

NATURAL RESOURCES EVALUATION REPORT

Florida Department of Transportation

District Four

Interstate 95 (I-95) / State Road 9 (SR 9) Project Development and Environment Study

Limits of Project: From South of Hallandale Beach Boulevard (SR 858) to North of Hollywood Boulevard (SR 820)

Broward County, Florida

Financial Management Number: 436903-1-22-02

ETDM Number: 14254

Date: March 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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## 1.0 EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT) District 4 is conducting an Interstate 95 (I-95) Project Development and Environment (PD&E) Study to evaluate interchange improvements at Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard. The project is in Broward County, Florida and is contained within the municipalities of Hallandale Beach, Pembroke Park, and Hollywood. The project is approximately three miles long and extends from south of Hallandale Beach Boulevard to north of Hollywood Boulevard (Mileposts 0.0-3.1).

This Natural Resources Evaluation (NRE) Report is prepared in accordance with the FDOT PD&E Manual Chapters (Wetlands and Other Surface Waters, Protected Species and Habitat, and Essential Fish Habitat), all dated July 1, 2023, and other state and federal laws and requirements. This report is an update to the December 2021 report, documented in the SWEPT file, and is based on the preferred alternative refinements completed in 2023 after further coordination with the local municipalities. U.S. Fish and Wildlife Service (USFWS) concurred with the determinations in 2021 (see **Appendix A**) and the determinations have not changed with this update.

This project resulted in an effect determination of **May Affect, Not Likely to Adversely Affect** for the federally listed eastern indigo snake, wood stork, and Florida bonneted bat (FBB), and **No Effect** on the Everglade snail kite, American crocodile, and Florida manatee.

The project will also have **No Effect Anticipated** on the state-listed gopher tortoise, and **No Adverse Effect Anticipated** on the Florida burrowing owl, little blue heron, and tricolored heron.

One mangrove wetland, four wet stormwater swales with hydrophytic vegetation, and ten stormwater ponds are present within 500 feet of the project corridor. No natural wetland systems will be impacted by the project. Landscaped cypress trees are located in a stormwater swale east of I-95 and south of Johnson Street. Approximately 2.22 acres of direct impacts to South Florida Water Management District (SFWMD) permitted stormwater swales within the existing I-95 right of way (ROW) are anticipated due to construction activities. It should be noted that the C-10 Canal is also referred to as the Hollywood Canal



in the vicinity of Hollywood Boulevard. For this report, this canal will be referenced as the C-10 Canal.

Mangrove habitats that are Essential Fish Habitat (EFH) and Habitat Area of Particular Concern (HAPC) were observed along the C-10 Canal on the north side of the bridge only. Two benthic surveys were conducted and no benthic resources (i.e., submerged aquatic vegetation (SAV)) were identified and no in-water work is proposed. Therefore, no involvement with EFH is anticipated.

## 2.0 PROJECT OVERVIEW

### 2.1 PROJECT DESCRIPTION AND LOCATION

The project limits are I-95 from south of Hallandale Beach Boulevard (SR 858) to north of Hollywood Boulevard (SR 820), a distance of approximately three miles (see **Figure 2.1**). The PD&E Study is proposing improvements to the Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard interchanges. The project is contained within the municipalities of Hallandale Beach, Pembroke Park, and Hollywood.

I-95 is the primary north-south interstate facility that links all major cities along the Atlantic Seaboard and is one of the most important transportation systems in southeast Florida. I-95 is one of the two major expressways that connects major employment centers and residential areas within the South Florida tri-county area. I-95 is part of the State's Strategic Intermodal System (SIS) and the National Highway System. In addition, I-95 is designated as an evacuation route. I-95, within the project limits, currently consists of eight general use lanes (four in each direction) and four dynamically tolled express lanes (two in each direction).

There are three existing full interchanges within the project limits located at Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard. Hallandale Beach Boulevard consists of four lanes west of I-95 and six lanes east of I-95. Pembroke Road and Hollywood Boulevard each have six lanes west of I-95 and four lanes east of I-95.

This PD&E Study is evaluating the potential modification of existing entrance and exit ramps serving the three interchanges within the project limits. Widening and turn lane modifications at the ramp terminals were evaluated to facilitate the ramp modifications and improve the access and operation of the interchanges.

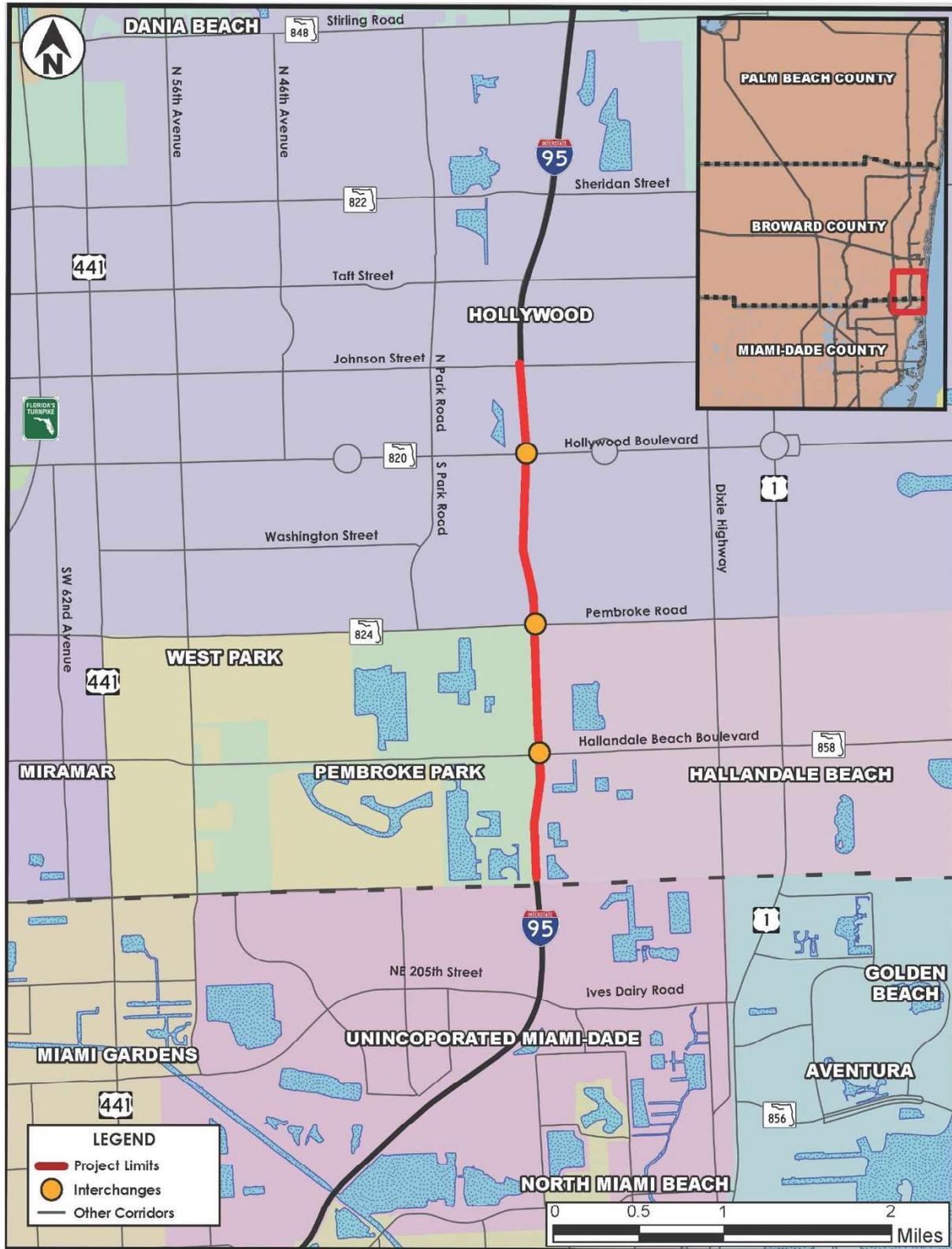


Figure 2.1 – Project Location Map



## 2.2 PURPOSE AND NEED OF THE PROJECT

The purpose and need for this project are to add lanes to the interchange and ramp terminal intersections at Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard. Other considerations for the purpose and need of this project include improving safety, system linkage, modal interrelationships, transportation demand, social demands, economic development, and emergency evacuation.

