populations or sightings and contains high quality potential habitat.

Multiple field investigations were conducted to evaluate wildlife presence and habitat potential, to identify wetlands and other surface waters, and to document existing conditions in the project area. Preliminary field investigations occurred on January 16, 2020, and again on June 29, 2020. In depth field surveys were conducted on September 21, 2022, and November 4, 2022. During field surveys, maps showing land use by FLUCCS code and USFWS NWI wetlands maps were verified with existing conditions. Biologists recorded visual observations of protected plant and animal species and their potential habitats, as well as other indicators of presence such as vocalizations, tracks, scat, staining, and burrows. They also noted natural vegetative communities in multiple locations and recorded dominant plant species in each stratum in wetlands.

The project is within the USFWS consultation areas for Audubon's crested caracara (*Polyborus plancus audubonii*), Florida grasshopper sparrow (*Ammodramus savannarum floridanus*), Florida sand skink (*Neoseps reynoldsi*), red-cockaded woodpecker (*Leuconotopicus borealis*), Florida scrub-jay (*Aphelocoma coerulescens*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*), and Lake Wales Ridge plants. The project is also within the core foraging areas of four wood stork

colonies (Lawne Lake, Eagle Nest Park, Gatorland, and Lake Russell) and within the Central Florida Black Bear Management Unit. Ranges and known localities of protected species were identified using USFWS and FWC databases. No designated Critical Habitat occurs in or adjacent to the project area, so no destruction or adverse modification of Critical Habitat is anticipated.

Through the ETDM system, FWC noted the potential loss of wildlife habitat and water quality degradation from the project. USFWS noted the potential presence of several Federally listed species and noted Best Management Practices (BMPs) should be used to prevent impacts to wetlands.

Habitats are mapped by FLUCCS code in **Figures 1-4** and **1-5** and were confirmed in the field with minor revisions. There were no sightings or indications of protected species during field investigation. Sensitive environmental feature are shown in **Figure 2-1**. The nearest bald eagle (*Haliaeetus leucocephalus*) nest reported by the FWC online bald eagle nest locator tool is approximately 1.81 miles from the project corridor. USFWS and FWC generally do not require any special protective measures or monitoring if a bald eagle nest is further than 660 feet from a project. Below is a description of each species in **Tables 2-1** and **2-2** along with pertinent aspects of their ecology, conservation, and potential habitat in the project area. Federally listed species are also considered to be state listed.

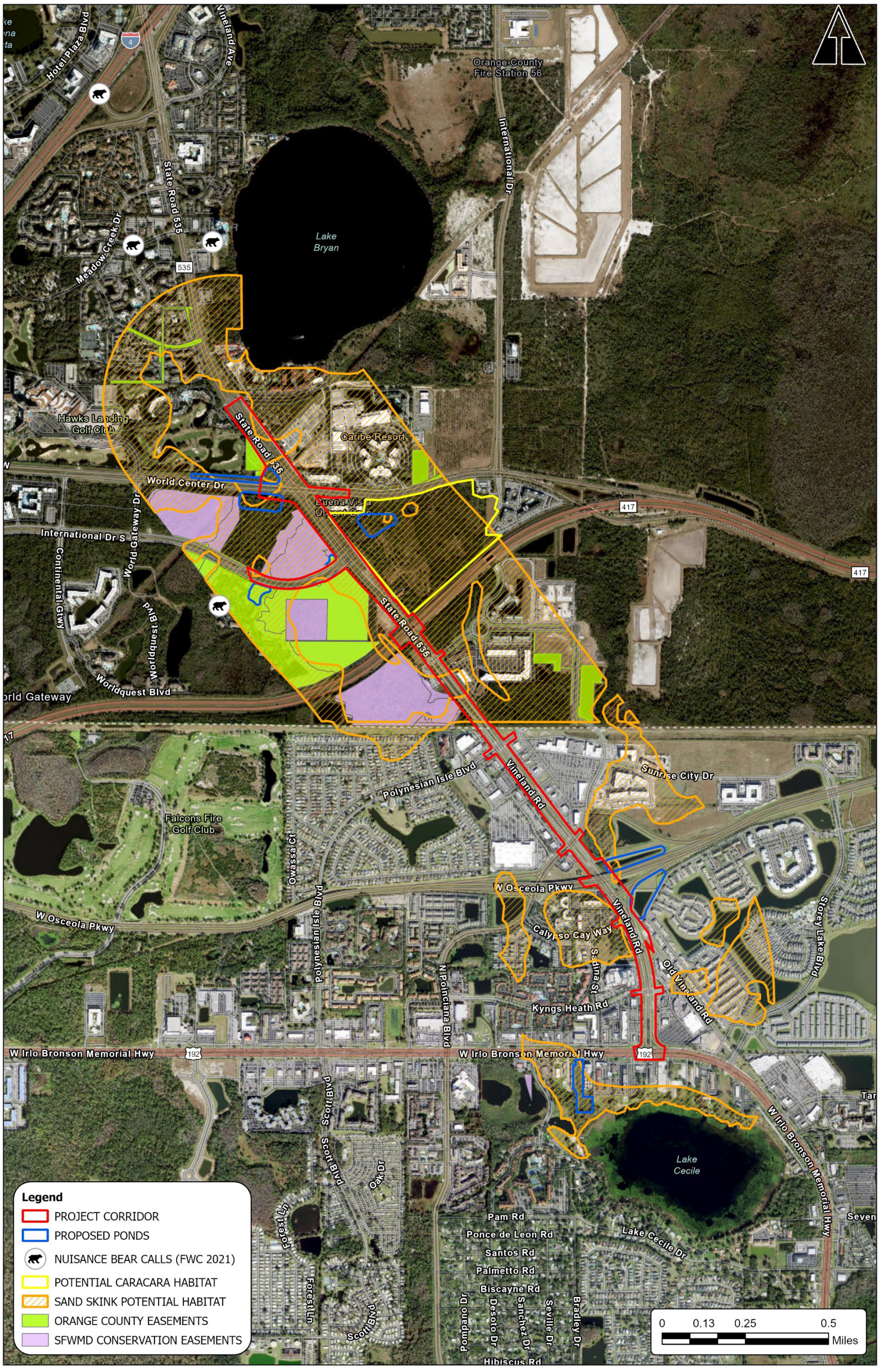

Figure 2-1 - Sensitive Environmental Features

2.2 Federally Protected Species in the Project Area

2.2.1 Audubon's Crested Caracara (Threatened- Federal)

Audubon's crested caracara is a non-migratory subspecies that occurs in Florida and is isolated from other crested caracara populations in the southwestern U.S., Mexico, and Central America. The project occurs within the USFWS consultation area for caracara. Audubon's crested caracara range throughout central Florida and typically inhabited dry and wet prairies with scattered cabbage palms (*Sabal palmetto*). They are also known to inhabit lightly wooded areas as well as improved and unimproved pastures (USFWS 2014a).

Audubon's crested caracara nest in the winter and early spring, with peak nesting in January and February. They often feed on carrion and will forage on the ground for insects, turtles, snakes, frogs, or fish. Audubon's crested caracara are primarily threatened by habitat loss through urbanization and conversion to agriculture.

The project occurs within the USFWS consultation area for this species correspondence with USFWS is provided in **Appendix A**. Potential caracara nesting habitat was initially evaluated in accordance with the methods described in *Survey Protocol for Finding Caracara Nests (USFWS 2004), Recommended Management Practices and Survey Protocols for Audubon's Crested Caracara (Caracara cheriway audubonii) in Florida* (Morrison 2001), and *USFWS Crested Caracara Survey Protocol – Additional Guidance* (USFWS 2015). Additional field inspections to evaluate habitat suitability for Audubon's crested caracara are documented in the attached Technical Memorandum (**Appendix A**), which was submitted to both the North Florida and South Florida USFWS Ecological Services Field Offices. Those USFWS offices each returned letters, provided in **Appendix A**, stating that no suitable nesting habitat for Audubon's crested caracara would be impacted by the proposed project. For this reason, no nesting surveys were performed for caracara and a determination of **No Effect** is made for this species due to a lack of suitable habitat.

2.2.2 Blue-Tail Mole Skink and Sand Skink (Threatened- Federal)

Blue-tail mole skinks and sand skinks occur in scrub and sandhill habitats along the Lake Wales Ridge region of central Florida. They are typically found above 82 feet elevation and association with certain soil types (USFWS 2021). Blue-tail mole skink and sand skink populations are primarily threatened by habitat loss from development and agriculture, and habitat degradation due to lack of appropriate habitat management (USFWS 2021).

The project area contains areas mapped as potentially suitable habitat for blue-tail mole skinks following guidance by USFWS. Those areas occur within the range of blue tailed mole skinks, at appropriate elevations, and in appropriate soil types. A map showing those potentially suitable skink habitat areas is provided as **Figure 2-1**. There were no documented occurrences of blue-tail mole skink or sand skink in the project study area, and none were detected during field investigations.

Field inspections to evaluate habitat suitability for sand and blue-tail mole skinks are documented in the attached Technical Memorandum (**Appendix A**), which was submitted to both the North Florida and South Florida USFWS Ecological Services Field Offices. Those USFWS offices each returned letters, provided in **Appendix A**, stating that no suitable habitat for sand or blue-tailed mole skinks would be impacted by the proposed project. For this reason, no cover-board surveys were performed and a determination of **No Effect** is made for these species due to a lack of suitable habitat.

2.2.3 Eastern Black Rail (Threatened- Federal)

The eastern black rail is a secretive marsh bird species, and the smallest rail in North America. It inhabits salt, brackish, and freshwater wetlands in the eastern United States. Black rails are wetland dependent and marsh and emergent vegetation on moist to saturated soils interspersed with or adjacent to shallow water. Dense vegetative cover that conceals but allows movement is required; however, when shrub or densities become too high habitat quality is reduced. Black rails forage on a variety of small aquatic and terrestrial invertebrates and seeds.

Wetlands that may form potential habitat for eastern black rail in the project area are mapped by SFWMD as Mixed Wetland Hardwoods (FLUCCS 6170), Cypress (FLUCCS 6210), Cypress – Mixed Hardwoods (FLUCCS 6216), and Wetland Forested Mixed (FLUCCS 6300). However, shrub densities within these areas is so high that the habitat is unsuitable for black rails. There are no documented occurrences of black rails in the project study area, and none were detected during field investigations. The proposed project would not directly impact any wetlands. For these reasons, a determination of **No Effect** is made for this species.

2.2.4 Eastern Indigo Snake (Threatened- Federal)

Habitat loss is the primary threat to eastern indigo snakes. In central, south central, and coastal Florida, the eastern indigo snake inhabits hammocks, coastal scrub, dry glades, palmetto flats, prairie, brushy riparian areas, canal corridors, and wet fields.

Vegetated lands in the project area contain potential habitat for eastern indigo snakes including those mapped by SFWMD as Cypress Mixed Hardwoods (FLUCCS 6216), Pine Flatwoods (FLUCCS 4140), Upland Shrub and Brushland (FLUCCS 3200), and Wetland Forested Mixed (FLUCCS 6300). No gopher tortoise burrows or other refugia that are occasionally inhabited by eastern indigo snakes were found in the project corridor. Because the project area lies within the North Florida and South Florida Ecological Services Offices (ESOs), both the North and South *Eastern Indigo Snake Programmatic Effect Determination Key* (USFWS 2013, 2017) were followed in evaluating potential impacts from the proposed project and are provided below.

North Florida ESO Eastern Indigo Snake Programmatic Effect Determination Key

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

B. Permit will be conditioned for use of the Service's *Standard Protection Measures for the Eastern Indigo Snake* during site preparation and project construction……..*go to C*

C. There are no gopher tortoise burrows, holes, cavities, or other refugia where a snake could be buried or trapped and injured during project activities……*NLAA*

South Florida ESO Eastern Indigo Snake Programmatic Effect Determination Key

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

B. Permit will be conditioned for use of the Service's most current guidance for Standard Protection Measures for the Eastern Indigo Snake during site preparation and project construction…..*go to C*

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*

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*

No gopher tortoise burrows were detected during field surveys by an FWC authorized gopher tortoise agent. However, transect surveys of the entire project corridor were not performed. The USFWS *Standard Protection Measures for the Eastern Indigo Snake* (**Appendix B**) will be implemented during site preparation and construction. For these reasons, a determination of **Not Likely to Adversely Affect** is made for eastern indigo snake.

2.2.5 Everglade Snail Kite (Endangered- Federal)

The Everglade snail kite is a medium-sized raptor with a distinguishing slender, curved bill used to prey on apple snails (*Pomacea paludosa*). The range of the species is restricted to watersheds in the central and southern part of Florida. Snail kite nesting and foraging habitat consists of freshwater marshes and shallow edges of natural and manmade lakes. Survival of the species is closely linked to the abundance of apple snails. Water quality and hydrology has experienced degradation as a result of urban development and agricultural activities, thus leading to a decline in snail abundance. Regulation of water stages in lakes and canals is particularly important to maintain vegetative communities that support their preferred food source.

The project occurs in the USFWS consultation area for this species. No marsh habitats or lake edges with emergent vegetation occur in the project area, no suitable habitat for Everglade snail kites is present. No Everglade snail kites were detected during field surveys and none are known to nest in the project area. Due to a lack of suitable habitat, a determination of **No Effect** is made for this species.

2.2.6 Florida Grasshopper Sparrow (Endangered- Federal)

Florida grasshopper sparrows inhabit dry open prairies that consist of bunch grasses, low shrubs, and saw palmetto. These habitat types are found in south-central Florida where there are poorly drained grasslands that have a history of frequent fires (USFWS 2008). Declines in Florida grasshopper sparrow populations are mainly attributed to habitat loss through conversion to agriculture and habitat degradation through fire suppression (USFWS 2008).

This project occurs in the USFWS consultation area for Florida grasshopper sparrow. The project area contain a habitat type mapped by SFWMD (Upland Shrub and Brushland, FLUCCS 3200) that can form potential habitat for grasshopper sparrows. However, this habitat in the project area lacks the disturbance or fire needed to maintain habitat suitability and is becoming filled with woody vegetation in excess of 20 feet tall. No grasshopper sparrows were detected during field surveys and none are known to occur in the vicinity of the project. Due to a lack of suitable habitat, a determination of **No Effect** is made for this species.

2.2.7 Florida Scrub-Jay (Threatened- Federal)

Florida scrub-jays generally inhabit sandpine scrub, scrubby flatwoods, oak scrub, and coastal scrub habitats of peninsular Florida where the canopy is less than ten feet tall. These habitat types require well-drained sandy soils and occur along the coastlines, ridges, and dry portions of the central Florida peninsula (USFWS 2014d). Florida scrub-jay populations continue to show decreasing trends, predominantly due to habitat loss from development and habitat degradation through fire suppression (USFWS 2014d).

This project occurs in the USFWS consultation area for Florida scrub-jays but the project area lacks vegetation typical of suitable scrub-jay habitat. The project area contains areas mapped as Upland Shrub and Brushland (FLUCCS 3200), but these areas lack the regular disturbance regime of fire and do not have shrub/scrub vegetative structural characteristics of suitable Florida scrub-jay habitat. No Florida scrub-jays were identified during field surveys. The closest observed scrub-jay occurrence is approximately 9.5 miles west of the project corridor and was observed on May 28, 2017. For these reasons, a determination of **No Effect** is made for Florida scrub-jay.

2.2.8 Red-Cockaded Woodpecker (Endangered- Federal)

The red-cockaded woodpecker is a small woodpecker approximately 7 inches long. They were once common throughout longleaf pine ecosystems, but populations began to decline due to habitat loss caused by tree farming, urbanization, and conversion to agriculture. They live in mature pine forests and are the only woodpecker species to excavate cavities exclusively in living pine trees, generally those over 80 years old (USFWS 2016).

This project occurs in the USFWS consultation area for the red-cockaded woodpecker. Habitat loss remains the main threat to this species. No old growth, mature forests occur in the project area and no indications of red-cockaded woodpeckers or nest trees were detected during field investigations. There are no records or red-cockaded woodpeckers in the vicinity of the project.

The project is within the USFWS consultation area for red-cockaded woodpecker, but the project corridor does not contain suitable habitat. For this reason, and because none were detected during field investigations, a determination of **No Effect** is made for this species.

2.2.9 Wood Stork (Endangered- Federal)

The main threat to wood storks stems from the loss, fragmentation, and modification of habitat, typically through urban encroachment and alterations of hydrology (USFWS 2014c). Wood stork have experienced a decline in the area and quality of breeding and foraging habitats range wide.

Wood storks can occur in a variety of wetland habitats, including freshwater marshes, stock ponds, shallow, seasonally flooded roadside and agricultural ditches, narrow tidal creeks, managed impoundments, and depressions in cypress heads and swamp sloughs. Wood storks require shallow water 5 to 15 inches deep for foraging. Because of their foraging method of wading and feeling for prey with their open bill, wood storks forage most effectively in areas of open shallow water lacking dense vegetation. Wood storks form nesting colonies in medium to tall trees that are isolated and protected by open water.

For this region of Florida, the USFWS has defined a wood stork Core Foraging Area (CFA) as being within 18.6 miles of a wood stork nesting colony. The project occurs within the CFA of the Lake Russell, Gatorland, Eagle Nest Park, and Lawne Lake wood stork nesting colonies. The Lake Russell colony is located approximately 14.81 miles south of the project corridor. The Gatorland colony is approximately 4.84 miles east of the project corridor. The Eagle Nest Park colony is approximately 11.26 miles north of the project corridor. The Lawne Lake colony is approximately 14.52 miles north of the project corridor.

Determinations of wood stork Suitable Foraging Habitat (SFH) follow the definitions described in the USFWS *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (USFWS 1990) and the USFWS Wood Stork Effect Determination Keys from USFWS (**Appendix C**).

No wetlands exist in the project corridor, where direct impacts would occur under the Preferred Alternative. Direct impacts are anticipated to OSWs including roadside swales and ditches as well as to two areas mapped by SFWMD as Reservoirs (FLUCCS 5300). One of those areas is south of International Drive and west of SR 535 and the other area is east of SR 535 and north of Osceola Parkway. Those areas are both manmade stormwater ponds and do not support the foraging depths and prey concentrations typical of SFH. Roadside swales and ditches are manmade areas that capture stormwater but do not support prey, are not seasonally flooded, and are not considered SFH. No isolated, open water areas are present that could form potential nesting habitat.

Because the project area lies within the North Florida and South Florida Ecological Services Offices (ESOs), both the South and North and Central Peninsular Florida *Wood Stork Programmatic Effect Determination Key* (USFWS 2010, 2008) were followed in evaluating potential impacts from the proposed project and are provided below.

South Florida ESO Wood Stork Programmatic Effect Determination Key

A. Project does not affect SFH……..*No Effect*

Central and North Florida ESO Wood Stork Programmatic Effect Determination Key

A. Project more than 2,500 feet from a colony site……*go to B*

B. Project does not affect suitable foraging habitat (SFH)……*No Effect*

Because SFH is not present and therefore will not be impacted by the project, a determination of **No Effect** is made for the wood stork.

2.2.10 Beautiful Pawpaw (Endangered-Federal)

Beautiful pawpaw is a long-lived diminutive shrub species found in central and southern Florida. It occurs naturally in mesic flatwoods with an open canopy of slash or longleaf pine. However, beautiful pawpaw requires prescribed fire in order to maintain open ground cover.

Potential habitat for beautiful pawpaw in the project area includes areas mapped by SFWMD as Pine Flatwoods (FLUCCS 4110). However, since this area does experience a regular fire or disturbance regime, it is extremely low quality potential habitat. Historic records indicate this species has been documented in Orange County, but the most recent observation was August 8, 1988. No beautiful pawpaw were detected during field surveys and none are known to have occurred in the project corridor. For these reasons, a determination of **No Effect** is made for beautiful pawpaw.

2.2.11 Britton's Beargrass (Endangered- Federal)

Britton's beargrass is a perennial herbaceous plant species with a moderate to long life span. It occurs principally on five of the central peninsular ridges (Mount Dora, Orlando, Lake Wales, Lake Henry, and Winter Haven) from Marion County south through Highlands County. Britton's beargrass is a habitat generalist and occurs in multiple xeric upland communities, including scrub and sandhill.