Adding lanes within the study area will enhance the mobility of people and goods by alleviating current and future congestion at the interchanges and on the surrounding freight and transit networks. Reduced congestion will serve to maintain and improve viable access to the major transportation facilities and businesses in the area.

The I-95 PD&E Study phase from south of Hallandale Beach Boulevard to north of Hollywood Boulevard is included in the Broward Metropolitan Planning Organization (MPO) 2045 Long Range Transportation Plan (LRTP), Transportation Improvement Program (TIP), FDOT Work Program, FDOT State TIP (STIP), and FDOT SIS Five Year Plan.

Additionally, social and economic demands on the I-95 corridor will continue to increase as population and employment increase. The Broward County MPO LRTP predicted that the population would grow from 1.9 million in 2018 to 2.2 million by 2045, an increase of 16 percent. Jobs were predicted to increase from 0.9 to 1.2 million during the same period, an increase of 25 percent.

## 2.3 PREFERRED ALTERNATIVE

A preferred alternative was selected in September 2021. Subsequent coordination with the local municipalities generated several requests to modify the preferred alternative in specific areas to meet their local needs. Therefore, FDOT addressed these requests and evaluated several modifications to the preferred alternative.

In 2023, FDOT completed the evaluation and finalized the refinements to the preferred alternative. The refined preferred alternative is proposing a combination of ramp modifications and collector distributor roads adjacent to the I-95 mainline lanes. Collector distributor roads are extra lanes between the interstate freeway lanes and local frontage/crossing roads. Their primary purpose is to move vehicle lane changing away from the high-speed traffic on the interstate lanes. Lane changes occur on the



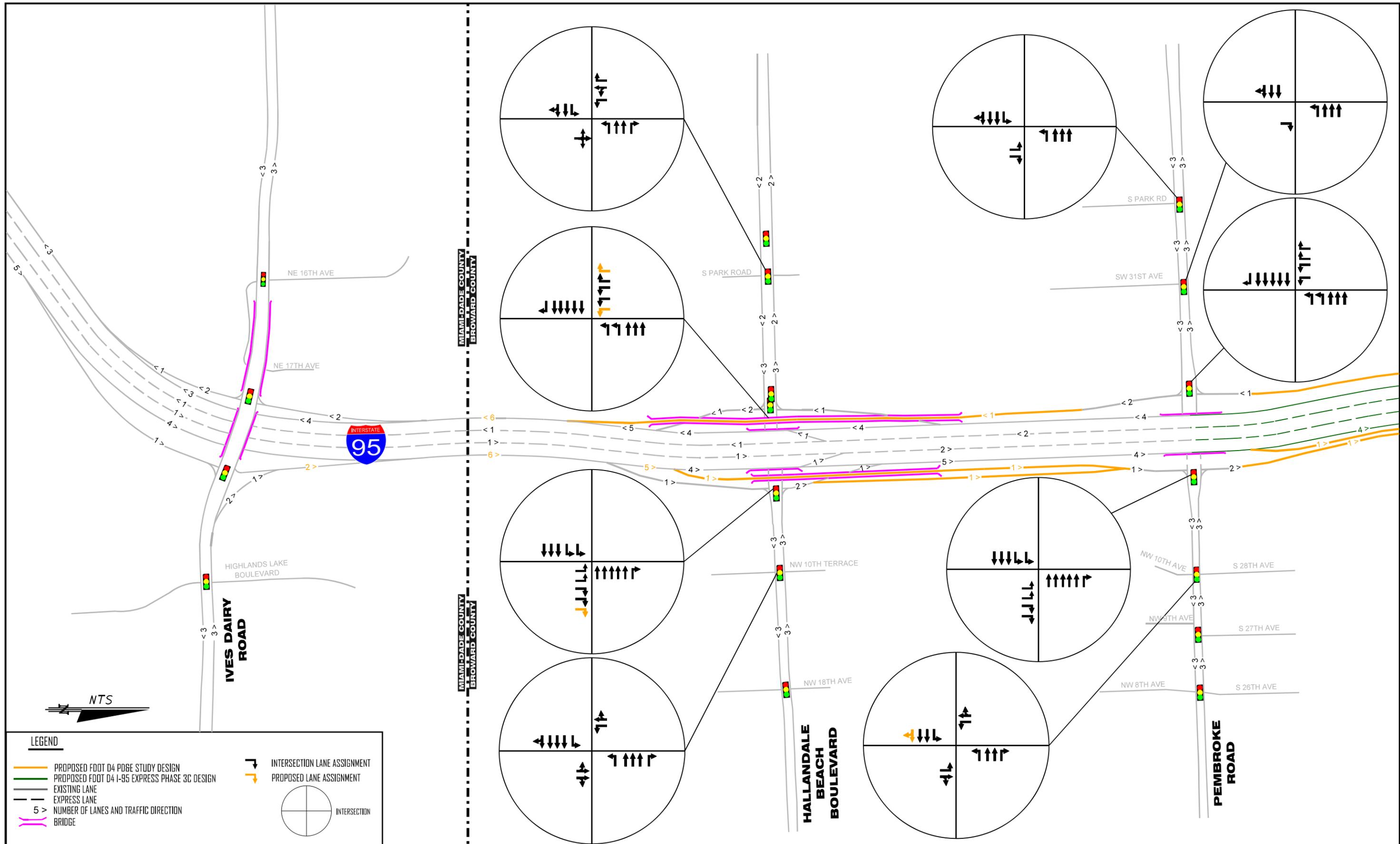
collector distributor roads as vehicles move from the interstate to the frontage roads or other connecting roadways and vice versa.

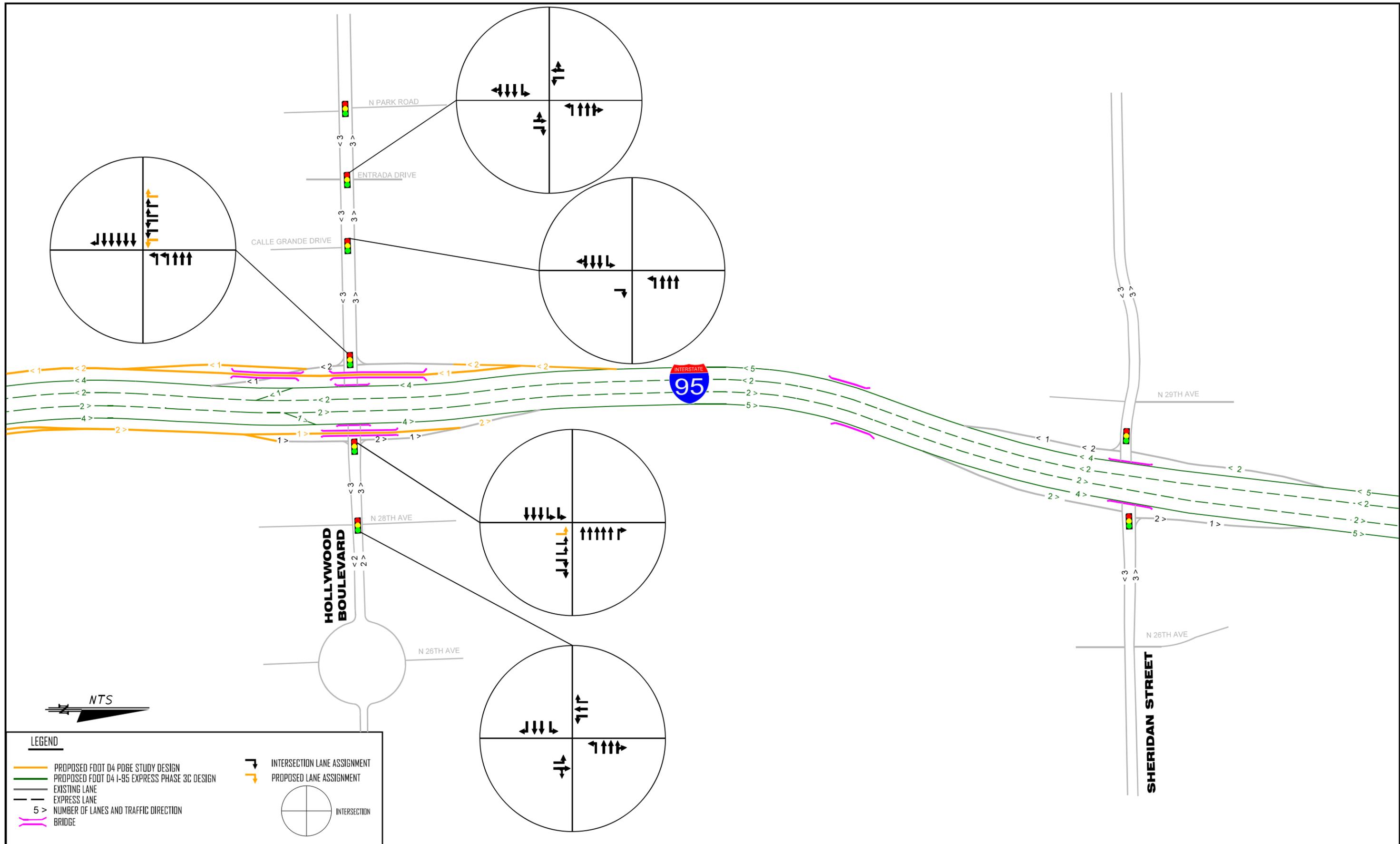
**Figure 2.2** shows a schematic line diagram of the refined preferred alternative.