Potential habitat for Britton's beargrass in the project area includes areas mapped by SFWMD as Open Land (FLUCCS 1900), Upland Shrub and Brushland (FLUCCS 3200), and Pine Flatwoods (FLUCCS 4110). However, since these areas do not experience fire or a regular disturbance regime, they are extremely low quality potential habitat. Historic records indicate this species has been documented on private land in Orange and Osceola Counties. The most recent observation was in the mid-1990s. No signs of Britton's beargrass was detected during field surveys and none are known to have occurred in the project area. For these reasons, a determination of **No Effect** is made for Britton's beargrass.

2.2.12 Florida Greeneyes (Threatened- Federal)

Florida greeneyes is a perennial herbaceous wildflower endemic to Florida. They are solitary and terminal with flowers consisting of vibrant yellow ray florets. Their native range includes the eastern panhandle of Florida, and north and central peninsular Florida. It occurs naturally in

sandhills, dry pine flatwoods, and mixed upland forests, as well as along dry roadsides and in ruderal areas.

Potential habitat for Florida greeneyes in the project area includes areas mapped by SFWMD as Pine Flatwoods (FLUCCS 4110), Upland Shrub and Brushland (FLUCCS 3200), Disturbed Land (FLUCCS 7400), and along Roads and Highways (FLUCCS 8140). Historic records indicate this species has been found in Orange and Osceola Counties, and the most recent observation was May 5, 2013 when a voucher was collected at the edge of flatwoods in the Econlockhatchee Sandhills Conservation Area, which is approximately 26 miles northeast of the project corridor. No Florida greeneyes were detected during field surveys and none are known to have occurred in the project area. For these reasons, a determination of **No Effect** is made for Florida greeneyes.

2.2.13 Gray's Beaksedge (Threatened- Federal)

Gray's beaksedge is a perennial graminoid endemic to the Southeast US and West Indies. It is grass-like in appearance with inflorescences consisting of spiked clusters. It occurs naturally in sandy pinelands and sandhills.

Potential habitat for Gray's beaksedge in the project area includes areas mapped by SFWMD as Pine Flatwoods (FLUCCS 4110). Historic records indicate this species has been recorded in Orange and Osceola Counties, and the most recent observation was May 11, 2001 when a voucher was collected in longleaf pine sandhills approximately 21.6 miles north of the project. No Gray's beaksedge were detected during field surveys and none are known to have occurred in the project area. For these reasons, a determination of **No Effect** is made for Gray's beaksedge.

2.2.14 Lewton's Polygala (Endangered- Federal)

Lewton's polygala is a federally-endangered plant species that inhabits sandhills, scrub, scrubby flatwoods, and their transition zones. Potential suitable habitat for Lewton's polygala occurs within the project area mapped by SFWMD as Pine Flatwoods (FLUCCS 4110). This habitat is relatively low quality because it is lacks sandhill or scrubby vegetation and is becoming dominated by mature pine trees. Historic records indicate this species has been recorded in Orange and Osceola Counties, but few remaining populations are known to persist. Lewton's polygala was not detected during field surveys and none are known to have occurred in the project area. For these reasons, a determination of **No Effect** is made for Lewton's polygala.

2.2.15 Papery Whitlow-Wort (Threatened- Federal)

The papery whitlow-wort is a short-lived, dioecious herbaceous plant species that forms mats with its branches radiating horizontally from a central taproot. Papery whitlow-wort is endemic to central Florida and primarily inhabits sand pine scrub and rosemary scrub.

Potential suitable habitat for papery whitlow-wort is not present within the project area. Historic records indicate this species has been recorded in Orange and Osceola Counties but few known populations persist. Papery whitlow-wort was not detected during field surveys and none are known to have occurred in the project area. Because of a lack of potential habitat and sightings, a determination of **No Effect** is made for papery whitlow-wort.

2.2.16 Scrub Plum (Endangered- Federal)

Scrub plum is a long-lived, heavily branched shrub species native to ancient ridges in central Florida. Suitable habitat for scrub plum includes fire-maintained rosemary and oak scrub, xeric scrubby flatwoods, longleaf pine sandhills, and turkey oak sandhills mainly on the Lake Wales Ridge.

Potential habitat for scrub plum includes areas mapped by SFWMD as Pine Flatwoods (FLUCCS 4110) and Upland Shrub and Brushland (FLUCCS 3200). These habitats are relatively low quality because they are not truly scrub or sandhill typical of scrub plum habitat and they lack fire. No scrub plum were detected during field surveys and there are no records of scrub plum occurring in the project area. For these reasons, a determination of **No Effect** is made for scrub plum.

2.3 State Protected Species in the Project Area

2.3.1 Florida Black Bear

Florida black bears are large, omnivorous mammals that occur throughout Florida. They were removed from the state list of threatened species in 2012 but continue to be protected under Florida Administrative Code (FAC) 68A-4.001(4), -4.004, -4.009, -9010, and -12.004.

The project is located with the "common" range of the black bear as mapped by FWC. The nearest documented occurrence of a Florida black bear reported by FWC was in 2019, approximately 600 feet west of the project at the southern project terminus. In 2010 a juvenile black bear was captured in the residential area west of SR 535 and south of International Drive. Potential habitat occurs in vegetated portions of the project area, and Florida black bears are also known to visit residential neighborhoods near more natural habitats. In order to avoid and minimize impacts to black bears, FDOT commits to properly removing garbage and food debris daily and will report nuisance black bears during construction.

2.3.2 Florida Burrowing Owl (Threatened- Florida)

The Florida burrowing owl occurs throughout the state, although it is patchily distributed. Some human activities, such as land clearing and draining of wetlands, have increased their range in Florida but have exposed owls to additional threats. They traditionally inhabited native prairies and now can be found in pastures, agricultural fields, golf courses, airports, and vacant lots.

Potential habitat for Florida burrowing owl includes areas mapped by SFWMD as Golf Course (FLUCCS 1820), Open Land (FLUCCS 1900), and Upland Shrub and Brushland (FLUCCS 3200). Any open land within the project area could be potential habitat; however, burrowing owl colonies are typically conspicuous and well documented. No burrowing owls were identified in the project area during records research or field surveys. For these reasons, a determination of **No Adverse Effect Anticipated** is made for Florida burrowing owl.

2.3.3 Florida Pine Snake (Threatened- Florida)

Florida pine snakes are one of the largest snakes in Eastern North America reaching lengths up to 84 inches. Their range includes southwest South Carolina, west to Mobile Bay in Alabama, and

south Florida, excluding the Everglades. The primary threats to Florida pine snakes are habitat loss due to conversion of pine communities to agriculture, pine plantations, and urban development. They inhabit areas that feature well-drained sandy soils with a moderate to open canopy.

Potential habitat occurs throughout the project area in areas mapped by SFWMD as Pine Flatwoods (FLUCCS 4110), Upland Shrub and Brushland (FLUCCS 3200), and Open Land (FLUCCS 1900). No pine snakes were identified in the project area during records research or field surveys. For these reasons, a determination of **No Adverse Effect Anticipated** is made for Florida pine snake.

2.3.4 Florida Sandhill Crane (Threatened- Florida)

Florida sandhill cranes, a subspecies of sandhill crane, have a range that includes Florida and as far north as the Okefenokee Swamp in Georgia. Florida sandhill cranes are non-migratory and usually nest over freshwater ponds and marshes, where they typically lay two eggs. Young Florida sandhill cranes are able to leave the nest within 24 hours of hatching and become independent after ten months (Nesbitt 1996). Florida sandhill cranes inhabit freshwater marshes, prairies, and pastures throughout the state. The drainage of wetlands and conversion of prairies to agriculture are the primary threats to Florida sandhill cranes. Their former range included parts of coastal Texas, Alabama, and Louisiana, but habitat loss and overhunting greatly diminished the populations in the 20th century and their range shrank to its current area (FWC 2022c). The most recent Biological Status Review of Florida Sandhill Cranes, from 2011, indicates continuing population declines from 1974 to 2003.

Potential foraging habitat for Florida sandhill cranes occurs throughout the project area in areas mapped by SFWMD as Reservoirs (FLUCCS 5300), Lakes (FLUCCS 5200), Mixed Wetlands Hardwoods (FLUCCS 6170), Cypress (FLUCCS 6210), Cypress – Mixed Hardwoods (FLUCCS 6216), and Wetland Forested Mixed (FLUCCS 6300). No sandhill cranes were identified in the project area during records research or field surveys. Sandhill cranes are highly mobile and likely to relocate a short distance away if disturbed by construction. For these reasons, a determination of **No Adverse Effect Anticipated** is made for Florida sandhill crane.

2.3.5 Little Blue Heron (Threatened- Florida)

Little blue herons occur along the entire eastern and Gulf coasts of the U.S. as well as throughout the Mississippi River Valley, southern California, and into central and South America. The threats to little blue heron are poorly understood (FWC 2022f) but likely include coastal development, disturbance at foraging and breeding sites, environmental issues, degradation of feeding habitat, reduced prey availability, and predators. Other threats may include exposure to pesticides, toxins, and infection by parasites (FWC 2022f, Rodgers et al. 1995). According to the Biological Status Report published in 2011, little blue heron populations increased gradually throughout the 20th Century until the 1990's, when a slow but steady decline was observed.

Little blue herons inhabit a variety of aquatic environments including fresh, salt, and brackish water systems like swamps, estuaries, ponds, lakes, and rivers (Rodgers et al. 1995). Their nests

are typically built in trees and shrubs on islands, emergent vegetation, or in dense thickets near water. Potential foraging habitat in the project area occurs in areas mapped by SFWMD as Wetland Forested Mixed (FLUCCS 6300), Cypress (FLUCCS 6210), and Cypress Mixed Hardwoods (FLUCCS 6216). It is unlikely potential nesting occurs in the project area due to lack of water bodies within the project area. No little blue herons were identified in the project area during records research or field surveys, and no wetlands would be impacted by the project. For these reasons, a determination of **No Adverse Effect Anticipated** is made for little blue heron.

2.3.6 Roseate Spoonbill (Threatened- Florida)

Roseate spoonbills can be found in coastal areas of Central America, the Caribbean, and the Gulf of Mexico as well as South America east of the Andes Mountains. Nesting habitats include coastal mangroves and dredge spoil islands and they often nest near other wading bird species (FNAI 2001). The primary historical threat to roseate spoonbills was hunting for their feathers; however, this practice was prohibited, allowing populations to rebound (FWC 2022g). Current threats include reduced prey availability and general habitat degradation or loss, pesticide exposure, and illegal shooting.

The project corridor does not contain flats, tidal areas, or large expanses of shallow water typical of potential foraging habitat. Because of a lack of suitable habitat, a determination of **No Adverse Effect Anticipated** is made for roseate spoonbill.

2.3.7 Southeastern American Kestrel (Threatened- Florida)

Southeastern American kestrels inhabit open woodlands, sandhill, and fire-maintained savannah pine habitats; however, they will also use alternative habitats such as pastures and open fields. The Southeastern subspecies is non-migratory and found throughout peninsular Florida. They nest in cavities excavated by woodpeckers and other natural processes that create holes in dead, standing longleaf pine trees. Primary threats to Southeastern American kestrel populations are the loss of feeding and nesting habitat through development of residential areas, removal of trees in agriculture fields, and suppression of fire (FWC 2022b).

Potential habitat occurs through the project area in locations mapped by SFWMD as Open Land (FLUCCS 1900), Pine Flatwoods (FLUCCS 4110), and Disturbed Land (FLUCCS 7400). Nesting surveys were not performed, but no kestrels were detected during general field surveys and no potential nesting cavities were observed. The project is not anticipated to impact any mature forest or areas with abundant standing dead trees. For these reasons, a determination of **No Adverse Effect Anticipated** is made for southeastern American kestrel.

2.3.8 Tricolored Heron (Threatened- Florida)

Tricolored herons range from Massachusetts south throughout the Gulf coast, and as far south as northern Brazil. They also inhabit the Pacific coast from Baja California to Ecuador. Nests are typically found on protected islands or in trees overhanging water. Tricolored herons are permanent residents in Florida and are most common in south and central Florida regions. They inhabit fresh and saltwater marshes, estuaries, mangrove swamps, lagoons, and river deltas

(Frederick 1997). According to the Biological Status Review published in 2011, tricolored heron population trends are difficult to detect because of high variability between survey years, though a significant decline was documented across the 1970's and 1980's.

The major threat facing tricolored heron populations is loss of habitat through development and draining of wetlands. Other threats include pesticides and pollutants (Rodgers, 1997), Spalding et al. 1997), alterations to the hydrology of foraging areas, reduced prey abundance, and oil spill impacts to critical breeding, foraging, and roosting sites (FWC 2022i). No marsh or similar open, aquatic habitat that might be suitable for foraging occur in the project area. The forested wetlands are generally too overgrown to be suitable for tricolor heron. No potential nesting habitat occurs in the project area. For these reasons, a determination of **No Adverse Effect Anticipated** is made for tricolored heron.

2.3.9 Gopher Tortoise (Threatened- Florida)

The gopher tortoise is a state-threatened species that inhabits xeric and mesic forests, fields, and disturbed areas. The project area was preliminarily surveyed for gopher tortoise burrows during field inspections. No gopher tortoise burrows were found. Suitable habitat for gopher tortoises within the project area occurs in areas mapped as pine flatwoods. However, the probability of occurrence is low due to the quality and amount of available suitable habitat. The construction of the project is not anticipated to impact any potentially occupied gopher tortoise burrows. If any are observed during the design and permitting phases of this project, a formal survey and relocation will be carried out in accordance with FWC guidelines. Therefore, a determination of **No Adverse Effect Anticipated** is made for gopher tortoise.

2.4 Non-Listed Protected Species

2.4.1 Monarch Butterfly

The monarch butterfly is designated as a candidate species for federal listing. Adults may reside in Florida year-round or may migrate to other states or wintering sites in Mexico. Breeding females require milkweeds (genus *Asclepias*) to lay their eggs on, and the larvae are dependent on milkweeds for food. The adults rely on a variety of wildflowers as nectar sources. No milkweeds were observed in the project area, and no adult or larval monarch butterfly individuals were observed during field investigations and there are no known records of occurrence in the project area. Therefore, the project is unlikely to affect the monarch. If this species becomes listed during this project, FDOT will continue to coordinate as appropriate with USFWS.

2.4.2 Tricolored Bat

The tricolored bat is designated as a candidate species for federal listing. Tricolored bats are one of the smallest bat species native to North America and can be distinguished from other Florida bat species by its pink forearms that strongly contrast its black wings. During the winter, tricolored bats can be found in caves and mines. However, in the southern United States, tricolored bats can also be found roosting in culverts. In the spring, summer, and fall, tricolored bats roost in forested habitats. No tricolored bats were observed during field reviews, and there have been no documented occurrences in the project area. Therefore, the project is unlikely to

affect the tricolored bat. If this species becomes listed during this project, FDOT will continue to coordinate as appropriate with USFWS.

2.5 Potential Impacts to Protected Species and Habitats

A No Build Alternative is used to evaluate the existing conditions and provide a comparison for the potential impacts of the Preferred Alternative. The No Build Alternative involves taking no action and so would have no impacts on listed species or habitats; however, the No Build Alternative would not address the needs of the proposed project.

The extent of potential direct impacts from the Preferred Alternative were assessed by overlaying habitat types (as mapped by SFWMD and compared with USFWS NWI maps and field investigations) onto the project corridor, which represents the footprint of direct impacts.

2.5.1 Direct Impacts to Protected Species and Habitats

The extent of anticipated direct impacts to habitats from the Build Alternative by FLUCCS Code are summarized in **Table 2-3** and direct impacts to habitats from the proposed ponds are summarized in **Table 2-4**. The project would expand FDOT right-of-way in the southeast corner of the intersection between S.R. 535 and World Center Drive, and along the northwest corner of the intersection between S.R. 535 and International Drive South. Impacts to wetlands and other surface waters are addressed in greater detail in the Wetlands Evaluation section of this document.

Table 2-3 Build Alternative Direct Impacts by FLUCCS Code

Land Use/Land Cover	FLUCCS CODE	Impacts Under Recommended Alternative (Acres)
Commercial and Services	1400	0.12
Pine Flatwoods	4110	0.11
Roads and Highways	8140	0.48
	TOTAL	0.71

Table 2-4 Direct Impacts from Ponds by FLUCCS Code

Land Use/Land Cover	FLUCCS Code	Acres of Impact
Medium Density Under Construction	1290	3.81
Multiple Dwelling Units, High Rise	1340	0.73
Commercial and Services	1400	3.38
Golf Course	1820	2.38
Upland Shrub and Brushland	3200	2.72
Pine Flatwoods	4110	4.44
Reservoirs	5300	2.59
Roads and Highways	8140	4.34
	TOTAL	24.39

2.5.2 Indirect Impacts to Protected Species and Habitats

Indirect impacts are those impacts that are linked and causally related to the proposed project and may be temporary or permanent. For transportation projects, indirect impacts typically include disturbance to areas adjacent to the project. These impacts include the short-term impacts associated with road construction activities as well as other long-term impacts due to the proximity of the roadway to wildlife habitat.

Potential short-term indirect impacts for the recommended alternative could result from the use of heavy equipment, the staging or stockpiling of equipment and materials, and increased erosion associated with soil disturbance. Avoidance of a construction area by wildlife and downstream sedimentation from erosion are examples of short-term indirect effects facing this project. Most protected species that may occur in the project corridor, such as wood stork or southeastern American kestrel, are highly mobile and are anticipated to readily relocate to adjacent habitats; therefore, the potential for short-term indirect impacts to protected species from construction is anticipated to be minimal. Best Management Practices (BMPs) typically associated with road construction projects will be implemented and maintained throughout all construction activities to minimize indirect impacts from erosion and other sources.

2.5.3 Cumulative Impacts to Protected Species and Habitats

A “cumulative impact”, according to the definition in the Council of Environmental Quality Regulations (40 CFR 1508.7), is “the impact on the environment, which results from the

incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." The Preferred Alternative for the project would impact approximately 0.11 acres of pine flatwoods. No designated Critical Habitats would be affected, and no adverse impacts to any listed species would occur under the Preferred Alternative. FDOT will follow the *Standard Specifications for Road and Bridge Construction*, which contains Best Management Practices to avoid and minimize impacts to wildlife and their habitat during construction. For these reasons, no cumulative impacts are anticipated as a result of the Preferred Alternative.

2.5.4 Avoidance, Minimization, and Mitigation

Impacts to protected species and habitats were sequentially avoided and then minimized during alternatives development, first by utilizing an existing transportation corridor and then by reducing the project footprint to minimize the area impacted. The area of expanded right-of-way was the minimum required to meet current FDOT standards.

FDOT Standards Specifications for Road and Bridge Construction will be implemented to further minimize impacts. USFWS Standard Protection Measures For The Eastern Indigo Snake (**Appendix B**) will also be implemented. FDOT will also avoid making food waste available to bears and will report nuisance black bears during construction. There will be no impacts to wetlands under the Preferred Alternative, so no wetland mitigation will be required.

3.0 Wetland Evaluation

No wetland impacts are anticipated under the Preferred Alternative. Wetlands are protected under Section 404 of the Clean Water Act. Guidance is provided in Executive Order 11990, Protection of Wetlands, which establishes a national policy to “avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative”. The USACE has the authority to regulate work in Waters of the US under Section 10 of the Rivers and Harbors Act of 1899 and the USFWS acts as a commenting body where permitted actions may affect listed species. In Florida, state authority over activities in state surface waters and wetlands is administered by FDEP and the five Water Management Districts.

Wetlands, as stated in Section 373.019(27) F.S. and in 33 CFR 328.3(b) and as used by the USACE in administering Section 404 of the Clean Water Act, are defined as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

Surface waters are considered by Section 373.019(21) F.S. to be waters on the surface of the earth, contained in bounds created naturally or artificially, including the Atlantic Ocean, the Gulf of Mexico, bays, bayous, sounds, estuaries, lagoons, lakes, ponds, impoundments, rivers, streams, springs, creeks, branches, sloughs, tributaries, and other watercourses. Regulatory agencies do not typically require mitigation for impacts to surface waters other than wetlands.

Surface waters are considered by Section 373.019(21) F.S. to be waters on the surface of the earth, contained in bounds created naturally or artificially, including, the Atlantic Ocean, the Gulf of Mexico, bays, bayous, sounds, estuaries, lagoons, lakes, ponds, impoundments, rivers, streams, springs, creeks, branches, sloughs, tributaries, and other watercourses. Regulatory agencies do not typically require mitigation for impacts to surface waters other than wetlands.

3.1 Methodology

Wetlands and Other Surface Waters (OSWs) were inspected and their locations in the project corridor were field verified. Wetlands are typically mapped in the field using three parameters as indicators of wetlands: presence of hydrophytic vegetation, hydric soils, and hydrology, utilizing methodologies consistent with the USACE *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (2010), Chapter 62-340, Florida Administrative Code, and the *Florida Wetlands Delineation Manual* (Gilbert et. al. 2011).

Through the ETDM system, SFWMD noted the potential presence of wetlands and OSWs associated with SFWMD conservation easements along the west side of S.R. 535 at the Orange/Osceola County line. USFWS noted the need to avoid and minimize impacts to wetlands and to provide compensatory mitigation for unavoidable impacts.

Comments Regarding Wetlands

The USACE stated that the project would have minimal level of importance. The USEPA does not expect significant impacts on wetlands and surface waters. USFWS expects the proposed project will result in minimal to moderate involvement with wetlands. The FLDEP stated the project would have minimal effects to wetlands; however, impacts must be reduced to the greatest extent practicable, with mitigation measures in place if minimization and avoidance of impacts are exhausted. The SFWMD noted that wetlands resources would be affected. Specifically, there is a conservation easement on the west side of S.R. 535 from World Center Drive to the Orange/Osceola County line and suggest impacts could be reduced by eliminating roadway widening on the west side of the road. NMFS stated the project would have moderate direct impacts and impacts to adjacent wetlands.

Responses to Comments Regarding Wetlands

Impacts to wetlands were avoided and minimized by following the existing SR 535 corridor as much as possible with limited new right-of-way as well as through pond site selection in uplands wherever possible. No impacts to wetlands are anticipated, and further analysis of potential impacts to wetlands and surface waters is anticipated during the Environmental Resource Permit (ERP) and state Section 404 permitting processes. The SFWMD conservation easement is likely mapped incorrectly as it extends into existing FDOT right-of-way. During the design phase, the precise right-of-way and conservation easement limits will be determined, and further avoidance and minimization can be incorporated as needed.

3.2 Wetlands and Other Surface Waters in the Project Area

No wetlands are located in the project corridor, where direct impacts would occur under the Preferred Alternative. Wetlands do occur in the larger Project Area, including a particularly large patch of forested wetlands west of SR 535, extending both north and south of SR 417.

Field investigations generally confirmed the wetland mapping by SFWMD (**Figures 1-4** and **1-5**). Four wetland types are mapped by SFWMD in the project area. They Mixed Wetland Hardwoods (FLUCCS 6170), Cypress (FLUCCS 6210), Cypress – Mixed Hardwoods (FLUCCS 6216), and Wetland Forested Mixed (FLUCCS 6300). OSWs mapped by SFWMD in the Project Area include Reservoirs (FLUCCS 5300) and Lakes (FLUCCS 5200). Roadside ditches and swales are also considered OSWs. There is no Essential Fish Habitat in the project area.

3.3 Impact Assessment

No wetlands exist in the project corridor, where direct impacts would occur under the Preferred Alternative, so no impacts to wetland are anticipated. Direct impacts are anticipated to OSWs including roadside swales and ditches as well as to two areas mapped by SFWMD as Reservoirs (FLUCCS 5300). One of those areas is south of International Drive and west of SR 535 and the other area is east of SR 535 and north of Osceola Parkway. Both of those areas are manmade stormwater ponds.

3.4 Avoidance, Minimization, and Mitigation

Impacts to wetlands were sequentially avoided and then minimized by following the existing S.R. 535 right-of-way as much as possible. Minimization measures, which may include reductions in the typical section, use of retaining walls to minimize roadway embankments, and similar measures, will be considered during the project design phase. FDOT *Standard Specifications for Road and Bridge Construction* will be implemented to further minimize impacts.

4.0 Anticipated Permits

Under operating agreement with the Florida Department of Environmental Protection, the SFWMD maintains state jurisdiction for Environmental Resource Permit reviews under 62-330 FAC for roadway and transportation projects. A SFWMD Environmental Resource Permit is anticipated for modifications to an existing drainage system and for increases in permeable cover. There are no Federally jurisdictional wetlands that will be impacted under the Preferred Alternative. Therefore, no Section 404 permit is anticipated. An FDEP National Pollution Discharge Elimination System Permit will also be required.

5.0 Conclusion

5.1 Protected Species and Habitats

This project was evaluated for impacts to protected plant and animal species and their habitats in accordance with the FDOT's *PD&E Manual, Part 2, Protected Species and Habitat,* which incorporates the requirements of the National Environmental Policy Act (NEPA) and related federal and state laws. Federal and state listed species with potential to occur in the project corridor were identified through research and coordination with US Fish and Wildlife Service, and the Florida Fish and Wildlife Conservation Commission.

There is no Critical Habitat present within the project area. Field investigations of the project area were conducted on multiple days and in different seasons to evaluate the potential presence of protected species and habitats. No adverse impacts are anticipated to any listed species from the Preferred Alternative. Effect determinations for listed species are provided in **Table 5-1**.

5.2 Wetlands and Other Surface Waters

This project was evaluated for impacts to wetlands and other surface waters in accordance with FDOT's *PD&E Manual, Part 2, Wetlands and Other Surface,* which incorporates the requirements of the National Environmental Policy Act (NEPA) and related federal and state laws. There would be no direct impacts to wetlands or other surface waters under the Preferred Alternative.

A SFWMD Environmental Resource Permit is anticipated for modifications to an existing drainage system and for increases in permeable cover. There are no Federally jurisdictional wetlands that will be impacted under the Preferred Alternative. Therefore, no Section 404 permit is anticipated. An FDEP National Pollution Discharge Elimination System Permit will also be required.

5.3 Commitments

In order to assure that the proposed project will not adversely impact protected species with the potential to occur within the project area, the FDOT will adhere to the following commitments:

- Implement the USFWS Standard Protection Measures for the Eastern Indigo Snake.
- The project is within the Central Florida Black Bear Management Unit with known mortality in the region. Therefore, during construction and consistent with the 2019 FWC Black Bear Management Plan, garbage and food debris must be properly removed from the construction site daily to eliminate possible sources of food that could encourage and attract bears. Nuisance black bears are to be reported to the FWC at the Wildlife Alert Hotline at 1-888-404-3922.

Table 5-1-1 Species Effect Determinations Under Preferred Alternative

Common Name	Scientific Name	Federal Status	State Status	Occurrence Potential in Project Area	Effect Determination
Fauna Species					
Audubon's crested caracara	Polyborus plancus audubonii	FT	-	Low	No Effect
Blue-tail mole skink	Eumeces egregius lividus	FT	-	Moderate	No Effect
Eastern black rail	Laterallus jamaicensis ssp. jamaicensis	FT	-	Low	No Effect
Eastern indigo snake	Drymarchon corais couperi	FT	-	Low	NLAA
Everglade snail kite	Rostrhamus sociabilis plumbeus	FE	-	Low	No Effect
Florida burrowing owl	Athene cunicularia	-	ST	Low	NAEA
Florida grasshopper sparrow	Ammodramus savannarum floridanus	FE	-	Low	No Effect
Florida pine snake	Pituophis melanoleucus mugitus	-	ST	Low	NAEA
Florida sandhill crane	Grus canadensis pratensis	-	ST	Low	NAEA
Florida sand skink	Neoseps reynoldsi	FT	-	Moderate	NLAA
Florida scrub-jay	Aphelocoma coerulescens	FT	-	Low	No Effect
Gopher tortoise	Gopherus polyphemus	-	ST	Low	NAEA
Little blue heron	Egretta caerulea	-	ST	Low	NAEA
Red-cockaded woodpecker	Picoides borealis	FE	-	Low	No Effect
Roseate spoonbill	Platalea ajaja	-	ST	Low	No Effect Antcipated
Southeastern American kestrel	Falco sparverius paulus	-	ST	Low	NAEA
Tricolored heron	Egretta tricolor	-	ST	Low	No Effect Anticipated
Wood stork	Mycteria americana	FE	-	Low	No Effect
Flora Species					
Beautiful pawpaw	Deeringothamnus pulchellus	FE	-	Low	No Effect
Britton's beargrass	Nolina brittoniana	FE	-	Low	No Effect
Florida greeneyes	Berlandiera subacaulis	FT	-	Low	No Effect
Gray's beaksedge	Rhynchospora grayi	FT	-	Low	No Effect
Lewton's polygala	Polygala lewtonii	FE	-	Low	No Effect

Notes: FE = Federally Endangered, FT = Federally Threatened, ST = State Threatened, NLAA = Not Likely to Adversely Affect, MANLAA = May Affect, Not Likely to Adversely Affect, NAEA = No Adverse Effect Anticipated

6.0 References

Christman, S.P.,1992. Sand skink, Neoseps reynoldsi (Stejneger). Pages 135-140 in P. E. Moler, editor. Rare and Endangered Biota of Florida. Volume III. Amphibians and reptiles. University Press of Florida, Gainesville, Florida, USA.

Efficient Transportation Decision Making (ETDM). 2020. Summary Report for Project #14325 – SR 535 from US 192 to N. of SR 536/World Center Dr.

Ernst, C. H., and E. M. Ernst. 2003. Snakes of the United States and Canada. Smithsonian Books, Washington, D.C., USA. 668pp.

FWC. 2014e. FWC Eagle Nest Locator data. Available at: https://ca.dep.state.fl.us/mapdirect/

FWC. 2022b. American kestrel. Available at: https://myfwc.com/wildlifehabitats/profiles/birds/raptors-and-vultures/american-kestrel/. Last accessed April 21, 2022.

FWC. 2022a. Audubons crested caracara. Available at: http://myfwc.com/wildlifehabitats/imperiled/profiles/birds/audubons-crested-caracara/. Last accessed April 21, 2022.

FWC. 2022c. Florida Sandhill Crane. Available at: http://myfwc.com/wildlifehabitats/imperiled/profiles/birds/florida-sandhill-crane/. Last accessed April 21, 2022.

FWC. 2022f. Little Blue Heron. Available at: http://myfwc.com/wildlifehabitats/imperiled/profiles/birds/little-blue-heron/. Last accessed April 21, 2022.

FWC. 2022g. Roseate Spoonbill. Available at: http://myfwc.com/wildlifehabitats/imperiled/profiles/birds/roseate-spoonbill/. Last accessed April 22, 2022.

FWC. 2022i. Tri-colored Heron *Egretta tricolor*. Available at: http://myfwc.com/media/2211502/Tricolored-Heron.pdf. Last accessed April 22, 2022.

Florida Natural Areas Inventory (FNAI). 2001. Field guide to the rare animals of Florida. http://www.fnai.org/FieldGuide/pdf/Podomys_floridanus.PDF.

Franz, R. 1992. Florida pine snake, Pituophis melanoleucus mugitus Barbour. Pages 254–258 in P. E. Moler, editor. Rare and endangered biota of Florida. Volume III. Amphibians and reptiles. University Press of Florida, Gainesville, Florida, USA.

Frederick, Peter C. 1997. Tricolored Heron (Egretta tricolor), The Birds of North America Online (A.Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online.

Gilbert, K.M., J.D. Tobe, R.W. Cantrell, M.E. Sweeley, and J.R. Cooper. 2011. The Florida Wetlands Delineation Manual. Florida Department of Environmental Protection. Tallahassee, Fl.

Natural Resources Conservation Service. 2024. Web Soil Survey. Online tool provided by U.S. Department of Agriculture. Available at: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

Nesbitt S.A., 1996. Florida Sandhill Crane. Pages 219 – 229 in J.A. Rodgers, Jr., H.W. Kale II, and H.T. Smith (Eds.). Rare and endangered biota of Florida, Vol. V: Birds. University Press of Florida, Gainesville, FL.

Morrison, Joan, L. 2001. Recommended Management Practices and Survey Protocols for Audubon's Crested Caracara (*Caracara cheriway audubonii*) in Florida. Technical Report No. 18. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.

Rodgers, J. A., Jr. 1997. Pesticide and heavy metal levels of waterbirds in the Everglades agricultural area of south Florida. Florida Field Naturalist 25: 33-41.

Rodgers, J. A., Jr., H. W. Kale, III, and H. T. Smith. 1996. Rare and endangered biota of Florida. Volume V. Birds. University Press of Florida. 736pp.

Rodgers, Jr., James A. and Henry T. Smith. 1995. Little Blue Heron (Egretta caerulea), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online.

Spalding, M. G., C. K. Steible, S. F. Sundlof, and D. J. Forrester. 1997. Metal and organochlorine contaminants in tissues of nestling wading birds (Ciconiiformes) from southern Florida. Florida Field Naturalist 25: 42 50.

U.S. Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. USACE Environmental Laboratory, Vicksburg, MS.

USACE. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0). USACE Engineer Research and Development Center. Vicksburg, MS.

USACE. 2015. Southwest Florida Comprehensive Watershed Plan. Available at: https://usace.contentdm.oclc.org/digital/collection/p16021coll7/id/2515/. Last accessed July 26, 2019.

U.S. Fish and Wildlife Service (USFWS). 1990. Habitat management guidelines for the wood stork in the southeast region. Prepared by John C. Ogden for the Southeast Region U.S. Fish and Wildlife Service; Atlanta, Georgia.

USFWS. 2004. Survey Protocol for Finding Caracara Nests. South Florida Ecological Services Field Office. 2pp.

USFWS. 2007. 5-Year Review for Sand skink (*Neoseps reynoldsi*). Available at: https://ecos.fws.gov/docs/tess/species_nonpublish/1055.pdf. Last accessed April 20, 2022.

USFWS. 2008. 5-Year Review for Florida grasshopper sparrow (*Ammodramus savannarum floridanus*). Available at: https://ecos.fws.gov/docs/tess/species_nonpublish/1288.pdf. Last accessed April 20, 2022.

USFWS. 2013. Eastern indigo Snake Programmatic Effect Determination Key. U.S. Fish and Wildlife Service. Available at: https://www.fws.gov/northflorida/IndigoSnakes/indigo-snakes.htm. Last accessed April 20, 2022.

USFWS. 2014a. Audubon's Crested Caracara *Polyborus plancus audbonii.* U.S. Fish and Wildlife Service. Available at: http://www.fws.gov/southeast/vbpdfs/species/birds/acca.pdf.

USFWS. 2014d. Florida Scrub-Jay. U.S. Fish and Wildlife Service information sheet. Available at: http://www.fws.gov/verobeach/mS.R.ppdfs/floridascrubjay.pdf. Last accessed April 20, 2022.

USFWS. 2014c. Wood Stork. U.S. Fish and Wildlife Service Information Sheet Available at: http://www.fws.gov/verobeach/mS.R.ppdfs/woodstork.pdf. Last accessed April 21, 2022.

USFWS. 2015. Crested Caracara Survey Protocol – Additional Guidance Available at: https://www.fws.gov/verobeach/BirdsPDFs/20161209_CCsurveyprotocol.pdf. Last accessed April 21,2022.

USFWS. 2016. Red-cockaded Woodpecker (*picoides borealis*). Available at: https://www.fws.gov/rcwrecovery/rcw.html. Last accessed April 21, 2022.

USFWS. 2021. 5-Year Review for Blue-Tailed Mole Skink (*Eumeces egregius lividus*). Available at: https://ecos.fws.gov/docs/tess/species_nonpublish/3310.pdf. Last accessed April 20, 2022.

APPENDIX A: USFWS Correspondence and Technical Memorandum

Rob Myers

From: Chasez, Heather <Heather.Chasez@dot.state.fl.us>
Sent: Tuesday, November 29, 2022 7:44 AM
To: Rob Myers
Cc: Graeber, David
Subject: FW: [EXTERNAL] SR 535 437174-1 PD&E Technical Consultation

Hello Rob,

Please see below ☺

Heather Chasez
Environmental Specialist IV
Project Compliance Coordinator
FDOT District Five
719 S. Woodland Blvd.
DeLand, FL 32720
Phone: (386) 943-5393

From: Williams, Zakia <zakia_williams@fws.gov>
Sent: Tuesday, November 29, 2022 8:41 AM
To: Chasez, Heather <Heather.Chasez@dot.state.fl.us>
Subject: Re: [EXTERNAL] SR 535 437174-1 PD&E Technical Consultation

Good Morning Heather,

After reviewing the document I agree with John that there is no suitable nesting habitat for Audubon's crested caracara and no suitable habitat for the sand skink and blue-tailed mole skink. This project will have no affect on these species. No surveys would be needed in the Orange County portion of this project. Please let me know if you have any further questions.

Thank you,
Zakia

Zakia Williams
Fish and Wildlife Biologist
US Fish and Wildlife Service
7915 Baymeadows Way, Ste. 200
Jacksonville, Florida 32256
(o) 904-731-3119
(f) 904-731-3045
(c) 904-200-2678

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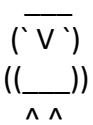

Note: This email correspondence and any attachments to and from this sender is subject to the Freedom of Information Act (FOIA) and may be disclosed to third parties.

From: Chasez, Heather <Heather.Chasez@dot.state.fl.us>
Sent: Monday, November 21, 2022 1:57 PM
To: Wrublik, John <john_wrublik@fws.gov>; Williams, Zakia <zakia_williams@fws.gov>
Cc: Rob Myers <Rob.Myers@metriceng.com>
Subject: RE: [EXTERNAL] SR 535 437174-1 PD&E Technical Consultation

Thank you for the feedback and quick turnaround, John!

Heather Chasez
Environmental Specialist IV
Project Compliance Coordinator
FDOT District Five
719 S. Woodland Blvd.
DeLand, FL 32720
Phone: (386) 943-5393

From: Wrublik, John <john_wrublik@fws.gov>
Sent: Monday, November 21, 2022 1:51 PM
To: Chasez, Heather <Heather.Chasez@dot.state.fl.us>; Williams, Zakia <zakia_williams@fws.gov>
Cc: Rob Myers <Rob.Myers@metriceng.com>
Subject: Re: [EXTERNAL] SR 535 437174-1 PD&E Technical Consultation

Heather,

Since the Project appears to be about evenly split between my area of review responsibility (Osceola County) and Zakia's area of review responsibility (Orange County), I will comment on the section of the project in Osceola County only, and Zakia can provide you with comments for the portion of the project in Orange County, Based on my review of the information provided, I find it unlikely that suitable nesting habitat for Audubon's crested caracara and suitable habitat for the sand skink and blue-tailed mole skink would be affected by the section of the project in Osceola County. Therefore, the Service would not request that caracara nest surveys and skink coverboard surveys be conducted within the portion of the project within Osceola County.

Sincerely,

John M. Wrublik
U.S. Fish and Wildlife Service
1339 20th Street

Vero Beach, Florida 32960
Office: (772) 469-4282
Fax: (772) 562-4288
email: John_Wrublik@fws.gov

From: Chasez, Heather <Heather.Chasez@dot.state.fl.us>
Sent: Monday, November 21, 2022 12:45 PM
To: Williams, Zakia <zakia_williams@fws.gov>; Wrublik, John <john_wrublik@fws.gov>
Cc: Rob Myers <Rob.Myers@metriceng.com>
Subject: [EXTERNAL] SR 535 437174-1 PD&E Technical Consultation

Hello Zakia and John,

FDOT is performing a PD&E Study that proposes to widen SR 535 from 4- to 6- lanes between US 192 to north of World Center Drive in Osceola and Orange Counties. We are assessing parcels for potential stormwater ponds and would like to coordinate with you for technical consultation regarding potential survey needs for the Audubon's crested caracara, sand skink, and blue-tailed mole skink. I will FTA to you both a document providing information on the parcels, their existing conditions and historic conditions. Please let me know if you have trouble accessing the document. Due to the observed habitats, site conditions, and parcel histories we are proposing no surveys are necessary for the sand skink, blue-tailed mole skink, or Audubon's crested caracara. Please review and let us know if you concur, or if (and which) surveys would be necessary to satisfy Section 7.