**Northbound Direction** – In the northbound direction, the preferred alternative is proposing two auxiliary lanes between Ives Dairy Road and Hallandale Beach Boulevard. The outside auxiliary lane becomes the exit ramp to Hallandale Beach Boulevard. The inside auxiliary lane becomes the exit ramp to Pembroke Road, which happens just south of the I-95/Hallandale Beach Boulevard bridge overpass. With this design, the existing exit ramp to Pembroke Road was relocated from south of Pembroke Road to south of Hallandale Beach Boulevard. The exit ramp to Pembroke Road crosses over the entry ramp from Hallandale Beach Boulevard and stays elevated until reaching Pembroke Road. The preferred alternative is proposing a new local ramp connection between Hallandale Beach Boulevard and Pembroke Road. This connection will allow local traffic to travel between the two crossing roadways in the northbound direction without entering the I-95 mainline lanes.

The preferred alternative is also proposing a collector distributor road between Pembroke Road and north of Hollywood Boulevard. The existing exit ramp to Hollywood Boulevard was relocated from south of Hollywood Boulevard to just north of the I-95/Pembroke Road bridge overpass. The entry ramp from Pembroke Road merges with the exit ramp to Hollywood Boulevard becoming a two-lane collector distributor road. The outside lane of the collector distributor road becomes the exit to Hollywood Boulevard and the inside lane becomes the Pembroke Road entry ramp to I-95. The Hollywood Boulevard entry ramp merges with the Pembroke Road entry ramp becoming a two-lane on-ramp to I-95.

**Southbound Direction** – In the southbound direction, the preferred alternative is also proposing a collector distributor road between north of Hollywood Boulevard and Pembroke Road. The collector distributor road begins with a two-lane exit ramp just south of Johnson Street serving Hollywood Boulevard and Pembroke Road. The two lanes continue south until reaching Hollywood Boulevard. Before reaching Hollywood Boulevard, a one-lane left-hand exit ramp opens to continue traveling south to Pembroke Road. The exit ramp to Pembroke Road continues south over Hollywood Boulevard and crosses over the entry ramp from Hollywood Boulevard until reaching Pembroke Road. The preferred alternative is proposing a new local ramp connection between Hollywood Boulevard and Pembroke Road.







This connection will allow local traffic to travel between the two crossing roadways in the southbound direction without entering the I-95 mainline lanes.

The preferred alternative is proposing to relocate the existing southbound entry ramp from Pembroke Road to south of Hallandale Beach Boulevard. This entry ramp from Pembroke Road crosses over the southbound exit ramp to Hallandale Beach Boulevard and stays elevated over Hallandale Beach Boulevard and over the entry ramp from Hallandale Beach Boulevard. The ramp comes down and enters I-95 southbound. This entry ramp from Pembroke Road together with the entry ramp from Hallandale Beach Boulevard becomes two southbound auxiliary lanes between Hallandale Beach Boulevard and Ives Dairy Road.

**Intersection Improvements** – Ramp terminal intersection modifications were identified at Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard to improve the access and operations to and from I-95. **Figure 2.2** depicts these improvements.

**Stormwater Ponds/Swales** – Twenty-three dry retention swales are proposed along I-95 and one wet detention pond is proposed within the Sunset Property. This pond is located on the east side of I-95 just north of Johnson Street and will be developed in association with the City of Hollywood. The Orangebrook Golf Course and Country Club, owned by the City of Hollywood and a Section 4(f) resource, was considered to provide stormwater treatment area. However, the City of Hollywood is currently redeveloping this property and therefore it is not feasible at this time for use as a stormwater treatment location.

### 3.0 EXISTING CONDITIONS

This project is in southern Broward County within the incorporated City of Hallandale Beach, Town of Pembroke Park, and City of Hollywood. The corridor begins at the Broward/Miami-Dade County Line and continues north along I-95 to Johnson Street. At the three interchanges, the approximate street improvement limits are: Hallandale Beach Boulevard from Hammock Lane to west of NW 10th Terrace, Pembroke Road from east of South Park Road to NW 9th Avenue, and Hollywood Boulevard from Jaycee Boulevard to North 29th Avenue.

The study area consists of a completely developed urban environment, with minimal to moderate habitat for listed species within and immediately adjacent



to the ROW. Stormwater swales containing hydrophytic vegetation and standing water are located within or adjacent to the I-95 ROW; all are permitted by SFWMD as dry swales part of the existing surface water management system. One canal (C-10 Canal) is located adjacent to the proposed improvements on Hollywood Boulevard, west of I-95. A fringe mangrove wetland is also found on the north side of Hollywood Boulevard adjacent to the C-10 Canal, and within Stan Goldman Memorial Park.

Ten man-made stormwater ponds are also within 500 feet of the project area. These areas include drainage ponds along the I-95 corridor and within the three project interchanges. These other surface waters (OSW's) are primarily associated with commercial, residential, and golf course developments.