Also, as this project splits the regulatory responsibility, when the NRE is submitted will you both being providing comment/concurrence or is one of you going to take the lead?

Thank you and have a wonderful Thanksgiving.

Cheers,

Heather Chasez
Environmental Specialist IV
Project Compliance Coordinator
FDOT District Five
719 S. Woodland Blvd.
DeLand, FL 32720
Phone: (386) 943-5393

notified that any dissemination, distribution or copy of this communication is strictly prohibited. If you have received this communication in error, please contact the sender by reply E-mail and destroy all copies of the original message. Thank you.

Rob Myers

From: Wrublik, John <john_wrublik@fws.gov>
Sent: Monday, November 21, 2022 12:51 PM
To: Chasez, Heather; Williams, Zakia
Cc: Rob Myers
Subject: Re: [EXTERNAL] SR 535 437174-1 PD&E Technical Consultation

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Also, as this project splits the regulatory responsibility, when the NRE is submitted will you both being providing comment/concurrence or is one of you going to take the lead?

Thank you and have a wonderful Thanksgiving.

Cheers,

Heather Chasez
Environmental Specialist IV
Project Compliance Coordinator
FDOT District Five
719 S. Woodland Blvd.
DeLand, FL 32720
Phone: (386) 943-5393

State Road 535 PD&E Study

Existing Conditions Technical Memorandum for

Audubon's Crested Caracara and Sand and Blue-Tailed Mole Skink

This document provides data and information on existing environmental conditions in the project area of the State Road (SR) 535 Project Development and Environment (PD&E) Study, particularly with respect to evaluating potential habitat for Audubon's crested caracara (*Polyborus plancus audubonii*) as well as sand skink (*Neoseps reynoldsi*) and blue-tailed mole skink (*Eumeces egregius lividus*). Those habitat evaluations focus on five undeveloped parcels adjacent to the project where stormwater ponds may potentially be proposed.

The SR 535 PD&E Study limits extend along SR 535 from US 192 to north of World Center Drive and include portions of Osceola County in the south (**Figure 1**) and portions of Orange County in the north (**Figure 2**). The project location maps in **Figures 1** and **2** outline five parcels (labeled Parcels A through E) in blue that were evaluated in the field and are documented in greater detail in this memorandum. Maps showing land use and wetlands in the project area are included as **Figures 3** through **6**.

There are no records of caracara, sand skink, or blue-tailed mole skink occurring in or adjacent to the project area and no designated Critical Habitat occurs in the project area. The entire project is within the USFWS consultation areas for caracara and sand skink, and the Osceola County portion of the project is also within the USFWS consultation area for blue-tailed mole skink.

Audubon's Crested Caracara

Potential Habitat for Caracara in Osceola County Portion of Project Area

The southern portions of the project area, south of the Osceola-Orange County line, are heavily developed and field inspections revealed they do not contain prairies or pastures with scattered cabbage palms (*Sabal palmetto*) or other vegetation typical of caracara habitat. There are two larger, undeveloped parcels (Parcels D and E, see **Figures 1** and **4**) adjacent to the project in Osceola County. Parcel E is south of Calypso Cay Way and west of SR 535. Historic imagery from Google Earth reveals that Parcel E has been previously disturbed in its western portion and field inspections found most of the parcel contained a mixture of grasses and forbs in areas that appeared to have been previously graded. The parcel contains a patch of forest with mature oaks and cabbage palms forming a relatively dense canopy (**Appendix I Photographs 22A-32**). This forested patch is approximately 1.6 acres and Parcel E is less than six acres. It is surrounded by commercial and residential developments and lacks the vegetative components (prairie or pasture with scattered trees) of typical occupied caracara habitat.

The other undeveloped parcel in Osceola County, Parcel D, is located just south of North Poinciana Blvd. It is approximately seven acres and contains densely wooded wetlands and uplands without pasture or prairie typical of occupied caracara habitat (**Photographs 38-47**). The USFWS National Wetlands Inventory

Figure 1- Southern Portion of Project Area

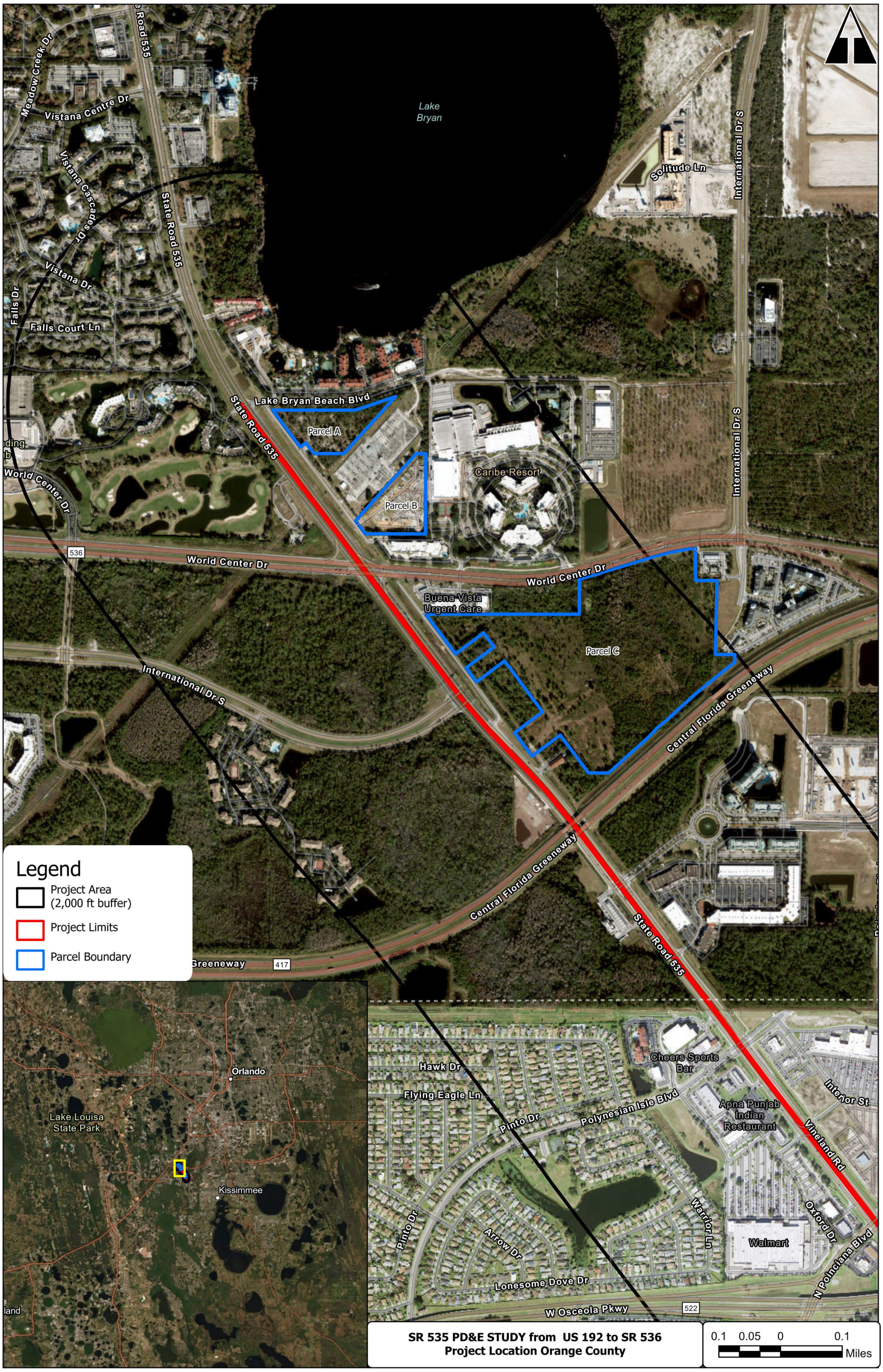


Figure 2- Northern Portion of Project Area

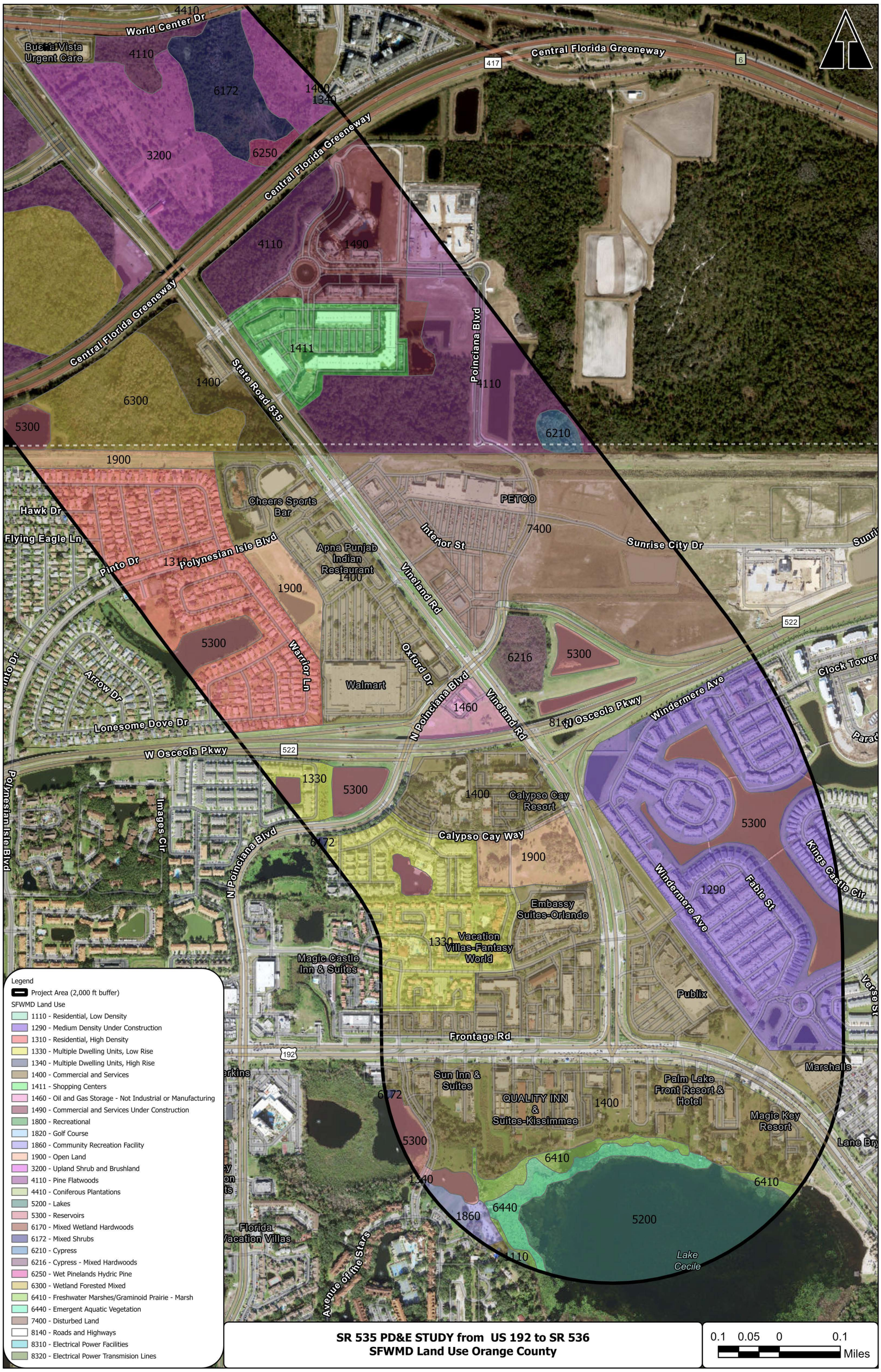


Figure 3- Land Use in the Southern Portion of Project Area

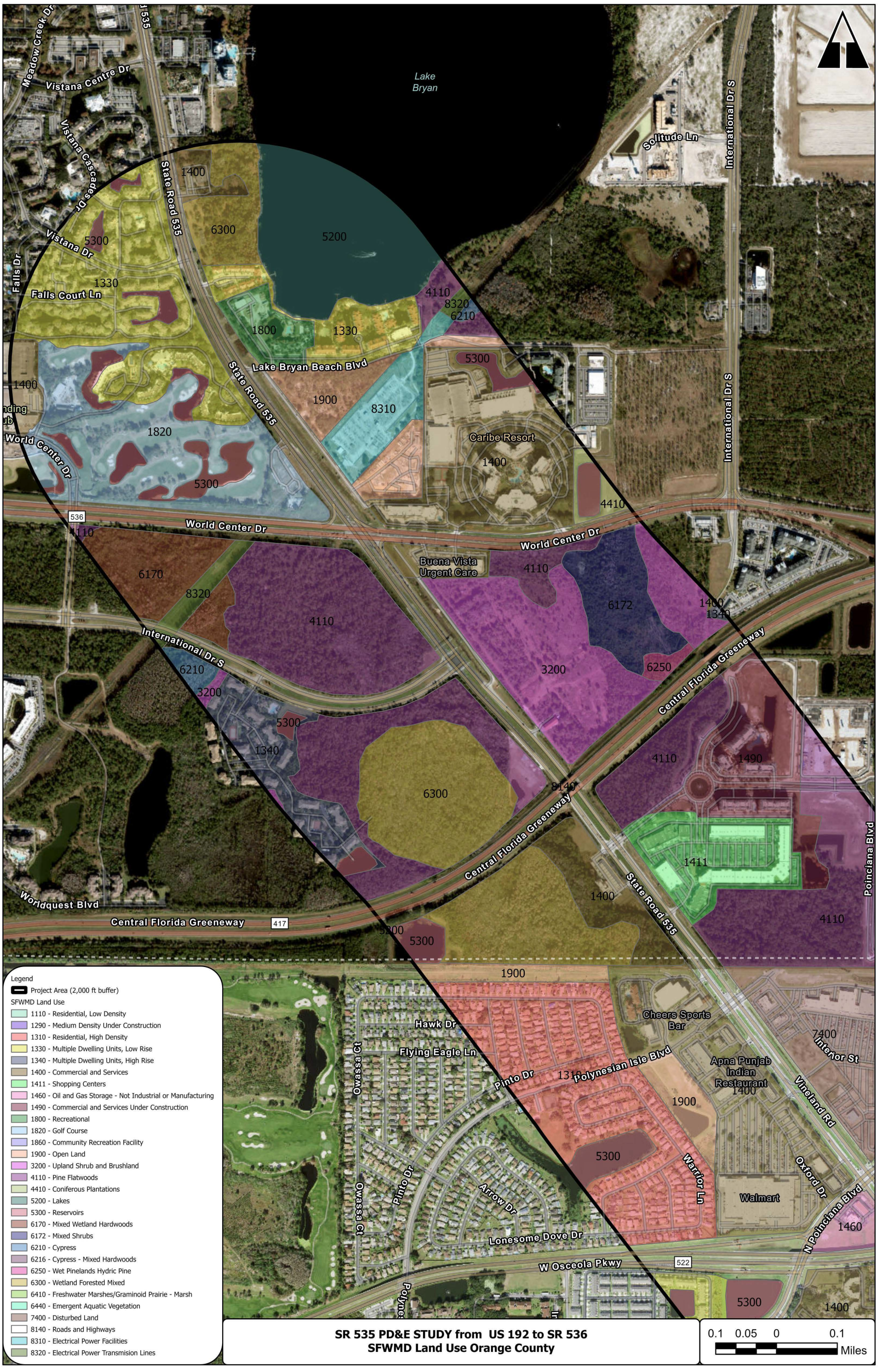


Figure 4- Land Use in the Northern Portion of Project Area

Figure 5- NWI-Mapped Wetlands within the Southern Portion of Project Area

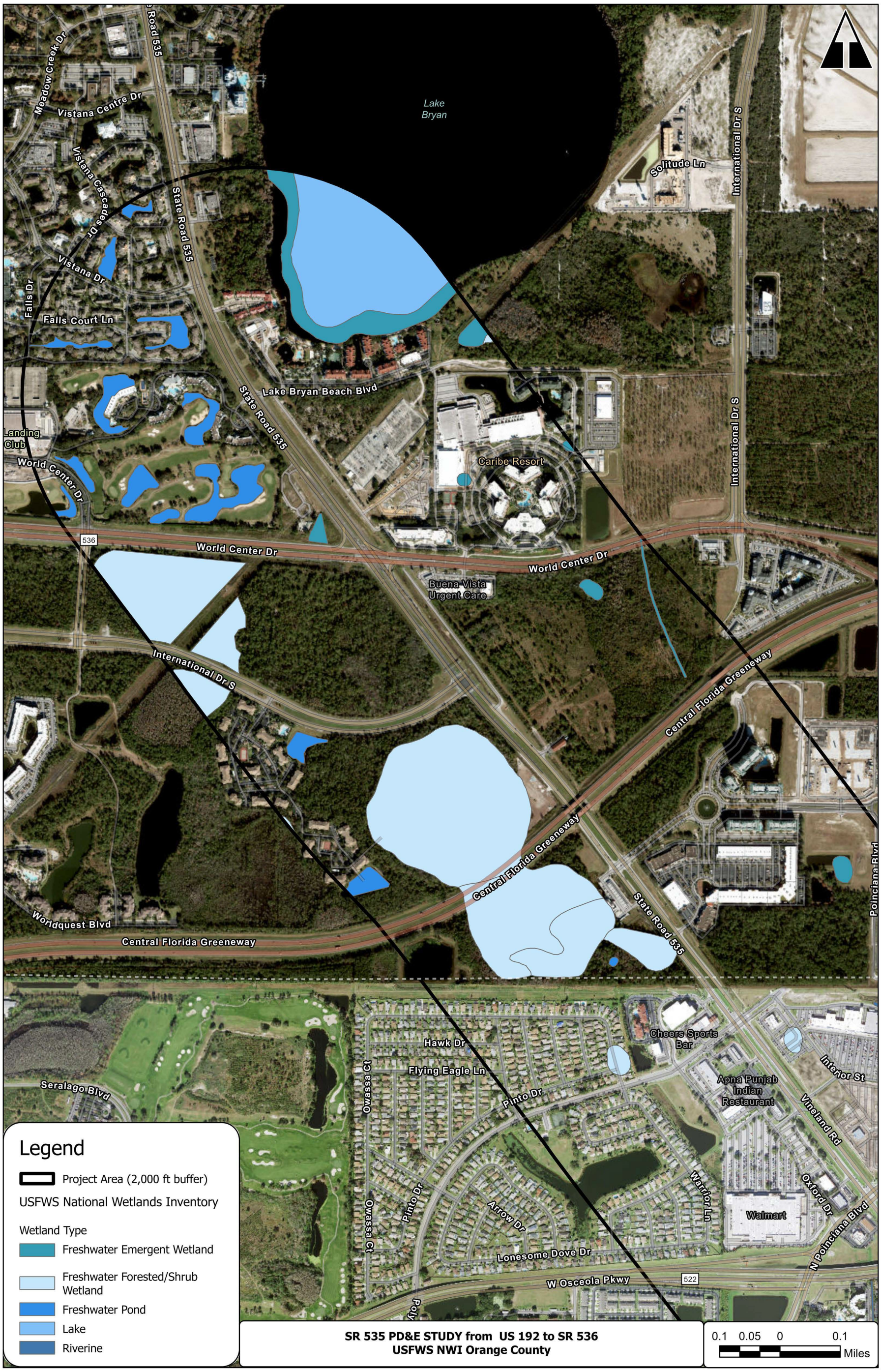


Figure 6- NWI-Mapped Wetlands within the Northern Portion of Project Area

(NWI) (see **Figure 3**) maps part of this parcel as Freshwater Forested/Shrub Wetland. This parcel is surrounded by roadways, a drainage pond, and commercial developments.