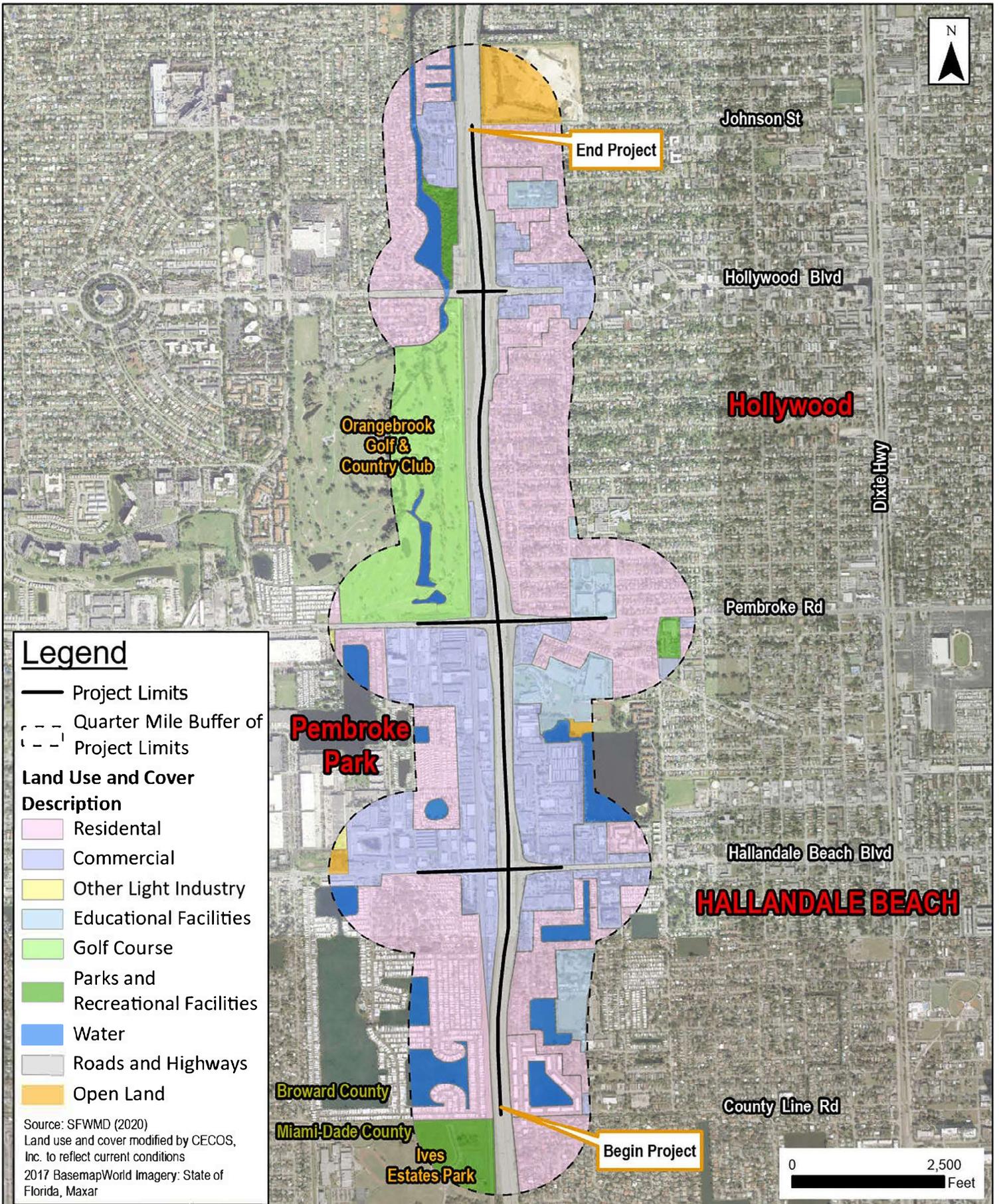
### 3.1 EXISTING AND FUTURE LAND USE

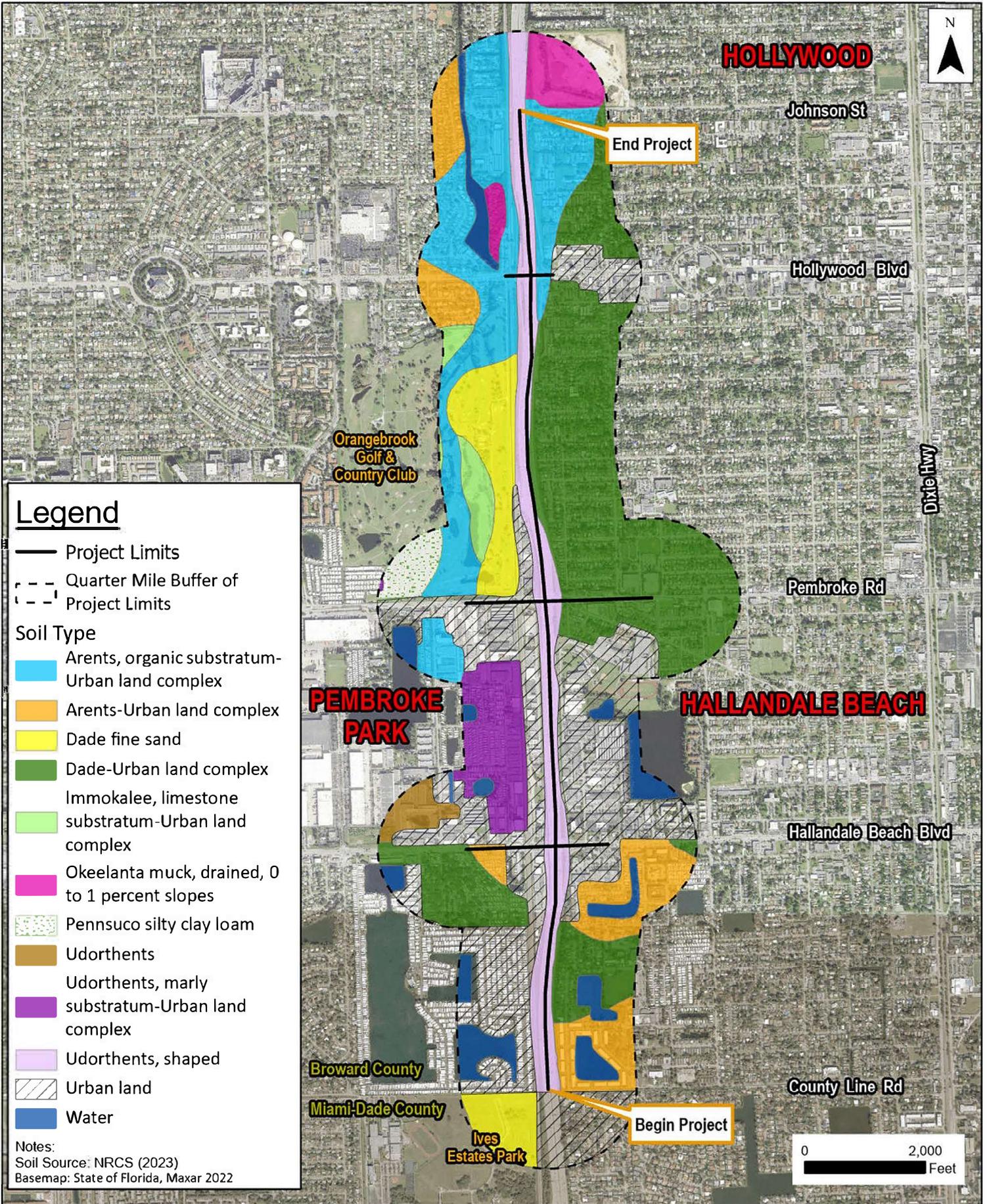
Existing land use within and adjacent to the project corridor was mapped using SFWMD Land Use and Cover nomenclature (see **Figure 3.1**). The primary land uses adjacent to the project corridor are comprised of residential and commercial uses. The Town of Pembroke Park and the Cities of Hallandale Beach and Hollywood, as well as Broward County, adopted comprehensive plans to establish goals, objectives, and policies for future growth pursuant to Chapter 163, Florida Statutes. These plans include Future Land Use Elements as well as Transportation Elements (see **Appendix B**). Future land use includes residential, commercial, educational, and parks and open space.

### 3.2 SOILS

Based on the Natural Resources Conservation Service (NRCS) Soil Survey, mapped soil types within proximity to the proposed improvements are shown in **Figure 3.2** and are classified in **Table 3.1**.

Five of the ten soils listed in **Table 3.1** are classified as hydric. These soils are mainly characterized as poorly to very poorly drained muck or sandy soils. Most of the areas within and adjacent to the project corridor have been disturbed by residential and infrastructure development and may not currently exhibit historic soil conditions.