Potential Habitat for Caracara in Orange County Portion of Project Area

The project area in Orange County contains multiple vegetated and undeveloped parcels adjacent to the project that were evaluated for the potential to form suitable caracara habitat. The forested areas in Orange County to the west of SR 535, and to the east of SR 535 and south of SR 417, do not appear to match the descriptions of potential caracara habitat because they are heavily wooded with a mostly closed canopy and lack an open prairie or pasture component. Parcel B is an empty field that lacks natural vegetative communities and is not potential habitat. Parcel A is relatively small lacks the open pasture or prairie component with scattered cabbage palms typical of sand or blue-tailed mole skink habitat.

A large undeveloped parcel of approximately 65 acres (labeled Parcel C in **Figures 1, 2, 7**, and **8**) located immediately east of SR 535, south of World Center Drive and north of SR 417 (See **Appendix I Photographs 1A-21**), was inspected in the field for potential to form suitable caracara habitat. Historic aerial imagery from Google Earth reveals the central and far eastern portions of this parcel were cleared in 2006. The western portion of Parcel C and other adjacent parcels contain a powerline easement and small access road with mature pine trees forming a more densely wooded block of forest. Recent aerial images and field inspections revealed a more open area in the middle of Parcel C that contains scattered mature pine trees and many young pine trees less than 15 feet tall. Field inspections revealed the densely forested area closer to SR 535 was upland but there was extensive standing water and wet soils covering much of the previously cleared area in the middle of Parcel C. No cabbage palms were encountered in this parcel and the canopy was dominated by pine trees that were encroaching into open areas. In some areas, a relatively dense understory is present with saw palmetto (*Serenoa repens*), wax myrtle (*Morella cerifera*), young pine trees and other species.

Sand Skink and Blue-tailed Mole Skink

Maps of potential habitat for sand skink and blue-tailed mole skink in the project area are provided as **Figures 7** and **8** and follow appropriate elevations and soil types as described in *Peninsular Florida Species Conservation and Consultation Guide, Sand and Blue-Tailed Mole Skink* (USFWS 2020). The SFWMD does not map any scrub vegetation communities in the project area (**Figures 3** and **4**). There is no documented occurrence of sand skink or blue-tailed mole skink in or adjacent to the project area, and no indications of their presence were encountered during field inspections.

Potential Habitat for Sand Skink and Blue-tailed Mole Skink in Osceola County Portion of Project

The majority of the project area in Osceola County has been developed and is now under commercial or transportation use. There are two undeveloped parcels in Osceola County that are adjacent to the project, (labeled Parcel D and Parcel E on **Figures 1, 7,** and **10**) and portions of each parcel are mapped as potential sand and blue-tailed mole skink habitat due to soil types and elevation. Parcel E is located south of Calypso Cay Way and west of SR 535 (outlined in blue in **Figures 1** and **7** and shown in **Figure 9**). Parcel D is located south of North Poinciana Blvd. and west of SR 535 and contains wetlands (**Figure 10**). Both parcels were inspected for their potential to form suitable habitat for sand skinks and blue-tailed mole skinks.

Figure 7- Sand Skink and Blue-tailed Mole Skink Potential Habitat in Osceola County

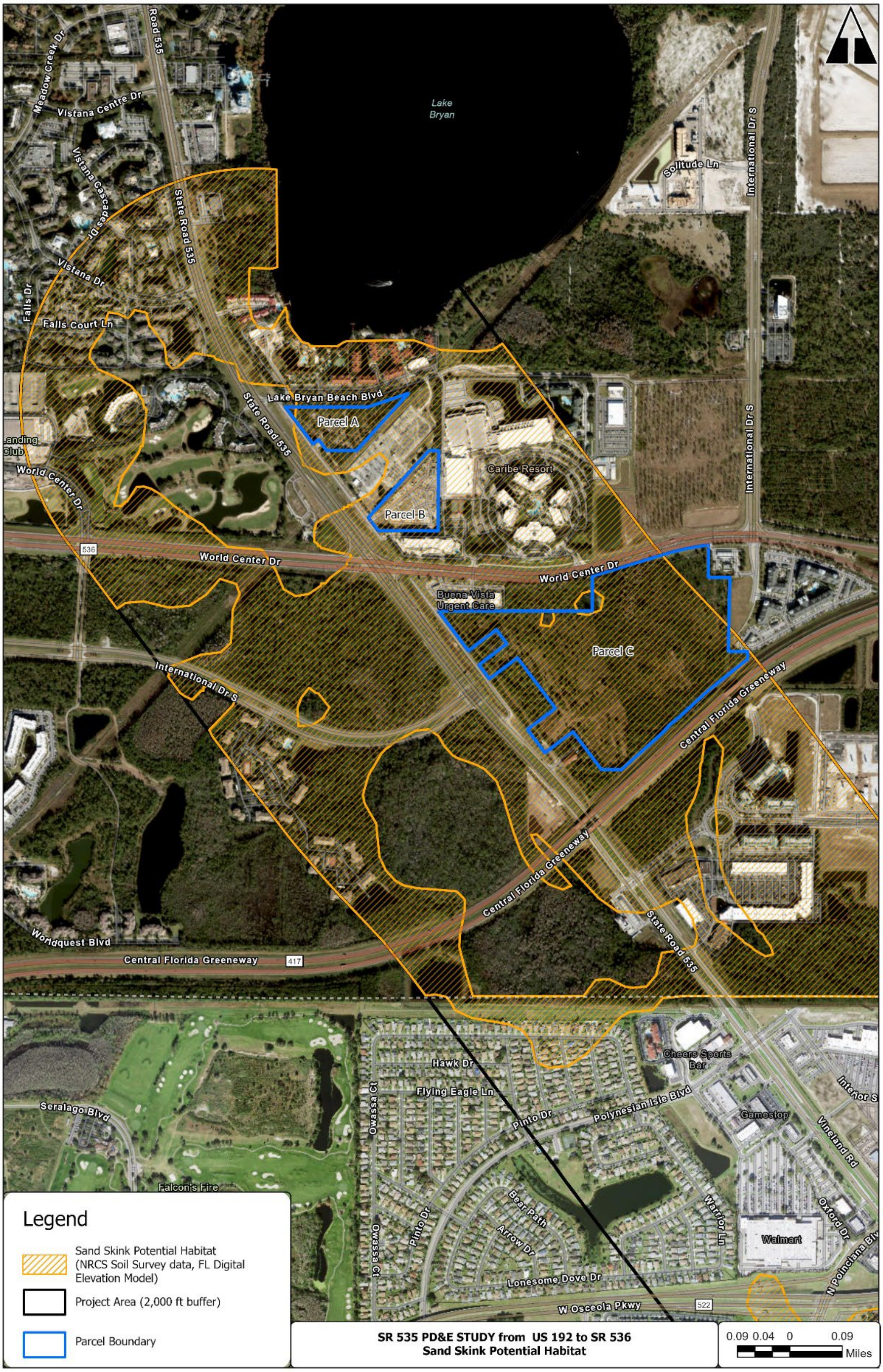


Figure 8- Sand Skink and Blue-tailed Mole Skink Potential Habitat in Orange County

Figure 9- Skink Potential Habitat in Targeted Parcel in Osceola County, West of SR 292

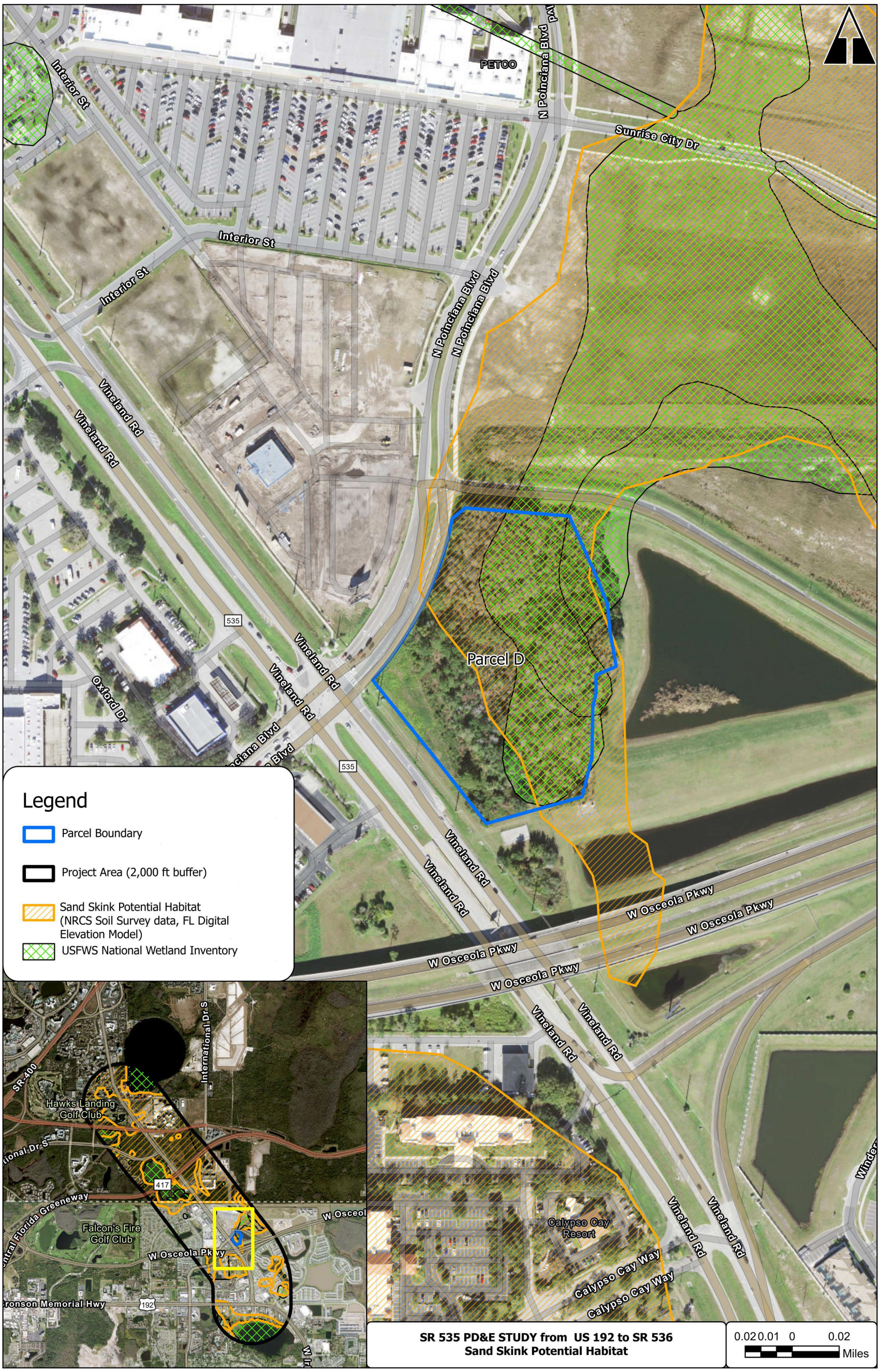


Figure 10. Map showing Parcel D, NWI Wetlands, and Potential Sand Skink Habitat Mapped by Elevation and Soil Type

The majority of Parcel E (**Figures 7** and **9** and **Appendix I Photographs 22A-32**) is mapped as potential habitat for sand and blue-tailed mole skinks except for the southeastern corner and eastern edge along the SR 535 right-of-way. The western and southern portions of this parcel have been previously disturbed, cleared, and graded. Parcel E contains open areas as well as a patch of mature oak and cabbage palms with dense canopy cover. The unforested portion of this parcel was previously disturbed and is covered with grasses and forbs. There are a few small areas of exposed soil in this parcel. The majority of Parcel E has been heavily disturbed and was previously used to store vehicles and shipping containers. Related rutting and soil disturbance is evident in aerial imagery. The vegetative communities and extent of open, bare patches of sandy soil do not match the descriptions of scrub, sandhill, xeric hammock, oak-dominated scrub, turkey oak barrens or other vegetative communities that more typically support sand or blue-tailed mole skinks. This parcel is less than six acres and is surrounded by commercial and residential developments.

A portion of Parcel D was mapped as potential sand and blue-tailed mole skink habitat based on soil type and elevation; however, the area immediately adjacent to SR 535 is not mapped as potential habitat. This parcel is heavily forested and most of the portions mapped as potential skink habitat are also mapped as wetland by the USFWS NWI (**Figure 10**). The vegetative communities in this parcel do not include scrub, sandhill, xeric hammock, oak-dominated scrub, turkey oak barrens or other vegetative communities that more typically support sand skinks (see **Photographs 38-47**). The canopy is dense with mature trees, no evidence of regular fire or disturbance was observed, and no open patches of sandy soil were observed during field inspections.

Potential Habitat for Sand Skink and Blue-tailed Mole Skink in Orange County Portion of Project

The majority of the project area in Orange County is mapped as potential habitat for sand skink and blue-tailed mole skink based on soils and elevation (**Figure 8**). However, the vast majority of these areas have either been developed or contain dense forest with heavy canopies that lack the scrub vegetation and open patches of soil typical of sand skink or blue-tailed mole skink habitat. This includes the undeveloped portions of the project area in Orange County to the west of SR 535, which do match the descriptions of suitable sand or blue-tailed mole skink habitat.

Parcel C (**Figure 8**) and adjacent areas by SR 535 were inspected in the field for potential to form suitable sand or blue-tailed mole skink habitat (see **Appendix I Photographs 1A-21**). This area contains a mixture of more dense, mature pine forest as well as pastures that were previously cleared and are now regenerating with a canopy dominated by pine trees. Extensive standing water and wet soils were encountered in the more open portions of Parcel C. No scrub or other vegetative communities or open patches of bare soil typical of sand skink or blue-tailed mole skink habitat were encountered in this parcel. No evidence of fire or regular disturbance was evident.

Parcels A and B (**Figure 2** and **Figure 8**) were also evaluated for potential to form sand skink or blue-tailed mole skink habitat. They are located east of SR 535, immediately north and south of an electrical substation between World Center Drive and Lake Bryan Beach Blvd (See parcels outlined in blue in **Figure 2** and **Figure 8,** and **Appendix I Photographs 33A-37**). Parcel B is approximately 5.75 acres and Parcel A is approximately 7 acres. Both of these parcels were previously disturbed, are mapped by the SFWMD as Open Land (FLUCCS 1900) and are surrounded by major roadways as well as commercial developments.

Parcel A contains scattered vegetation with a mostly discontinuous canopy formed by pines and the occasional oak tree. Open areas are dominated by saw palmetto and grasses/forbs with patches of bare soil apparent on recent aerial imagery. Historic imagery from Google Earth reveals Parcel A was cleared of most vegetation by 1995 and remained mostly void of larger vegetation until around 2004. Trees on Parcel A are densest along the northern limits of this parcel, by Lake Bryant Beach Blvd, where mature pines, oaks, and bald cypress occur. Historic images of the central and southern portion of Parcel A show tire ruts and soil disturbance from vehicles.

Parcel B is dominated by short grasses and forbs, with mature trees along the perimeter of the parcel. Historic imagery from Google Earth shows this parcel was cleared in 2012. Starting in 2017 it has been periodically used to store vehicles and construction materials. This parcel appears to have been previously graded and disturbed multiple times since 2012.

Recommendations

Osceola County Portion of Project

Due to a lack of suitable habitat, no historic records of occurrence, and a lack of indications of presence during field investigations, no nest surveys are recommended for Audubon's crested caracara in the Osceola County portion of the project area.

No communities of scrub vegetation are mapped by SFWMD in the project area and no impacts to scrub vegetation are anticipated. There is no documented occurrence of sand skink or blue-tailed mole skink in or adjacent to the project area, and no indications of their presence were encountered during field inspections. Parcel D is more heavily wooded than typical occupied sand or blue-tailed mole skink habitat and contains wetlands. The majority of Parcel E has been heavily disturbed and was previously used to store vehicles and shipping containers. Parcel E is surrounded by development, preventing colonization by outside populations of sand or blue-tailed mole skinks. Potential habitat is relatively low quality due to small patch size, isolation, prior disturbance in Parcel E and vegetation types in Parcel D. For these reason, no additional surveys for sand or blue-tailed mole skinks are recommended.

Orange County Portion of Project

Most of the undeveloped portions of the project area in Orange County, particularly west of SR 535, are too heavily wooded and do not contain the open prairie or pasture components typical of suitable caracara habitat. Parcel C lacks cabbage palms and contains extensive wetlands and mature pine trees. Younger pine trees are encroaching into previously open areas of Parcel C, creating a dense mid-story that is less open than typical caracara habitat. The project area is relatively isolated from other areas of potential caracara habitat and there are no know occurrences in the vicinity of the project. No indications of presence were detected during field investigations. For these reasons, no additional surveys for Audubon's crested caracara are recommended.

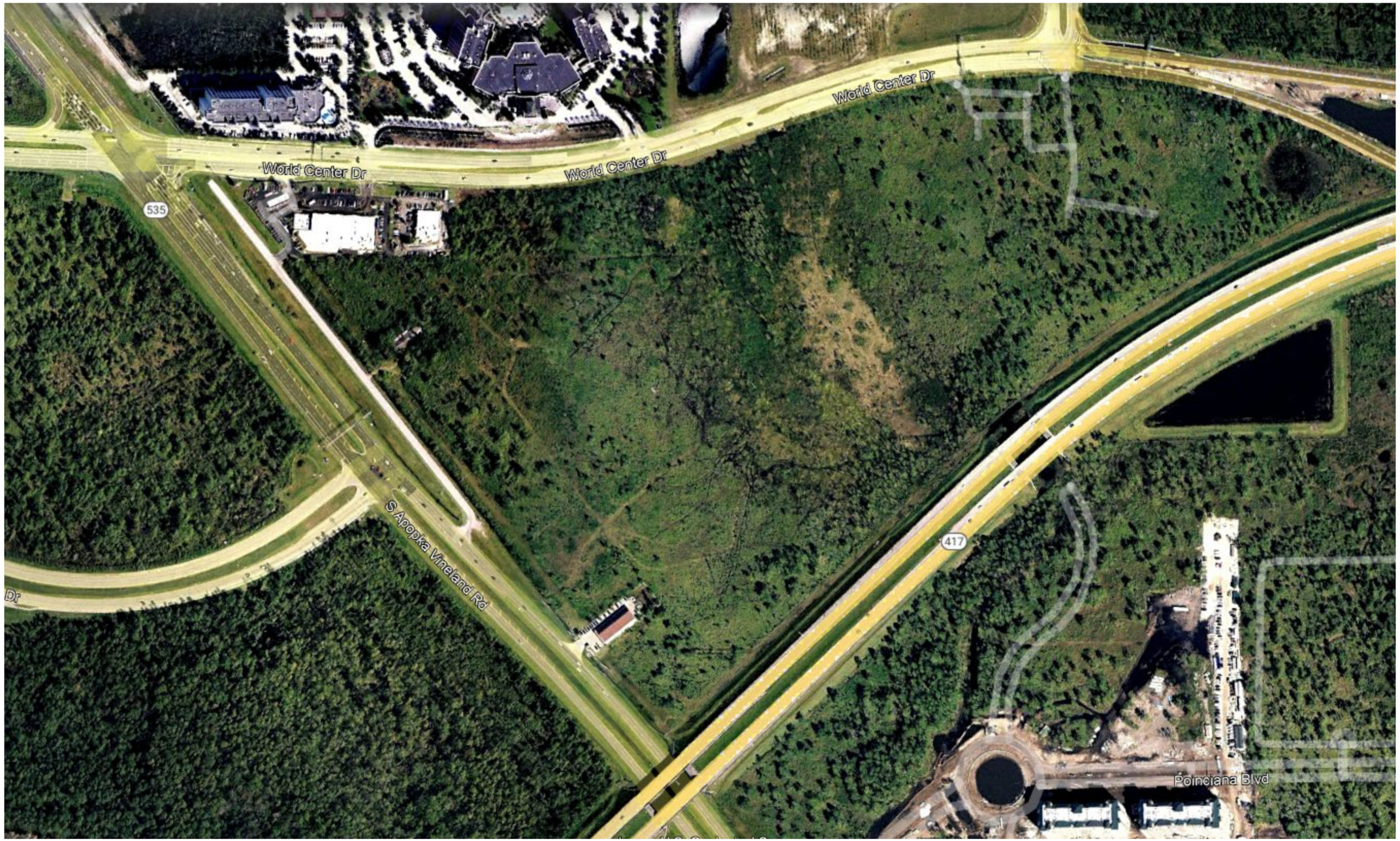
Potential habitat for sand or blue-tailed mole skinks was mapped remotely in Orange County by elevation and soil type. However, field investigations found there are no communities of scrub vegetation with open patches of sandy soil typical of suitable habitat for sand or blue-tailed mole skink. Remaining undeveloped

areas are relatively small (with the exception of Parcel C) and highly isolated by surrounding development. The project area is not directly connected to other areas of potential sand or blue-tailed mole skink habitat that might support immigration, and there are no occurrences of these species in the project area. For these reasons, no additional surveys for sand or blue-tailed mole skinks are recommended.