SR-9/I-95 from South of SR-858/Hallandale Beach Blvd. to North of SR-820/Hollywood Blvd. PD&E Study  
 Broward County

Soils Map

Figure 3.2



**Table 3.1 - Mapped Soils within 500 Feet of the Project Corridor**

Soil Name	Hydric Rating
Arents, organic substratum-Urban land complex	No
Arents-Urban land complex	No
Dade fine sand	Yes
Dade-Urban land complex	Yes
Immokalee, limestone substratum-Urban land complex	Yes
Okeelanta muck, drained, frequently ponded, 0 to 1 percent slopes	Yes
Pennsuco silty clay loam	Yes
Udorthents	No
Udorthents, marly substratum-Urban land complex	No
Udorthents, shaped	No
Urban land complex	No
Water	N/A

### 3.3 OTHER ENVIRONMENTAL FEATURES

Review of the Florida Natural Areas Inventory (FNAI) Conservation Lands Geographical Information System (GIS) Data Catalog revealed there are no conservation areas adjacent to the project corridor.

### 4.0 PROTECTED SPECIES AND HABITAT

The project was evaluated for impacts to wildlife and habitat resources, including protected species, in accordance with 50 Code of Federal Regulations (CFR) Part 402 of the Endangered Species Act (ESA) of 1973, as amended, Florida Department of Agriculture and Consumer Services (FDACS) Regulations 581.185 Florida Statutes and Chapter 5B-40 of the Florida Administrative Code, and the FDOT PD&E Manual. Wildlife and plant species are protected under the ESA, the Migratory Bird Treaty Act (MBTA), and the State of Florida, pursuant to Florida Statute 379.411. USFWS concurred with the determinations in 2021 (see **Appendix A**) and the determinations have not changed with this update.

Remnant wetland habitat and manmade surface waters (canals, ponds) exist within the project corridor, providing potential nesting and foraging habitat for federal and state-listed species. The C-10 Canal, west of I-95, is accessible to the Florida manatee and American crocodile, and brackish mangrove wetlands in



this canal provide suitable foraging habitat for listed wading birds, however, no work is proposed within this canal or wetlands. OSWs adjacent to the project area, including stormwater ponds, may contain some foraging habitat for wading birds. Four wet swales as well as other maintained grassed areas/swales are located within the project's ROW. These areas provide marginal habitat for the eastern indigo snake, burrowing owl, gopher tortoise, and associated commensal species. Habitat for listed plant species nor observations of these species were observed during field reviews.

#### 4.1 ASSESSMENT METHODOLOGY

Road improvements associated with the preferred alternative are primarily contained within the existing ROW of I-95, Hollywood Boulevard, Pembroke Road, and Hallandale Beach Boulevard. Additional ROW is being acquired primarily for drainage purposes including ponds and swales. Throughout the urban, developed corridor, a combination of windshield and pedestrian surveys were used to conduct the field reviews. Existing conditions field reviews were originally conducted on February 24 and 27, 2017. Additional field reviews were conducted to update previously identified resources. These field verification reviews were conducted on September 22, 2020, November 18, 2020, and November 20 and 21, 2023. Photographs from the latest field surveys are included in **Appendix C**. Benthic surveys were conducted in the C-10 Canal on August 23, 2017, and September 16, 2020, during daylight hours. The benthic surveys involved transects within the canal, extending 100 feet from the northern and southern end of the Hollywood Boulevard Bridge. An updated benthic survey was not conducted since no work is proposed in the canal. FBB visual roosting surveys were conducted on the bridges at the intersections and all trees adjacent to the project corridor on July 29, 2021, and surveys were updated November 20 and 21, 2023.

#### 4.2 DATA COLLECTION

A preliminary desktop review was conducted in 2021 and was updated in 2023 prior to performing the updated field assessments. Data collection through literature review, Environmental Technical Advisory Team (ETAT) comments, agency database searches, agency coordination, and GIS analyses were performed to identify federal and state protected species occurring or potentially occurring within the project area that may be impacted by the construction of



the I-95 proposed improvements. Information sources and databases used for the wildlife analyses include the following:

- *ESRI and Google Earth aerial imagery*
- *FDOT's Efficient Transportation Decision Making (ETDM) Screening Summary Report Number 14254 (incorporated by reference)*
- *FDOT's ETDM Environmental Screening Tool (EST)*
- *FNAI Biodiversity Matrix*
- *Florida Fish and Wildlife Conservation Commission (FWC) databases*
- *FWC Bald Eagle Nesting database*
- *FWC Waterbird Colony Locator*
- *FWC's Strategic Habitat Conservation Areas (SHCA)*
- *National Marine Fisheries Service (NMFS) EFH Mapper*
- *USFWS Environmental Conservation Online System (ECOS)*
- *USFWS Information for Planning and Consultation (IPaC)*
- *USFWS Listed Species GIS databases*
- *USFWS Comprehensive Everglades Restoration Plan (CERP) Manatee Accessibility Map*

#### 4.3 LISTED SPECIES EFFECT DETERMINATIONS

As stated above, listed species databases for Broward County and FNAI were reviewed to develop a project-specific protected species list and then compared to field conditions observed during the field reviews to correlate the habitat of each listed species with habitat present on the corridor. Per the USFWS' IPaC database, no Critical Habitats are present in this area. Consultation Areas are present for American crocodile, FBB, and Everglade snail kite.

##### 4.3.1 Federally Listed Species

The potential effect of the preferred alternative on each federally listed species is summarized in **Table 4.1**. Note that species listed as federally endangered or threatened are also listed by the State of Florida as endangered or threatened. A total of seven federally listed species were identified based on the database review (IPaC) and existing habitat to potentially occur in the project area. Each species, their habitat requirements, and potential for occurrence are briefly



discussed in the following sections. Note the potential for occurrence is based on additional research on species habitats and field reviews and are further defined below:

- **No** – The corridor is outside the species’ known range, or the corridor is within the species’ range but no suitable habitat for, or previous documentation of this species occurs, within the corridor, and it was not observed during field reviews.
- **Low** – The corridor is located within the species’ known range and minimal or marginal quality habitat is present within or adjacent to the corridor. However, there are no documented occurrences of the species in the vicinity, and it was not observed during field reviews.
- **Moderate** – The corridor is within the species’ range and suitable habitat exists; but there are no known occurrences of the species, and it was not observed during field reviews.
- **High** – The project is within the species’ known range, suitable habitat exists within the corridor, there is a minimum of one documented occurrence of the species within the corridor and/or the species was observed during field reviews.

**Table 4.1 - Federally Listed Species Determination of Effect**

Scientific Name	Common Name	Listing Status*	Potential of Occurrence	Determination of Effect**
<b>REPTILES</b>				
<i>Drymarchon corais couperi</i>	Eastern Indigo Snake	FT	Low	<b>MANLAA</b>
<i>Crocodylus acutus</i>	American Crocodile	FT	Moderate	<b>NE</b>
<b>BIRDS</b>				
<i>Mycteria americana</i>	Wood Stork	FT	High	<b>MANLAA</b>
<i>Rostrhamus sociabilis plumbeus</i>	Everglade Snail Kite	FE	Low	<b>NE</b>
<b>MAMMALS</b>				
<i>Trichechus manatus</i>	Florida Manatee	FT	High	<b>NE</b>
<i>Eumops floridanus</i>	Florida Bonneted Bat	FE	High	<b>MANLAA</b>

Note: \*FT = Federally designated Threatened; FE = Federally designated Endangered; T/SA = Threatened due to similarity of appearance