Appendix I- Photographs

Photograph 1A- Aerial View of Parcel C in Orange County Showing Location of Photograph Stations 1 through 5

Photograph 1B- Historic Aerial Photograph of Parcel C Area from 1995



Photograph 1C- Historic Aerial Photograph of Parcel C Area from 2006

Photograph 1D- Historic Aerial Photograph of Parcel C Area from 2022

Photograph 2- Parcel C Station 1 Facing North

Photograph 3- Parcel C Station 1 Facing East

Photograph 4- Parcel C Station 1 Facing South

Photograph 5- Parcel C Station 1 Facing West

Photograph 6- Parcel C Station 2 Facing North

Photograph 7- Parcel C Station 2 Facing East

Photograph 8- Parcel C Station 2 Facing South

Photograph 9- Parcel C Station 2 Facing West

Photograph 10- Parcel C Station 3 Facing North

Photograph 11- Parcel C Station 3 Facing East

Photograph 12- Parcel C Station 4 Facing South

Photograph 13- Parcel C Station 3 Facing West

Photograph 14- Parcel C Station 4 Facing North

Photograph 15- Parcel C Station 4 Facing East

Photograph 16- Parcel C Station 4 Facing South

Photograph 17- Parcel C Station 4 Facing West

Photograph 18- Parcel C Station 5 Facing North

Photograph 19- Parcel C Station 5 Facing East

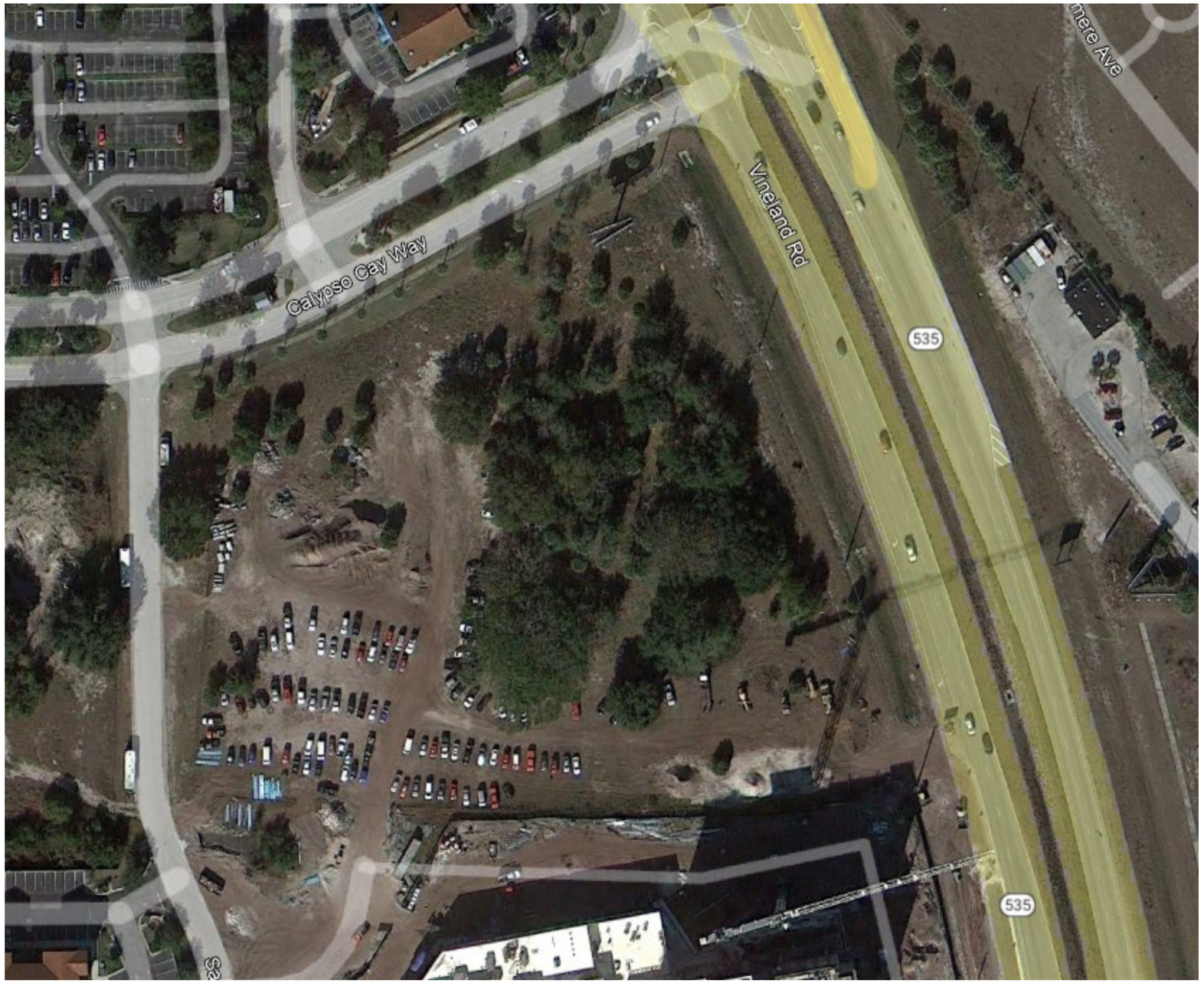
Photograph 20- Parcel C Station 5 Facing South

Photograph 21- Parcel C Station 5 Facing West

Photograph 22A- Parcel E in Osceola County Showing Location of Photograph Stations 6 and 7

Photograph 22B- Historic image of Parcel E area from 1995

Photograph 22C- Historic Image of Parcel E Area from 2008



Photograph 22D- Historic Image of Parcel E Area from 2012

Photograph 22E- Historic Image of Parcel E Area from 2022

Photograph 23- Parcel E Station 6 Facing North

Photograph 24- Parcel E Station 6 Facing East

Photograph 25- Parcel E Station 6 Facing South

Photograph 26- Parcel E Station 6 Facing West

Photograph 27- Parcel E Station 7 Facing North

Photograph 28- Parcel E Station 7 Facing East

Photograph 29- Parcel E Station 7 Facing South

Photograph 30- Parcel E Station 7 Facing West

Photograph 31- Parcel E Typical extent of bare, open ground, near Station 7

Photograph 32- Parcel E Typical extent of bare, open ground, near Station 7

Photograph 33A- Aerial Image of Parcels A and B in Orange County Showing Photo Stations

Photograph 33B- Historic Image of Area of Parcels A and B, from 1995

Photograph 33C- Historic Image of Area of Parcels A and B, from 1999

Photograph 33D- Historic Image of Area of Parcels A and B, from 2004

Photograph 33E- Historic Image of Area of Parcels A and B, from 2012

Photograph 33F- Historic Image of Area of Parcels A and B, from 2017

Photograph 33G- Historic Image of Area of Parcels A and B, from 2022

Photograph 34- View of Parcel A from Location 29, Facing Northeast

Photograph 35- View of Parcel A from Location 30, Facing North

Photograph 36- View of Parcel B from Location 31, Facing Northeast

Photograph 37- View of Parcel B from Location 32, Facing West

Photograph 38- Historic Aerial of Parcel D 1999

Photograph 39- Historic Aerial of Parcel D from 2013

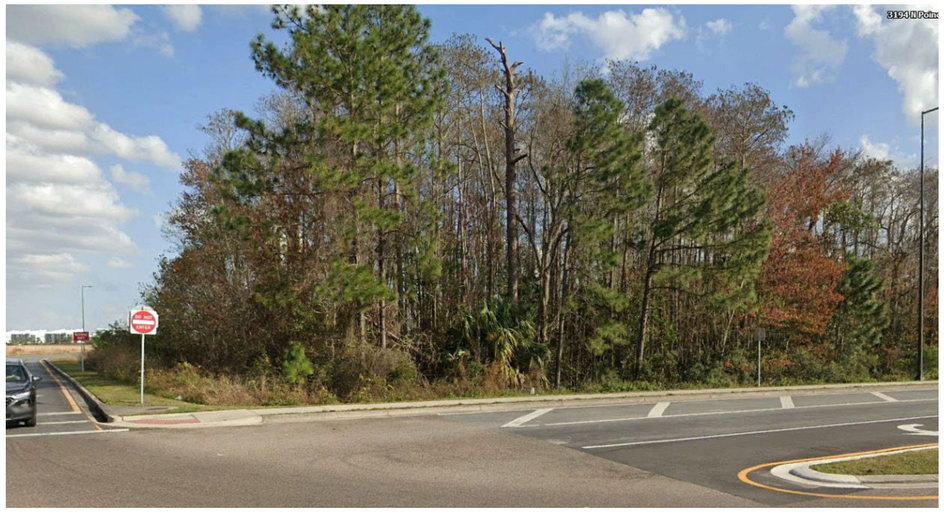
Photograph 40- Historic Aerial of Parcel D from 2006

Photograph 41- 2018 Aerial Photograph of Parcel D Showing Photograph Station Locations

Photograph 42- North Side of Parcel D from Photo Station 1 on offramp, facing west

Photograph 43- Parcel D from Intersection of Poinciana Drive and SR 535, Photo Station 2, facing east

Photograph 44- West Side of Parcel D from SR 535 from Photo Station 3, facing northeast



Photograph 45- East Side of Parcel D from SR 535 from Photo Station #, facing east

Photograph 46- East Side of Parcel D from Osceola Parkway, from Photo station 5, facing northwest

Photograph 47- South Side of Parcel D from Osceola Parkway Overpass, facing north

APPENDIX B: Standard Protection Measures for the Eastern Indigo Snake

United States Department of the Interior
U. S. FISH AND WILDLIFE SERVICE
7915 BAYMEADOWS WAY, SUITE 200
JACKSONVILLE, FLORIDA 32256-7517

IN REPLY REFER TO:
August 13, 2013

Colonel Alan M. Dodd, District Engineer
Department of the Army
Jacksonville District Corps of Engineers
P.O Box 4970
Jacksonville, Florida 32232-0019
(Attn: Mr. David S. Hobbie)

RE: Update Addendum to USFWS Concurrence Letter to U.S. Army Corps of Engineers Regarding Use of the Attached Eastern Indigo Snake Programmatic Effect Determination Key

Dear Colonel Dodd:

This letter is to amend the January 25, 2010, letter to the U.S. Army Corps of Engineers regarding the use of the attached eastern indigo snake programmatic effect determination key (key). It supersedes the update addendum issued January 5, 2012.

We have evaluated the original programmatic concurrence and find it suitable and appropriate to extend its use to the remainder of Florida covered by the Panama City Ecological Services Office.

On Page 2

The following replaces the last paragraph above the signatures:

"Thank you for your continued cooperation in the effort to conserve fish and wildlife resources. Any questions or comments should be directed to Annie Dziergowski (North Florida ESO) at 904-731-3089, Harold Mitchell (Panama City ESO) at 850-769-0552, or Victoria Foster (South Florida ESO) at 772-469-4269."

On Page 3

The following replaces both paragraphs under "Scope of the key":

"This key should be used only in the review of permit applications for effects determinations for the eastern indigo snake within the State of Florida, and not for other listed species or for aquatic resources such as Essential Fish Habitat (EFH)."

On Page 4

The following replaces the first paragraph under Conservation Measures:

"The Service routinely concurs with the Corps' "not likely to adversely affect" (NLAA) determination for individual project effects to the eastern indigo snake when assurances are given that

our *Standard Protection Measures for the Eastern Indigo Snake* (Service 2013) located at: http://www.fws.gov/northflorida/IndigoSnakes/indigo-snakes.htm will be used during project site preparation and project construction. There is no designated critical habitat for the eastern indigo snake."

On Page 4 and Page 5 (Couplet D)

The following replaces D. under Conservation Measures:

D. The project will impact less than 25 acres of xeric habitat (scrub, sandhill, or scrubby flatwoods) or less than 25 active and inactive gopher tortoise burrows.....*go to* E

The project will impact more than 25 acres of xeric habitat (scrub, sandhill, or scrubby flatwoods) or more than 25 active and inactive gopher tortoise burrows and consultation with the Service is requested[2].....*"may affect"*

On Page 5

The following replaces footnote #3:

"[3]If excavating potentially occupied burrows, active or inactive, individuals must first obtain state authorization via a FWC 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 ."

Thank you for making these amendments concerning the Eastern Indigo Snake Key. If you have any questions, please contact Jodie Smithem of my staff at the address on the letterhead, by email at jodie_smithem@fws.gov, or by calling (904)731-3134.

Sincerely,

Dawn Jennings
Acting Field Supervisor

cc:
Panama City Ecological Services Field Office, Panama City, FL
South Florida Ecological Services Field Office, Vero Beach, FL

United States Department of the Interior

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

January 25, 2010

David S. Hobbie
Chief, Regulatory Division
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Service Federal Activity Code: 41420-2009-FA-0642
Service Consultation Code: 41420-2009-I-0467
41910-2010-I-0045
Subject: North and South Florida Ecological Services Field Offices Programmatic Concurrence for Use of Original Eastern Indigo Snake Key(s) Until Further Notice

Dear Mr. Hobbie:

The U.S. Fish and Wildlife Service's (Service) South and North Florida Ecological Services Field Offices (FO), through consultation with the U.S. Army Corps of Engineers Jacksonville District (Corps), propose revision to both Programmatic concurrence letters/keys for the federally threatened Eastern Indigo Snake (*Drymarchon corais couperi*), (indigo snake), and now provide one key for both FO's. The original programmatic key was issued by the South Florida FO on November 9, 2007. The North Florida FO issued a revised version of the original key on September 18, 2008. Both keys were similar in content, but reflected differences in geographic work areas between the two Field Offices. The enclosed key satisfies each office's responsibilities under the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C.1531 *et seq.*).

Footnote number 3 in the original keys indicated "A member of the excavation team should be authorized for Incidental Take during excavation through either a section 10(a)(1)(A) permit issued by the Service or an incidental take permit issued by the Florida Fish and Wildlife Conservation Commission (FWC)." We have removed this reference to a Service issued Section 10(a)(1)(A) permit, as one is not necessary for this activity. We also referenced the FWC's revised April 2009 Gopher Tortoise Permitting Guidelines with a link to their website for updated excavation guidance, and have provided a website link to our Standard Protection Measures. All other conditions and criteria apply.

We believe the implementation of the attached key achieves our mutual goal for all users to make consistent effect determinations regarding this species. The use of this key for review of projects

located in all referenced counties in our respective geographic work areas leads the Service to concur with the Corps' determination of "may affect, not likely to adversely affect" (MANLAA) for the Eastern indigo snake. The biological rationale for the determinations is contained within the referenced documents and is submitted in accordance with section 7 of the Act.

Should circumstances change or new information become available regarding the eastern indigo snake or implementation of the key, the determinations may be reconsidered as deemed necessary.

Thank you for your continued cooperation in the effort to conserve fish and wildlife resources. Any questions or comments should be directed to either Allen Webb (Vero Beach) at 772-562-3909, extension 246, or Jay Herrington (Jacksonville) at 904-731-3326.

Sincerely,

Paul Souza
Field Supervisor
South Florida Ecological Services Office

David L. Hankla
Field Supervisor
North Florida Ecological Services Office

Enclosure

cc: electronic only
FWC, Tallahassee, Florida (Dr. Elsa Haubold)
Service, Jacksonville, Florida (Jay Herrington)
Service, Vero Beach, Florida (Sandra Sneckenberger)

Eastern Indigo Snake Programmatic Effect Determination Key

Scope of the key

This key should be used only in the review of permit applications for effects determinations within the North and South Florida Ecological Services Field Offices Geographic Areas of Responsibility (GAR), and not for other listed species or for aquatic resources such as Essential Fish Habitat (EFH). Counties within the **North** Florida GAR include Alachua, Baker, Bradford, Brevard, Citrus, Clay, Columbia, Dixie, Duval, Flagler, Gilchrist, Hamilton, Hernando, Hillsborough, Lafayette, Lake, Levy, Madison, Manatee, Marion, Nassau, Orange, Pasco, Pinellas, Putnam, St. Johns, Seminole, Sumter, Suwannee, Taylor, Union, and Volusia.

Counties in the **South** Florida GAR include Broward, Charlotte, Collier, De Soto, Glades, Hardee, Hendry, Highlands, Lee, Indian River, Martin, Miami-Dade, Monroe, Okeechobee, Osceola, Palm Beach, Polk, Sarasota, St. Lucie.

Habitat

Over most of its range, the eastern indigo snake frequents several habitat types, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats (Service 1999). Eastern indigo snakes appear to need a mosaic of habitats to complete their life cycle. Wherever the eastern indigo snake occurs in xeric habitats, it is closely associated with the gopher tortoise *(Gopherus polyphemus),* the burrows of which provide shelter from winter cold and summer desiccation (Speake et al. 1978; Layne and Steiner 1996). Interspersion of tortoise-inhabited uplands and wetlands improves habitat quality for this species (Landers and Speake 1980; Auffenberg and Franz 1982).

In south Florida, agricultural sites, such as sugar cane fields, created in former wetland areas are occupied by eastern indigo snakes (Enge pers. comm. 2007). Formerly, indigo snakes would have only occupied higher elevation sites within the wetlands. The introduction of agriculture and its associated canal systems has resulted in an increase in rodents and other species of snakes that are prey for eastern indigo snakes. The result is that indigos occur at higher densities in these areas than they did historically.

Even though thermal stress may not be a limiting factor throughout the year in south Florida, indigo snakes still seek and use underground refugia. On the sandy central ridge of central Florida, eastern indigos use gopher tortoise burrows more (62 percent) than other underground refugia (Layne and Steiner 1996). Other underground refugia used include armadillo (*Dasypus novemcinctus*) burrows near citrus groves, cotton rat (*Sigmodon hispidus*) burrows, and land crab (*Cardisoma guanhumi*) burrows in coastal areas (Service 2006). 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. In extreme south Florida (the Everglades and Florida Keys), indigo snakes are found in tropical

hardwood hammocks, pine rocklands, freshwater marshes, abandoned agricultural land, coastal prairie, mangrove swamps, and human-altered habitats (Steiner et al. 1983). It is suspected that they prefer hammocks and pine forests, because most observations occur in these habitats disproportionately to their presence in the landscape (Steiner et al. 1983). Hammocks may be important breeding areas as juveniles are typically found there. The eastern indigo snake is a snake-eater so the presence of other snake species may be a good indicator of habitat quality.

Conservation Measures

The Service routinely concurs with the Corps' "not likely to adversely affect" (NLAA) determination for individual project effects to the eastern indigo snake when assurances are given that our *Standard Protection Measures for the Eastern Indigo Snake* (Service 2004) located at: http://www.fws.gov/northflorida/IndigoSnakes/indigo-snakes will be used during project site preparation and project construction. There is no designated critical habitat for the eastern indigo snake.

In an effort to reduce correspondence in effect determinations and responses, the Service is providing an Eastern Indigo Snake Effect Determination Key, similar in utility to the West Indian Manatee Effect Determination Key and the Wood Stork Effect Determination Keys presently being utilized by the Corps. 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 determination and no additional correspondence will be necessary[1]. This key is subject to revisitation as the Corps and Service deem necessary.

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 *Standard Protection Measures For The Eastern Indigo Snake* 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[2] .....*"may affect"*

C. There are gopher tortoise burrows, holes, cavities, or other refugia where a snake could be buried or trapped and injured during project activities .....*go to* D

There are no gopher tortoise burrows, holes, cavities, or other refugia where a snake could be buried or trapped and injured during project activities .....*"NLAA"*

D. The project will impact less than 25 acres of xeric habitat supporting less than 25 active and inactive gopher tortoise burrows.....*go to* E

The project will impact more than 25 acres of xeric habitat or more than 25 active and inactive gopher tortoise burrows and consultation with the Service is requested[2]..... *"may affect"*

E. Any permit will be conditioned such that all gopher tortoise burrows, active or inactive, will be evacuated prior to site manipulation in the vicinity of the burrow[3]. If an 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 indigo snake, no work will commence until the snake has vacated the vicinity of proposed work..... *"NLAA"*

Permit will not be conditioned as outlined above and consultation with the Service is requested[2] ..... *"may affect"*

---

[1]With an outcome of "no effect" or "NLAA" as outlined in this key, the requirements of section 7 of the Act are fulfilled for the eastern indigo snake and no further action is required.

[2]Consultation may be concluded informally or formally depending on project impacts.

[3] If burrow excavation is utilized, it should be performed by experienced personnel. The method used should minimize the potential for injury of an indigo snake. Applicants should follow the excavation guidance provided within the Florida Fish and Wildlife Conservation Commission's revised April 2009 Gopher Tortoise Permitting Guidelines located at **http://myfwc.com/License/Permits_ProtectedWildlife.htm#gophertortoise**. A member of the excavation team should be authorized for Incidental Take during excavation through an incidental take permit issued by the Florida Fish and Wildlife Conservation Commission.

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 interspersion 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 (*Dasypus 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 protections 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 burrow[1]. 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.....**NLAA**[2]

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

End Key

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[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)

LITERATURE CITED

Enge K. M. 2017. Personal communication. Email from Kevin Enge, Florida Fish and Wildlife Conservation Commission, Gainesville, Florida to Steve Mortellaro, U.S. Fish and Wildlife Service, Vero Beach, Florida, July 5, 2017. Locations of Eastern Indigo Snake (*Drymarchon couperi*).

Enge K. M. and M. J. Endries. 2009. Status of the Eastern Indigo Snake (*Drymarchon couperi*) in Florida. Southeast Partners in Amphibian and Reptile Conservation Meeting.

Landers, J. L. and D.W. Speake. 1980. Management Needs of Sandhill Reptiles in Southern Georgia. Proceedings Annual Conference of Southeastern Association of Fish and Wildlife Agencies. 34: 515-529.

Layne, J.N., and T.M. Steiner. 1996. Eastern indigo snake (Drymarchon corais couperi): summary of research conducted on Archbold Biological Station. Report prepared under Order 43910-6-0134 to the U.S. Fish and Wildlife Service; Jackson, Mississippi.

Lawler, H.E. 1977. The status of *Drymarchon corais couperi* (Holbrook), the eastern indigo snake, in the southeastern U.S.A. *Herpetological Review* 8(3):76-79.

Means, D. B. 2006. Vertebrate faunal diversity of longleaf pine ecosystems. In *The Longleaf Pine Ecosystem* pp. 157-213. Springer New York.

Molar, P.E. 1985a. Distribution of the eastern indigo snake, *Drymarchon corais couperi*, in Florida. *Herpetological Review* 16(2):37-38.

Moler, P.E. 1985b. Home range and seasonal activity of the eastern indigo snake, Drymarchon corais couperi, in northern Florida. Final performance report, Study E-1-06, III-A-5. Florida Game and Fresh Water Fish Commission; Tallahassee, Florida.

Steiner, T.M., O.L. Bass, Jr., and J.A. Kushlan. 1983. Status of the eastern indigo snake in Southern Florida National Parks and vicinity. South Florida Research Center Report SFRC-83-01, Everglades National Park; Homestead, Florida.

U.S. Fish and Wildlife Service (Service). 1999. South Florida multi-species recovery plan. 23 pp.

U.S. Fish and Wildlife Service (Service). 2013. Standard Protection Measures for the Eastern Indigo Snake. August 12, 2013. U.S. Fish and Wildlife Service, South Florida Ecological Services Office; Vero Beach, Florida.

Wilson, L.D. and L. Porras. 1983. The ecological impact of man on the south Florida herpetofauna. *University of Kansas Museum of Natural History Special Publication* 9:1–89.

Zeigler, M. 2006. Personal communication. Citrus grove operations manager. Meeting with the U.S. Fish and Wildlife Service on August 1, 2006. Agricultural Resource Management; Vero Beach, Florida.

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE

U.S. Fish and Wildlife Service

December 2023

The Standard Protection Measures for the Eastern Indigo Snake (Plan) below has been developed by the U.S. Fish and Wildlife Service (USFWS) in Florida and Georgia for use by project proponents and their construction personnel help minimize adverse impacts to eastern indigo snakes. However, implementation of this Plan does not replace any state of federal consultation or regulatory requirements. At least 30 days prior to any land disturbance activities, the project proponent shall notify the appropriate USFWS Field Office (see Field Office contact information) via e-mail that the Plan will be implemented as described below.

As long as the signatory of the e-mail certifies compliance with the below Plan (including use of the approved poster and pamphlet (USFWS Eastern Indigo Snake Conservation webpage), no further written confirmation or approval from the USFWS is needed regarding use of this Plan as a component of the project.

If the project proponent 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. The project proponent 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.

STANDARD PROTECTION MEASURES

BEFORE AND DURING CONSTRUCTION ACTIVITIES:

- All Project personnel shall be notified about the potential presence and appearance of the federally protected eastern indigo snake (*Drymarchon couperi*).
- All personnel shall be advised that there are civil and criminal penalties for harassing, harming, pursuing, hunting, shooting, wounding, killing, capturing, or collecting the species, in knowing violation of the Endangered Species Act of 1973.
- The project proponent or designated agent will post educational posters in the construction office and throughout the construction site. The posters must be clearly visible to all construction staff and shall be posted in a conspicuous location in the

Project field office until such time that Project construction has been completed and time charges have stopped.

- Prior to the onset of construction activities, the project proponent or 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 pamphlet 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. Photos of eastern indigo snakes may be accessed on USFWS, Florida Fish and Wildlife Conservation Commission and/or Georgia Department of Natural Resources websites.
- Each day, prior to the commencement of maintenance or construction activities, the Contractor shall perform a thorough inspection for the species of all worksite equipment.
- If an eastern indigo snake (alive, dead or skin shed) 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 Office. The contact information for the USFWS is provided below and on the referenced posters and pamphlets.
- During initial site clearing activities, an onsite observer is recommended 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).
- Periodically during construction activities, the project area should be visited 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.
- For erosion control use biodegradable, 100% natural fiber, net-free rolled erosion control blankets to avoid wildlife entanglement.

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 (See USFWS Field Office Contact Information).

USFWS FIELD OFFICE CONTACT INFORMATION

Georgia Field Office: Phone: (706) 613-9493, email: gaes_assistance@fws.gov
Florida Field Office: Phone: (352) 448-9151, email: fw4flesregs@fws.gov

POSTER & PAMPHLET INFORMATION

Posters with the following information shall be placed at strategic locations on the construction site and along any proposed access roads (final posters for Plan compliance are available on our website in English and Spanish and should be printed on 11 x 17in or larger paper and laminated (USFWS Eastern Indigo Snake Conservation webpage). Pamphlets are also available on our webpage and should be printed on 8.5 x 11in paper and folded, and available and distributed to staff working on the site.

POSTER CONTENT (ENGLISH):

ATTENTION

Federally-Threatened Eastern Indigo Snakes may be present on this site!

Killing, harming, or harassing eastern indigo snakes is strictly prohibited and punishable under State and Federal Law.

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

• Stop land disturbing activities and allow the snake time to move away from the site without interference. Do NOT attempt to touch or handle the snake.

• Take photographs of the snake, if possible, for identification and documentation purposes.

• Immediately notify supervisor/agent, and a U.S. Fish and Wildlife Service (USFWS) Ecological Services Field Office, with the location information and condition of the snake.

• If the snake is located near clearing or construction activities that will cause harm to the snake, the activities must pause until a representative of the USFWS returns the call (within one day) with further guidance.

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

• Stop land disturbing activities and immediately notify supervisor/applicant, and a USFWS Ecological Services Field 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.

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, reaching up to 8 ft long. Named for the glossy, blue-black scales above and slate blue below, they often have orange to reddish color (cream color in some cases)

in the throat area. They are not typically aggressive.

SIMILAR SPECIES: The black racer resembles the eastern indigo snake. However, black racers have a white or cream chin, and thinner bodies.

LIFE HISTORY: Eastern indigo snakes live in a variety of terrestrial habitat types. Although they prefer uplands, they also use wetlands and agricultural areas. They will shelter inside gopher tortoise burrows, other animal burrows, stumps, roots, and debris piles. Females may lay from 4 to 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTED STATUS: The eastern indigo snake is protected by the USFWS, Florida Fish and Wildlife Conservation Commission, and Georgia Department of Natural Resources. Any attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage eastern indigo snakes is prohibited by the U.S. Endangered Species Act. Penalties include a maximum fine of $25,000 for civil violations and up to $50,000 and/or imprisonment for criminal offenses. Only authorized individuals with a permit (or an Incidental Take Statement associated with a USFWS Biological Opinion) may handle an eastern indigo snake.

Please contact your nearest USFWS Ecological Services Field Office if a live or dead eastern indigo snake is encountered:

Florida Office: (352) 448-9151

Georgia Office: (706) 613-9493

POSTER CONTENT (SPANISH):

ATENCIÓN

¡Especie amenazada, la culebra Índigo del Este, puede ocupar el área!

Matar, herir o hostigar culebras Índigo del Este es estrictamente prohibido bajo la Ley Federal.

SI VES UNA CULEBRA ÍNDIGO DEL ESTE O UNA CULEBRA NEGRA VIVA EN EL ÁREA:

• Pare excavación y permite el movimiento de la culebra fuera del área sin interferir. NO atentes tocar o recoger la culebra.

• Fotografié la culebra si es posible para identificación y documentación.

• Notifique supervisor/agente, y la Oficina de Campo de Servicios Ecológicos del Servicio Federal de Pesca y Vida Silvestre (USFWS) apropiada con información acerca del sitio y condición de la culebra.

• Si la culebra está cerca de un área de construcción que le pueda causar daño, las actividades deben parar hasta un representante del USFWS regrese la llamada (dentro de un día) con más orientación.

SI VES UNA CULEBRA ÍNDIGO DEL ESTE MUERTA EN EL ÁREA:

• Pare excavación. Notifique supervisor/aplicante, y la Oficina de Campo de Servicios Ecológicos apropiada con información acerca del sitio y condición de la culebra.

• Fotografié la culebra si es posible para identificación y documentación.

• Emerge completamente la culebra en agua y congele la especie hasta que personal apropiado de la agencia de vida silvestre la recoja.

DESCRIPCIÓN. La culebra Índigo del Este es una de las serpientes sin veneno más grande en Norte América, alcanzando hasta 8 pies de largo. Su nombre proviene del color azul-negro brilloso de sus escamas, pero pueden tener un color anaranjado-rojizo (color crema en algunos casos) en su mandíbula inferior. No tienden a ser agresivas.

SERPIENTES PARECIDAS. La corredora negra, que es de color negro sólido, es la única otra serpiente que se asemeja a la Índigo del Este. La corredora negra se diferencia por una mandíbula inferior color blanca o crema y un cuerpo más delgado.

HÁBITATS Y ECOLOGÍA. La culebra Índigo del Este vive en una variedad de hábitats, incluyendo tierras secas, humedales, y áreas de agricultura. Ellas buscan refugio en agujeros o huecos de tierra, en especial madrigueras de tortugas de tierra. Las hembras ponen 4 hasta 12 huevos blancos entre abril y junio, y la cría emergen entre julio y octubre.

PROTECCIÓN LEGAL. La culebra Índigo del Este es clasificada como especie amenazada por el USFWS, la Comisión de Conservación de Pesca y Vida Silvestre de Florida y el Departamento de Recursos Naturales de Georgia. Intento de matar, hostigar, herir, lastimar, perseguir, cazar, disparar, capturar, colectar o conducta parecida hacia las culebras Índigo del Este es prohibido por la Ley Federal de Especies en Peligro de Extinción. Penalidades incluyen un máximo de $25,000 por violaciones civiles y $50,000 y/o encarcelamiento por actos criminales. Solos individuales autorizados con un permiso o Determinación de toma incidental (Incidental Take Statement) asociado con una Opinión Biológico del USFWS pueden recoger una Índigo del Este.

Por favor de contactar tu Oficina de Campo de Servicios Ecológicos más cercana si encuentras una culebra Índigo del Este viva o muerta:

Oficina de Florida: (352) 448-9151

Oficina de Georgia: (706) 613-9493

APPENDIX C: USFWS Wood Stork Effect Determination Key

United States Department of the Interior

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

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

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 determination[1]. 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 site[3] ..... "*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[1]"*.

B. Project impact to SFH is less than 0.20 hectare (one-half acre)[6]……..……*NLAA[1]"*

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 site ……..…….…….…..……*go to* D

Project impacts to SFH within the CFA of a colony site …….…..…...…….*go 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 hydroperiod[7] 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 guidance[8]…….. *NLAA[1]"*

Project not as above.……... *"may affect[4]"*

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 hydroperiod[7] of the wetlands affected, and provides foraging value similar

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[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 guidance[8]..... *"NLAA[1]"*

Project does not satisfy these elements ..... *"may affect[4]"*

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)
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LITERATURE CITED

Ceilley, D.W. and S.A. Bortone. 2000. A survey of freshwater fishes in the hydric flatwoods of flint pen strand, Lee County, Florida. Proceedings of the 27th Annual Conference on Ecosystems Restoration and Creation, 70-91. Hillsborough Community College; Hillsborough County, Florida.

Flemming, D.M., W.F. Wolff, and D.L. DeAngelis. 1994. Importance of landscape heterogeneity to wood storks. Florida Everglades Management 18: 743-757.

Kahl, M.P., Jr. 1964. Food ecology of the wood stork (*Mycteria americana*) in Florida. Ecological Monographs 34:97-117.

Ogden, J.C. 1991. Nesting by wood storks in natural, altered, and artificial wetlands in central and northern Florida. Colonial Waterbirds 14:39-45.

Ogden, J.C., J.A. Kushlan, and J.T. Tilmant. 1976. Prey selectivity by the wood stork. Condor 78(3):324-330.

Ogden, J.C. 1996. Wood Stork *in* J.A. Rodgers, H. Kale II, and H.T. Smith, eds. Rare and endangered biota of Florida. University Press of Florida; Gainesville, Florida.

Rodgers, J.A. Jr., A.S. Wenner, and S.T. Schwikert. 1987. Population dynamics of wood storks in northern and central Florida, USA. Colonial Waterbirds 10:151-156.

Rodgers, J.A., Jr., S.T. Schwikert, and A. Shapiro-Wenner. 1996. Nesting habitat of wood storks in north and central Florida, USA. Colonial Waterbirds 19:1-21.

U.S. Fish and Wildlife Service. 1990. Habitat management guidelines for the wood stork in the southeast region. Prepared by John C. Ogden for the Southeast Region U.S. Fish and Wildlife Service; Atlanta, Georgia.

U.S. Fish and Wildlife Service. 1999. South Florida multi-species recovery plan. Fish and Wildlife Service; Atlanta, Georgia. Available from: http://verobeach.fws.gov/Programs/Recovery/vbms5.html.

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 mainain 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 degredation 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 our 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:

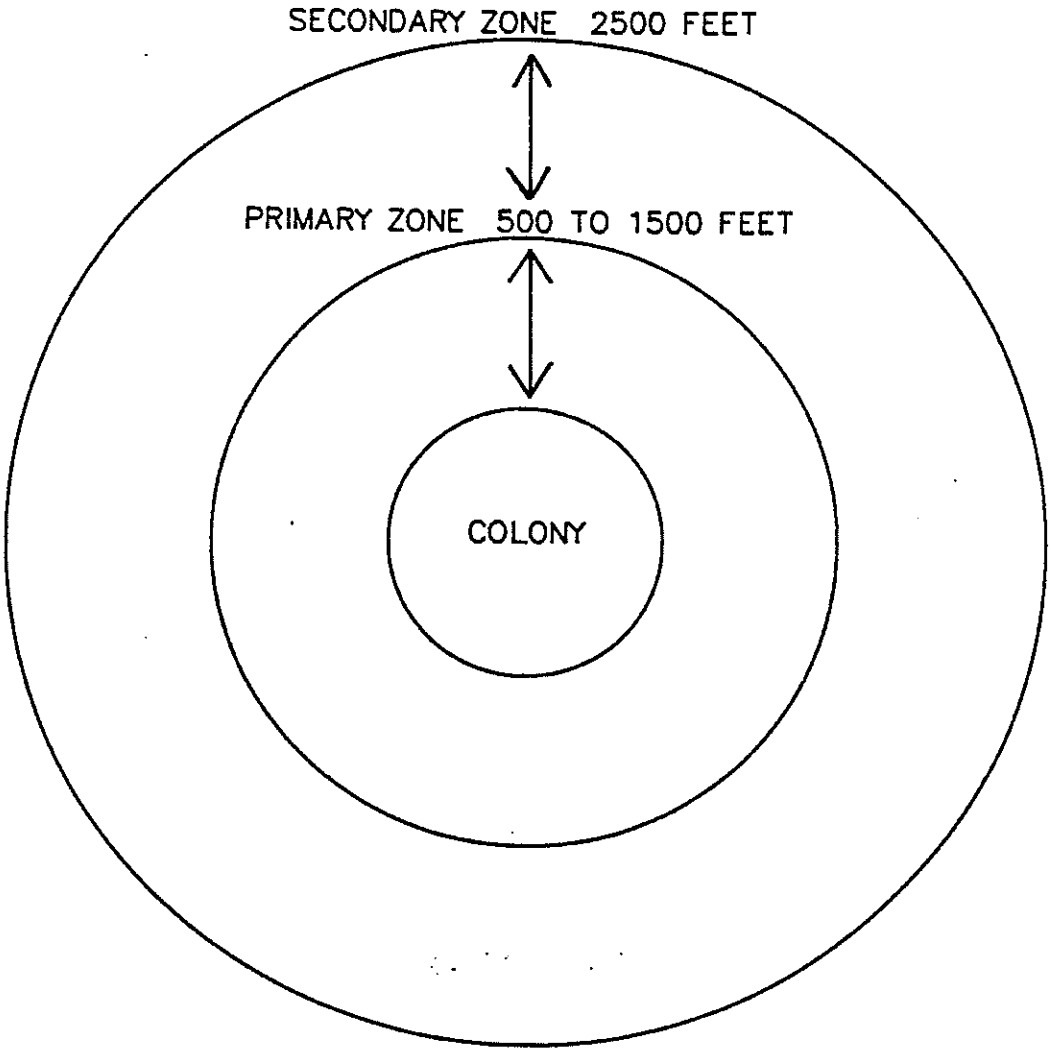
(1) Any lumbering or other removal of vegetation, and

(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


SECONDARY ZONE 2500 FEET
PRIMARY ZONE 500 TO 1500 FEET
COLONY

(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 trans-mission 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...".