\*\* NE = No Effect; MANLAA = May Affect, Not Likely to Adversely Affect



### Eastern Indigo Snake

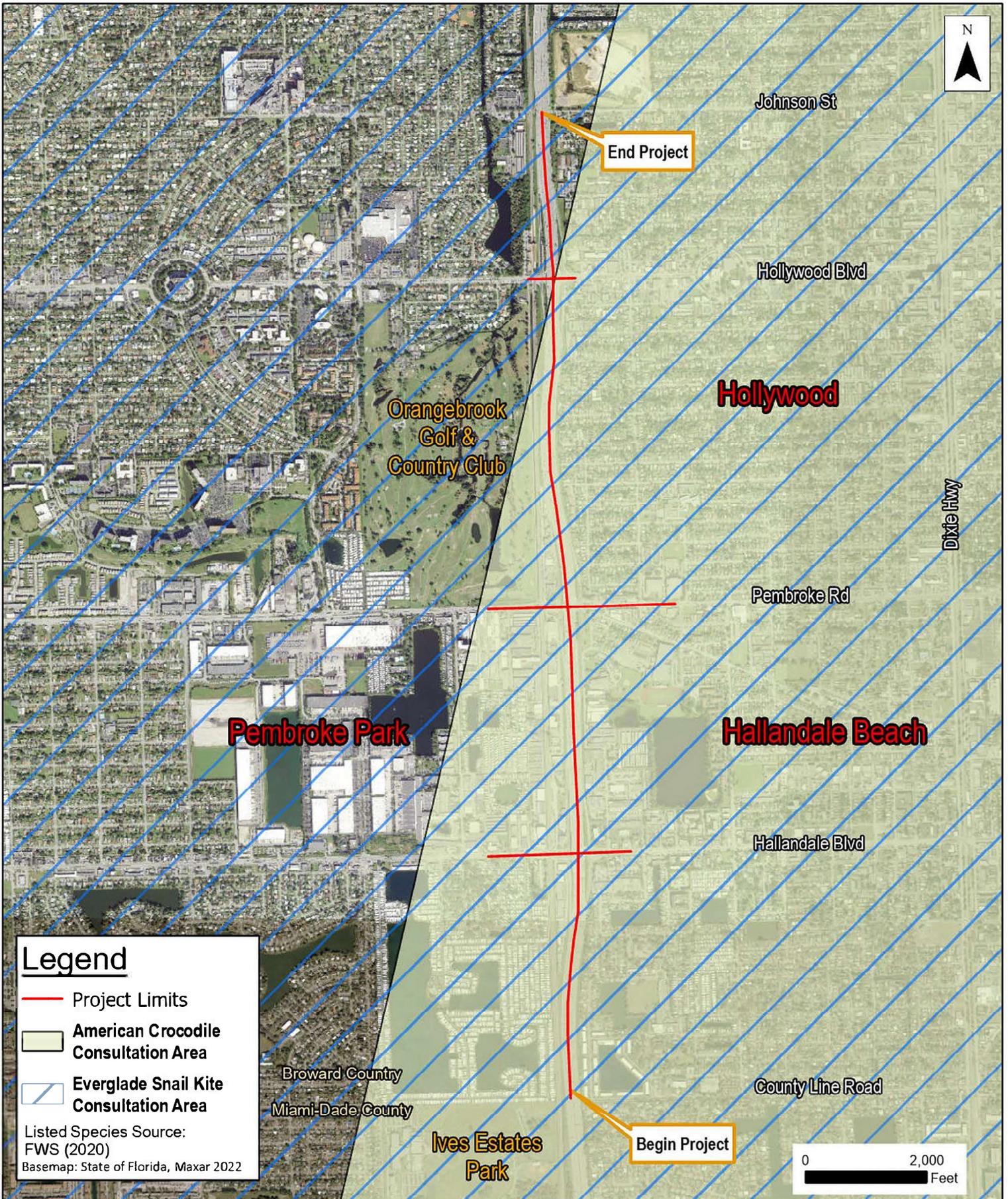
The eastern indigo snake is listed as Threatened by USFWS. Habitat for this snake is broad, ranging from scrub and sandhills to wet prairies and disturbed uplands. Low quality habitat is present in areas of open, undeveloped land along the corridor (e.g., canal banks, vacant lots). These snakes often inhabit gopher tortoise burrows, although no burrows were observed within the corridor. While disturbed, upland habitat is present adjacent to the project ROW, only minimal habitat for the gopher tortoise was present in the study area and no potential eastern indigo snake habitat will be impacted. Individuals of this species were not observed during field reviews. To minimize potential adverse effects to the eastern indigo snake during construction, the FDOT will adhere to the Standard Protection Measures for the Eastern Indigo Snake (USFWS 2021, see **Appendix D**). These measures will be incorporated into the final project construction documents. Additionally, the Programmatic Indigo Snake Key (USFWS, July 2017) was also reviewed (see **Appendix E**). Based on this key, site conditions, and incorporation of standard protection measures, the FDOT determined the project **May Affect, Not Likely to Adversely Affect** the eastern indigo snake.

### American Crocodile

The American crocodile is listed as Threatened by USFWS and the project corridor is within the USFWS Consultation Area for the American crocodile (see **Figure 4.1**). During the non-nesting season, the American crocodile is found primarily in fresh and brackish water inland swamps, creeks, and bays. Nesting habitat includes sites with well drained sandy shorelines or marl creek banks adjacent to deep water. Crocodiles also nest on elevated man-made structures such as canal berms. This species may forage within the C-10 Canal, however, the canal banks are not suitable for nesting due to heavy vegetation, riprap, and seawalls. A crocodile warning sign was observed on the north side of Hollywood Boulevard adjacent to Stan Goldman Memorial Park. Individuals or nests of this species were not observed during field reviews, however unconfirmed sightings have been reported by residents. Based on the project location, no suitable nesting habitat, field review results, and no in-water work proposed in the C-10 Canal, the FDOT determined the project will have **No Effect** to the American crocodile.

### Everglade Snail Kite

The Everglade snail kite is listed as Endangered by USFWS. They are medium-sized hawks with deep red eyes and a white rump patch. The project corridor is within the USFWS consultation area for this species (see **Figure 4.1**).



SR9/I-95 from South of SR858/Hallandale Beach Blvd.  
to North of SR820/Hollywood Blvd. PD&E Study  
Broward County