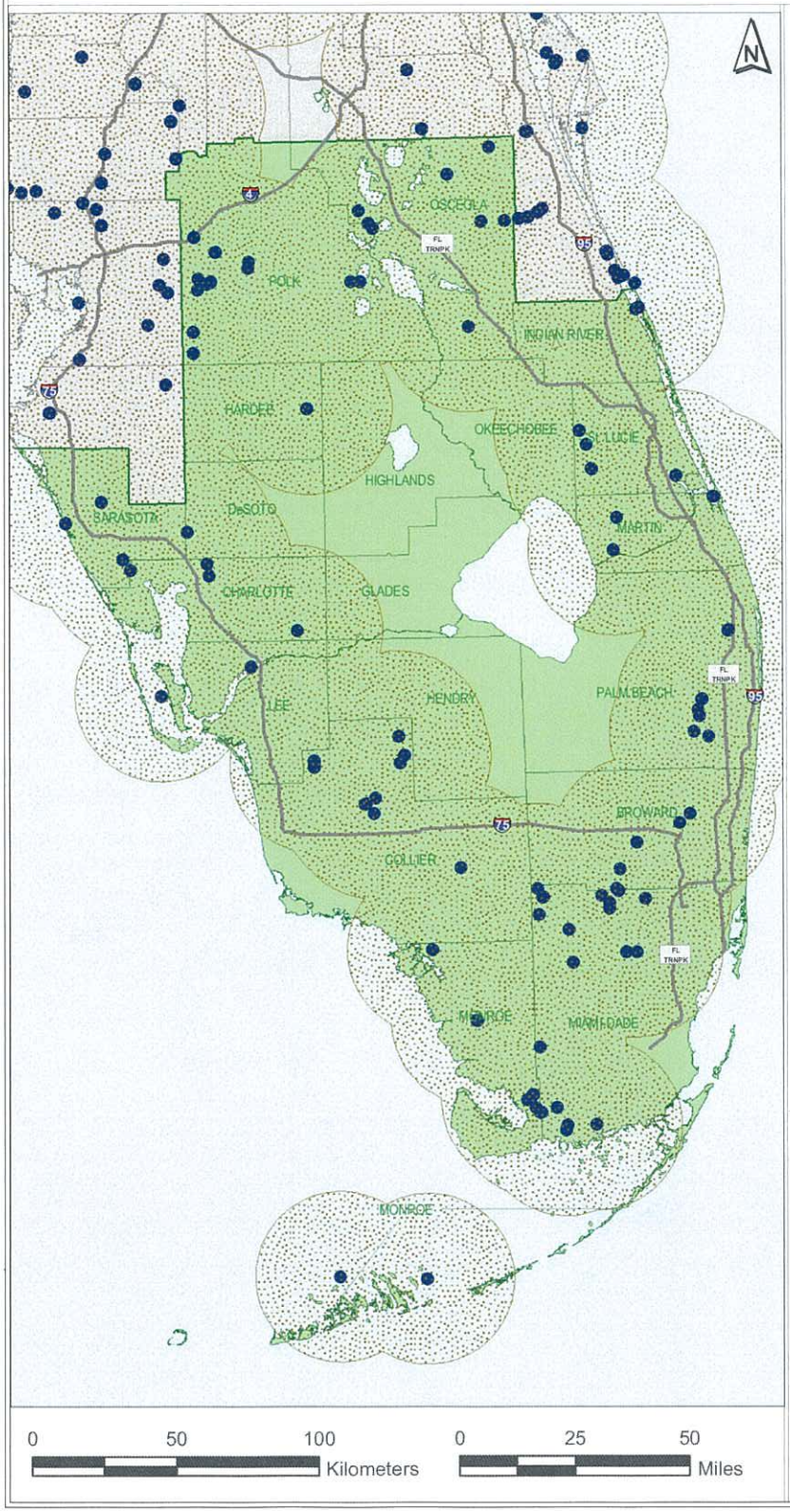
The wood stork is listed as endangered pursuant to the Endangered Wildlife Act of 1973 (Section 27-3-130 of the Code). Section 391-4-13-.06 of the Rules and Regulations of the Georgia Department of Natural Resources prohibits harassment, capture, sale, killing, or other actions which directly cause the 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 ..."

5/21/2010

Wood Stork



Nesting Colonies
Core Foraging Areas

1999 to 2005

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

U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

Produced by:
South Florida Ecological Services Office
http://verobeach.fws.gov
Phone: 772.562.3909

5/21/2010

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/m^2) 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 Dalrmyple'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*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*132 = 1,584). The resultant is 0.6389 or 64 percent 11*92=1012/1584*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 than120 days of the year average ± 4 fish/m^2; whereas, those flooded for more than 340 days of the year average ± 25 fish/m^2 (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 hydropeiod. 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/m^2 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/m^2. In these studies, the data was provided in g/m^2 dry-weight and was converted to g/m^2 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/m^2 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/m^2 and to be composed of 25 fish/m^2. 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/m^2, with an average weight of 0.26 grams per fish, the biomass of a Class 3 hydroperiod would be 2.3 grams/m^2 (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	*Centrarchidae*	14	44
Yellow bullhead	*Italurus natalis*	2	12
Marsh killifish	*Fundulus confluentus*	18	11
Flagfish	*Jordenella floridae*	32	7
Sailfin molly	*Poecilia latipinna*	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).

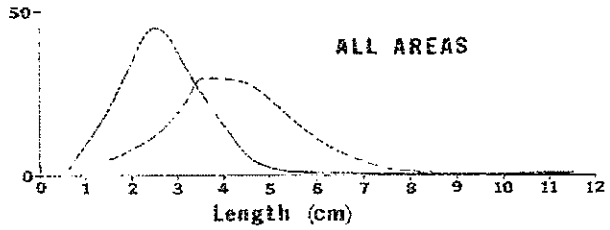


FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

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/m^2 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' icthyofauna 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/m^2 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/m^2, 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/m^2 sample. Using this approach summed over all species in long hydroperiod wetlands, only 3.685 g/m^2 of the 6.5 g/m^2 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/m^2 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/m^2 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/m^2 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/m^2 / 6.5 g/m^2 = 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/m^2, adjusted by 51 percent for appropriate size and species composition, provides an available biomass of 1.196 grams/m^2. 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 hydroperid wetlands. The Service is aware of these questions and is examining alternative ways to assess these concerns. However, until futher 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 (Table 10)*0.37 (Table 3)=2,919.9 grams or 2.92 kg)

In the example provided, the 5 acres of wetlands, converted to square-meters (1 acre= 4,047 m^2) would provide 2.9 kg of biomass (5*4,047*0.39 (Table 10)*0.37 (Table 3)= 2,919.9 grams or 2.9 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(Table 10)*0.37 (Table 3)=1,751.95grams or 1.75 kg)

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

Net increase: 4.74 kg-1.75 kg = 2.98 kg Compensation Site

Project Site Balance 2.98 kg- 2.92 kg = 0.07kg

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 (Table 10)*0.37 (Table 3)=1,751.95grams or 1.75 kg) and following restoration provides 4.74 kg (3*4,047*0.39 (Table 10)*1(Table 3)=4,734.99 grams or 4.74 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/m^2 instead of a class 3 hydroperiod with a 0.39 grams/m^2 [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.

LITERATURE CITED

Browder, J.S. 1984. Wood stork feeding areas in southwest Florida. Florida Field Naturalist 12:81-96.

Carlson, J.E., and M.J. Duever. 1979. Seasonal fish population fluctuation in south Florida swamps. Proceedings of Annual Conference of Southeastern Association of Fish and Wildlife Agencies 31:603-611.

Chick, J. H., C. R. Ruetz III, aud J. C. Trexlcr. 2004. Spatial Scale and abundance patterns of large fish communities in freshwater marshes of the Florida Everglades. Wetlands. 24 (3):652-644. American Journal of Fislieries Management 19: 957-967.

Chick, J. H., S. Coync, aud J. C. Trexlcr. 1999. Effectiveness of airboat electrofishing for sampling fishes in shallow, vegetated habitats. North American Journal of Fishieries Management 19: 957-967.

Coulter, M.C. 1987. Foraging and breeding ecology of wood storks in east-central Georgia. Pages 21-27 in Proceedings of the Third Southeastern Nongame and Endangered Wildlife Symposium (R.R. Odom, K.A. Riddleberger, and J.C. Ozier, eds.). Georgia Department of Natural Resources, Atlanta, Georgia.

Coulter, M.C., and A.L. Bryan, Jr. 1993. Foraging ecology of wood storks (*Mycteria americana*) in east-central Georgia: I. Characteristics of foraging sites. Colonial Waterbirds 16(1):59-70.

Coulter, M.C., J.A. Rodgers, J.C. Ogden, and F.C. Depkin. 1999. Wood stork (*Mycteria americana*). The Birds of North America, Issue No. 409 (A. Poole, ed.). Cornell Lab of Ornithology, Ithaca, New York.

Fleming, D.M., W.F. Wolff, and D.L. DeAngelis. 1994. Importance of landscape heterogeneity to wood storks in Florida Everglades. Environmental Management 18(5):743-757.

Gawlik, D.E. 2002. The effects of prey availability on the numerical response of wading birds. Ecological Monographs 72(3):329-346.

Kushlan, J.A., S.A. Voorhees, W.F. Loftus, and P.C. Frohring. 1986. Length, mass and caloric relationships of Everglades animals. Florida Scientist 49(2):65-79.

Loftus, W.F., and A.M. Eklund. 1994. Long-term dynamics of an Everglades small-fish assemblage. Pages 461-484 in Everglades: the ecosystem and its restoration (S.M. Davis and J.C. Ogden, eds.). St. Lucie Press, Delray, Florida.

O'Hare, N.K., and G.H. Dalrymple. 1997. Wildlife in southern Everglades invaded by melaleuca (*Melaleuca quinquenervia*). Bulletin of the Florida Museum of Natural History 41(1):1-68. University of Florida, Gainesville, Florida.

Ogden, J.C., J.A. Kushlan, and J.T. Tilmant. 1976. Prey selectivity by the wood stork. The Condor 78(3):324-330.

Ogden, J.C., J.A. Kushlan, and J.T. Tilmant. 1978. The food habits and nesting success of wood storks in Everglades National Park in 1974. U.S. Department of the Interior, National Park Service, Natural Resources Report No. 16.

Trexler, J. C., and C. W. Goss. 2009. Aquatic Fauna as Indicators for Everglades Restoration: Applying Dynamic Targets in Assessments. Ecological Indicators. Vol 9: 108-119.

Trexler, J.C., W.F. Loftus, F. Jordan, J.H. Chick, K.L. Kandl, T.C. McElroy, and O.L. Bass. 2002. Ecological scale and its implications for freshwater fishes in the Florida Everglades. Pages 153-182 in The Everglades, Florida Bay, and Coral Reefs of the Florida Keys: An ecosystem sourcebook (J.W. Porter and K.G. Porter, eds.). CRC Press, Boca Raton, Florida.

Turner, A., and J. C. Trexler. 1997. Sampling invertebrates from the Florida Everglades: a comparison of alternative methods. Journal of the North American Benthological Society 16:694-709

Turner, A.W., J.C. Trexler, C.F. Jordan, S.J. Slack, P. Geddes, J.H. Chick, and W.F. Loftus. 1999. Targeting ecosystem features for conservation: standing crops in the Florida Everglades. Conservation Biology 13(4):898-911.

U.S. Fish and Wildlife Service. 2006. August 31, 2006, Lake Belt Mining Region of Miami-Dade County Biological Opinion. South Florida Ecological Services Office; Vero Beach, Florida

U.S. Fish and Wildlife Service. 2009. February 12, 2009, Fort Myers Mine No 2 Biological Opinion. South Florida Ecological Services Office, Vero Beach, Florida. http://www.fws.gov/filedownloads/ftp%5verobeach

THE CORPS OF ENGINEERS, JACKSONVILLE DISTRICT, U. S. FISH AND WILDLIFE SERVICE, JACKSONVILLE ECOLOGICAL SERVICES FIELD OFFICE AND STATE OF FLORIDA EFFECT DETERMINATION KEY FOR THE WOOD STORK IN CENTRAL AND NORTH PENINSULAR FLORIDA
September 2008

Purpose and Background

The purpose of this document is to provide a tool to improve the timing and consistency of review of Federal and State permit applications and Federal civil works projects, for potential effects of these projects on the endangered wood stork (*Mycteria americana*) within the Jacksonville Ecological Services Field Office (JAFL) geographic area of responsibility (GAR see below). The key is designed primarily for Corps Project Managers in the Regulatory and Planning Divisions and the Florida Department of Environmental Protection or its authorized designee, or Water Management Districts. The tool consists of the following dichotomous key and reference material. The key is intended to be used to evaluate permit applications and Corps' civil works projects for impacts potentially affecting wood storks or their wetland habitats. At certain steps in the key, the user is referred to graphics depicting known wood stork nesting colonies and their core foraging areas (CFA), footnotes, and other support documents. The graphics and supporting documents may be downloaded from the Corps' web page at http://www.saj.usace.army.mil/permit or at the JAFL web site at http://www.fws.gov/northflorida/WoodStorks. We intend to utilize the most recent information for both the graphics and supporting information; so should this information be updated, we will modify it accordingly. **Note: This information is provided as an aid to project review and analysis, and is not intended to substitute for a comprehensive biological assessment of potential project impacts. Such assessments are site-specific and usually generated by the project applicant or, in the case of civil works projects, by the Corps or project co-sponsor.**

Explanatory footnotes provided in the key must be closely followed whenever encountered.

Scope of the key

This key should only be used in the review of permit applications for effects determinations on wood storks within the JAFL GAR, and not for other listed species. Counties within the JAFL GAR include Alachua, Baker, Bradford, Brevard, Citrus, Clay, Columbia, Dixie, Duval, Flagler, Gilchrist, Hamilton, Hernando, Hillsborough, Lafayette, Lake, Levy, Madison, Manatee, Marion, Nassau, Orange, Pasco, Pinellas, Putnam, St. Johns, Seminole, Sumter, Suwannee, Taylor, Union, and Volusia.

The final effect determination will be based on project location and description, the potential effects to wood storks, and any measures (for example project components, special permit conditions) that avoid or minimize direct, indirect, and/or cumulative

impacts to wood storks and/or suitable wood stork foraging habitat. Projects that key to a "no effect" determination do not require additional consultation or coordination with the JAFL. Projects that key to "NLAA" also do not need further consultation; however, the JAFL staff will assist the Corps if requested, to answer questions regarding the appropriateness of mitigation options. Projects that key to a "may affect" determination equate to "likely to adversely affect" situations, and those projects should not be processed under the SPGP or any other programmatic general permit. For all "may affect" determinations, Corps Project Managers should request the JAFL to initiate formal consultation on the Wood stork.

Summary of General Wood Stork Nesting and Foraging Habitat Information

The wood stork is primarily associated with freshwater and estuarine habitats that are used for nesting, roosting, and foraging. Wood storks typically nest colonially in medium to tall trees that occur in stands located either in swamps or on islands surrounded by relatively broad expanses of open water (Ogden 1991; Rodgers et al. 1996). Successful breeding sites are those that have limited human disturbance and low exposure to land based predators. Nesting sites 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.

In addition to limited human disturbance and land-based predation, successful nesting depends on the availability of suitable foraging habitat. Such habitat generally results from a combination 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 that tends to 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 opportunities, a variety of wetland habitats exhibiting short and long hydroperiods should be present. In terms of wood stork foraging, the Service (1999) describes a short hydroperiod as one where a wetland fluctuates between wet and dry in 1 to 5-month cycles, and a long hydroperiod where the wet period is greater than five consecutive months. Wood storks during the wet season generally feed in the shallow water of 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).

Because of their specialized feeding behavior, wood storks forage most effectively in shallow-water areas with highly concentrated prey. Typical foraging sites for the wood stork include freshwater marshes, depressions in cypress heads, swamp sloughs, managed impoundments, stock ponds, shallow-seasonally flooded roadside or agricultural ditches, and narrow tidal creeks or shallow tidal pools. Good foraging conditions are characterized by water that is relatively calm, open, and having water depths between 5 and 15 inches (5 and 38 cm). Preferred foraging habitat includes wetlands exhibiting a mosaic of submerged and/or emergent aquatic vegetation, and shallow, open-water areas subject to hydrologic

regimes ranging from dry to wet. The vegetative 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 daily or seasonal low water periods.

WOOD STORK KEY

Although designed primarily for use by Corps Project Managers in the Regulatory and Planning Divisions, and State Regulatory agencies or their designees, project permit applicants and co-sponsors of civil works projects may find this key and its supporting documents useful in identifying potential project impacts to wood storks, and planning how best to avoid, minimize, or compensate for any identified adverse effects.

A. Project within 2,500 feet of an active colony site[1]……*May affect*

Project more than 2,500 feet from a colony site……go to B

B. Project does not affect suitable foraging habitat[2] (SFH)……*no effect*

Project impacts SFH[2]……go to C

C. Project impacts to SFH are less than or equal to 0.5 acre[3]…….....*NLAA*[4]

Project impacts to SFH are greater than or equal to 0.5 acre..……..go to D

D. Project impacts to SFH not within a Core Foraging Area[5] (see attached map) of a colony site, and no wood storks have been documented foraging on site…….....NLAA[4]

Project impacts to SFH are within the CFA of a colony site, or wood storks have been documented foraging on a project site outside the CFA ……..….go to E

E. Project provides SFH compensation within the Service Area of a Service-approved wetland mitigation bank or wood stork conservation bank preferably within the CFA, or consists of SFH compensation within the CFA consisting of enhancement, restoration or creation in a project phased approach that provides an amount of habitat and foraging function equivalent to that of impacted SFH (see *Wood Stork Foraging Habitat Assessment Procedure*[6] for guidance), is not contrary to the Service's *Habitat Management Guidelines For The Wood Stork In The Southeast Region* and in accordance with the CWA section 404(b)(1) guidelines……*NLAA*[4]

Project does not satisfy these elements.……....……...*May affect*

[1] An active nesting site is defined as a site currently supporting breeding pairs of wood storks, or has supported breeding wood storks at least once during the preceding 10-year period.

[2] Suitable foraging habitat (SFH) is described as any area containing patches of relatively open (< 25% aquatic vegetation), calm water, and having a permanent or seasonal water depth between 2 and 15 inches (5 to 38 cm). 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 and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. See above *Summary of General Wood Stork Nesting and Foraging Habitat Information*.

[3] On an individual basis, projects that impact less than 0.5 acre of SFH generally will not have a measurable effect on wood storks, although we request the Corps to require mitigation for these losses when appropriate. Wood Storks are a wide ranging species, and individually, habitat change from impacts to less than 0.5 acre of SFH is 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.

[4] Upon Corps receipt of a general concurrence issued by the JAFL through the Programmatic Concurrence on this key, "NLAA" determinations for projects made pursuant to this key require no further consultation with the JAFL.

[5] The U.S. Fish and Wildlife Service (Service) has identified core foraging area (CFA) around all known wood stork nesting colonies that is important for reproductive success. In Central Florida, CFAs include suitable foraging habitat (SFH) within a 15-mile radius of the nest colony; CFAs in North Florida include SFH within a 13-mile radius of a colony. The referenced map provides locations of known colonies and their CFAs throughout Florida documented as active within the last 10 years. The Service believes loss of suitable foraging wetlands within these CFAs may reduce foraging opportunities for the wood stork.

[6]This draft document, *Wood Stork Foraging Habitat Assessment Procedure*, by Passarella and Associates, Incorporated, may serve as further guidance in ascertaining wetland foraging value to wood storks and compensating for impacts to wood stork foraging habitat.

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 that were determined "may affect, not likely to adversely affect." It is requested that information on date, Corps identification number, project acreage, project wetland acreage, and latitude and longitude in decimal degrees be sent to the Service quarterly.

Literature Cited

Kahl, M.P., Jr. 1964. Food ecology of the wood stork (*Mycteria americana*) in Florida. Ecological Monographs 34:97-117.

Ogden, J.C. 1991. Nesting by wood storks in natural, altered, and artificial wetlands in central and northern Florida. Colonial Waterbirds 14:39-45.

Rodgers, J.A. Jr., A.S. Wenner, and S.T. Schwikert. 1987. Population dynamics of wood storks in northern and central Florida, USA. Colonial Waterbirds 10:151-156.

Rodgers, J.A., Jr., S.T. Schwikert, and A. Shapiro-Wenner. 1996. Nesting habitat of wood storks in north and central Florida, USA. Colonial Waterbirds 19:1-21.

U.S. Fish and Wildlife Service. 1999. South Florida multi-species recovery plan. Fish and Wildlife Service; Atlanta, Georgia. Available from: http://verobeach.fws.gov/Programs/Recovery/vbms5.html.