Other Listed Species  
Consultation Areas Map

Figure 4.1

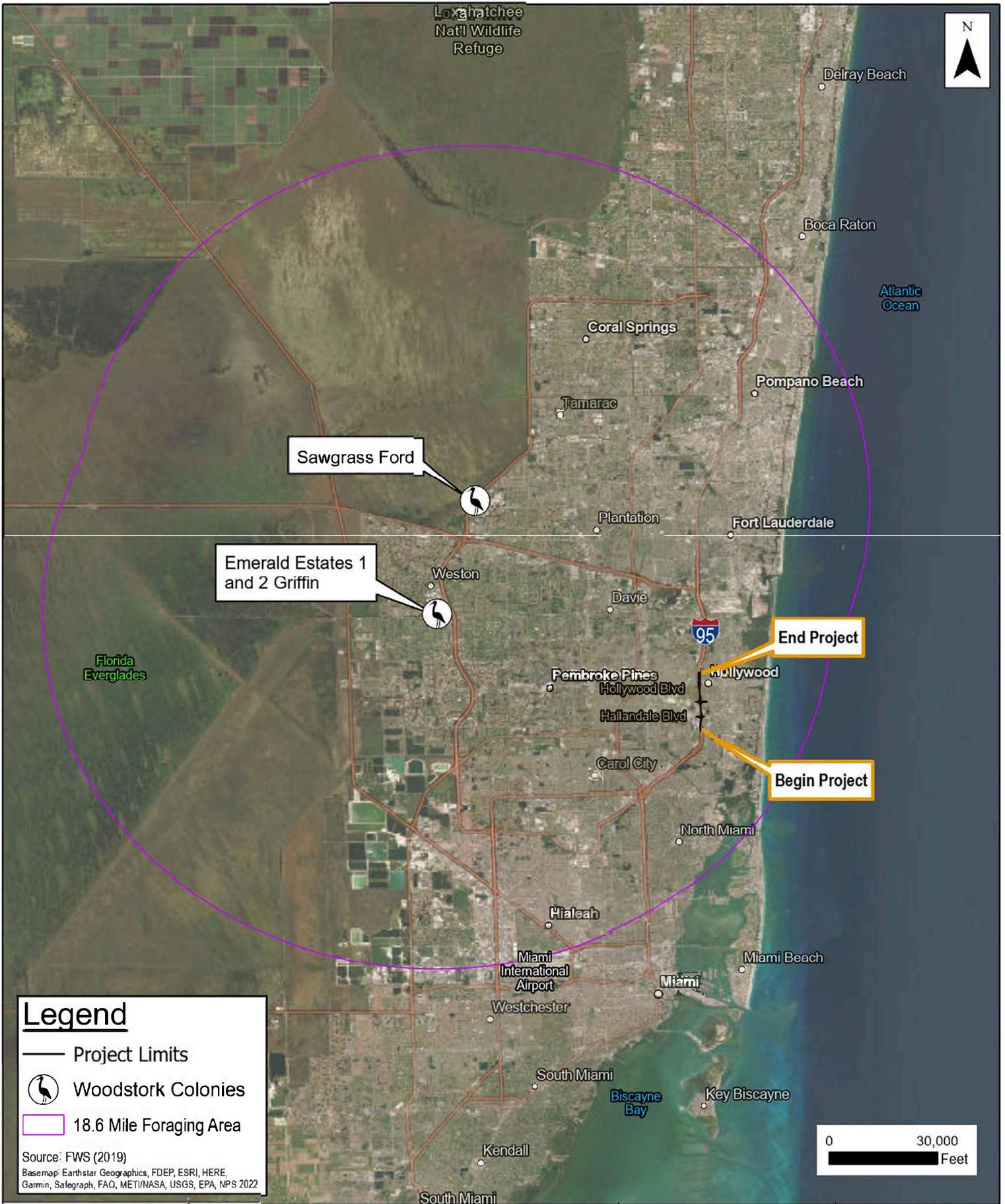


They regularly occur in lake shallows along the shores and islands of many major lakes, such as Lake Okeechobee, as well as expansive marshes of southern Florida such as Everglades National Park and the Water Conservation Areas over 16 miles west of the project. Kites nest primarily from January through July, though they can nest nearly year-round. This species relies almost entirely on apple snails for food. Foraging habitat consists of relatively shallow emergent wetland vegetation, either within extensive marsh systems, or in lake littoral zones. Kites nest in a variety of vegetation types, including both woody vegetation such as willows (*Salix sp.*), cypress (*Taxodium sp.*), pond apple (*Anona glabra*), as well as invasive, exotic species such as melaleuca (*Melaleuca quinquenervia*).

This species almost always nests in areas with good foraging habitat nearby. There is no suitable nesting or foraging habitat in the project area. Individuals or nests of this species or apple snails (the kite's primary food source) were not observed during field reviews. Due to no suitable habitat being in the project area, the FDOT has determined the project will have **No Effect** on the Everglade snail kite.

### Wood Stork

The wood stork is listed as Threatened by USFWS. The wood stork is a large wading bird that nests in colonies in inundated wetland forests, and forages in water depths ranging from two to 15 inches. The project corridor falls within the Core Foraging Area (CFA-18.6 miles) of two nesting wood stork colonies: Sawgrass Ford and Emerald Estates 1 and 2 Griffin (see **Figure 4.2**). Wetlands, wet swales, and portions of some stormwater ponds and canals contain suitable foraging habitat (SFH) for this species. Individuals of this species were not observed during field reviews. The project is anticipated to impact 2.22 acres of drainage swales; however, an approximate 3-acre stormwater pond with littoral shelf is proposed in the old Sunset Golf Course (currently vacant land and proposed location for a stormwater pond, hereby mentioned as Sunset Property) and will compensate for loss of wet swales (potential foraging habitat) along I-95. Based on the Wood Stork Effect Determination Key (USFWS, May 18, 2010; see **Appendix F**), minor impacts to SFH associated with the preferred alternative, and new swales and a pond proposed as part of the proposed drainage system, the FDOT determined the project **May Affect, Not Likely to Adversely Affect** the wood stork.



**Legend**

- Project Limits
- Woodstork Colonies
- 18.6 Mile Foraging Area

Source: FWS (2019)  
 Basemap: Earthstar Geographics, FDEP, ESRI, HERE, Garmin, Safegraph, FAO, METI/NASA, USGS, EPA, NPS 2022





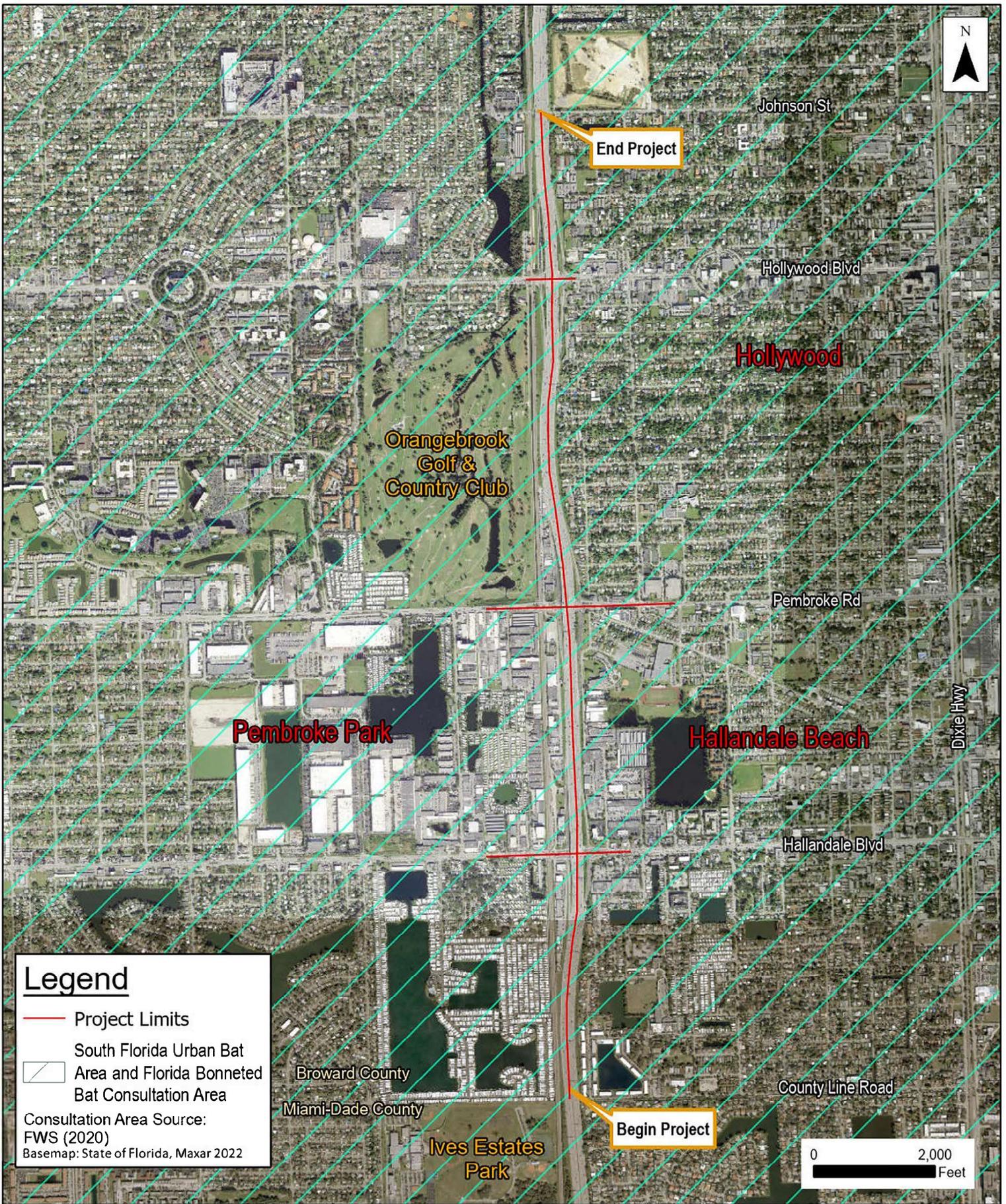
### West Indian (Florida) Manatee

The Florida manatee is listed as Threatened by USFWS. The manatee is a large, aquatic mammal that inhabits marine, brackish, and freshwater systems in coastal and riverine areas and forages on seagrasses and other aquatic vegetation. According to the USFWS Manatee Fort Lauderdale Field Station Accessibility Map, the C-10 Canal is accessible to manatees. A control structure, however, is present in the canal approximately 167 feet south of Hollywood Boulevard, prohibiting further manatee access south into the Orangebrook Golf Course and Country Club. Individuals of this species were not observed during field reviews and no in-water work is proposed at the C-10 Canal. Based on the information above and the Manatee Effect Determination Key (USFWS, April 2013; see **Appendix G**), the FDOT determined the project will have **No Effect** to the Florida manatee.

### Florida Bonneted Bat

The FBB is listed as Endangered by USFWS. The FBB is the largest bat species in Florida. This species is non-migratory and inhabits a variety of natural habitats including tropical hardwoods, pineland, and mangrove habitats, as well as man-made areas such as golf courses, bridges, buildings, neighborhoods, and road landscaped areas. The project corridor is within the USFWS FBB Consultation Area as well as the South Florida Urban Bat Area (see **Figure 4.3**). According to Global Positioning System (GPS) and radio-telemetry data collected on FBB, they may travel large distances while foraging, travelling an average distance of one to 9.5 miles from the roost though most observed are within 1 mile of their roost. The FBB prefers open spaces for foraging and trees for nesting, although artificial structures can also be used. Within the project corridor there is limited habitat except for the Orangebrook Golf Course and Country Club, Sunset Property, landscaped trees, and canals. No work is proposed in Orangebrook Golf Course and Country Club. Individuals were not observed during field reviews but potential roosting habitat (i.e., landscape trees and bridges) are present.

Potential roosting habitat in the form of trees/palms in the survey area were visually observed on July 29, 2021, and potential roosting structures were observed and located with a GPS (see **Appendix H** for report). An additional visual survey was conducted on November 20 and 21, 2023 to evaluate roosting habitat suitability (i.e., displaying suitable size with broken branches or snags, cavities, hollows, loose bark, or crevices with a diameter opening of one inch or greater). If a cavity was observed, it was viewed with binoculars and evaluated for indicators of bat roosting.



**Legend**

- Project Limits
- South Florida Urban Bat Area and Florida Bonneted Bat Consultation Area

Consultation Area Source:  
FWS (2020)  
Basemap: State of Florida, Maxar 2022

SR9/I-95 from South of SR858/Hallandale Beach Blvd.  
to North of SR820/Hollywood Blvd. PD&E Study  
Broward County

South Florida Urban Bat  
Area and Florida Bonneted  
Bat Consultation Area Map

Figure 4.3





Tree species, Diameter at Breast Height (DBH), height, cavity presence, and guano presence were recorded. No evidence of FBBs was observed, however, several trees meet the FBB roosting habitat criteria. All three bridges in the project corridor were reviewed for bats and no evidence of bats was observed. FDOT commits to perform additional surveys during design and to continue coordination with USFWS regarding survey methods and additional Best Management Practices (BMPs).

### 4.3.2 State Listed Species

The potential effect on each state-only listed species is summarized in **Table 4.2**. A total of four state-only listed species were identified to potentially occur in the project area. Each species and their habitat requirements are discussed in the following sections.

**Table 4.2 - State Listed Species Determination of Effect**

Scientific Name	Common Name	Listing Status*	Potential of Occurrence	Determination of Effect
<b>REPTILES</b>				
<i>Gopherus polyphemus</i>	Gopher Tortoise	ST	Low	No Effect Anticipated
<b>BIRDS</b>				
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	ST	High	No Adverse Effect Anticipated
<i>Egretta caerulea</i>	Little Blue Heron	ST	High	No Adverse Effect Anticipated
<i>Egretta tricolor</i>	Tricolored Heron	ST	High	No Adverse Effect Anticipated

**Note:** \*ST = State Threatened

### Gopher Tortoise

Gopher tortoises are listed as Threatened by FWC. They live in well-drained sandy soils, typically with a sparse tree canopy and abundant herbaceous vegetation, such as pine flatwoods, scrub, dry prairies, coastal dunes, and disturbed uplands. There is no suitable habitat within the project area and no burrows or individuals of this species were observed during field reviews. Based on the above information, a **No Effect Anticipated** determination was given to the gopher tortoise.



### Florida Burrowing Owl

The Florida burrowing owl is listed as Threatened by FWC. This owl prefers sparsely vegetated, high, sandy ground to create nesting burrows in the ground. Habitats may include ruderal areas such as pastures, airports, golf courses, parks, school grounds, road ROW, and vacant parcels in residential areas. Suitable habitat is present in the Orangebrook Golf Course and Country Club and Sunset property adjacent to the project as well as within the ROW. Burrowing owls have been observed in the past at the Orangebrook Golf Course and Country Club, however no work is proposed at Orangebrook Golf Course and Country Club. Additionally, the Sunset Property does not provide quality habitat for the owl due to its current overgrown condition and site grading activities. Individuals or burrows of this species were not observed during field reviews, and therefore, FDOT determined the project will have **No Adverse Effect Anticipated** on the Florida burrowing owl.

### Little Blue Heron

The little blue heron is listed as Threatened by FWC. This heron is a medium-sized wading bird that nests in woody vegetation and forages in shallow freshwater, saltwater, or brackish habitats. Moderate foraging habitat is present within the project corridor's wetland, stormwater swales, and littoral areas of stormwater ponds, as well as the C-10 Canal. No individuals or nests of this species were observed during the field reviews and foraging, if present, is anticipated to be transient. Therefore, FDOT determined the project will have **No Adverse Effect Anticipated** to the little blue heron.

### Tricolored Heron

The tricolored heron is listed as Threatened by FWC. This heron is also a medium-sized wading bird that typically nests on densely vegetated sites over water, such as mangrove islands or freshwater thickets, and forages in a variety of wetlands, including tidal marshes, creeks, ditches, swamps, and edges of lakes and ponds. Moderate nesting and foraging habitat are present within the study area's wetland, stormwater swales, and littoral areas of stormwater ponds as well as the C-10 Canal. No individuals or nests of this species were observed during the field reviews and foraging, if present, is anticipated to be transient. Therefore, FDOT determined the project will have **No Adverse Effect Anticipated** to the tricolor heron.



#### 4.4 OTHER PROTECTED SPECIES

Incidental species observed throughout the project corridor during field reviews are listed in **Table 4.3** along with the locations observed. These species are protected by the MBTA. The MBTA prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by USFWS.

**Table 4.3 – Other Protected Species Observed**

Scientific Name	Common Name	Location	Listing Status
<b>BIRDS</b>			
<i>Eudocimus albus</i>	White Ibis	WL-1, OSW-6, Orangebrook Golf Course	MBTA
<i>Gallinula chloropus</i>	Common moorhen	WL-1, OSW-6	MBTA
<i>Anhinga anhinga</i>	Anhinga	OSW 7	MBTA
<i>Ardea alba</i>	Great white heron	Swale 2	MBTA

**Note:** MBTA = Migratory Bird Treaty Act

All species mentioned in **Table 4.3** could be potentially found foraging within drainage features such swales or canals/ponds adjacent to the corridor or within the Orangebrook Golf Course. Four swales will be impacted by the proposed improvements and will be replaced. Impacts to ponds or canals are not anticipated. Therefore, this project is not anticipated to adversely affect these species.

#### 4.5 AVOIDANCE AND MINIMIZATION

Avoidance, minimization, and conservation measures are intended to minimize or avoid environmental impacts to listed species or critical habitat. The project is located within urban Broward County, so minimal appropriate habitats are available for protected species within or adjacent to the ROW. Naturally occurring uplands and wetlands are located outside the ROW and will not be impacted, however, due to ROW impacts, impacts to swales cannot be completely avoided. Permitted stormwater swales and surface waters (i.e., stormwater ponds) within the ROW provide marginal habitat for wading birds, including the wood stork, and impacts to these areas will be minimized to the



greatest extent practical throughout the project's design. While protected avian species were observed foraging in stormwater ponds during this study's field reviews, nesting within these areas or any area within the ROW is not anticipated. During the design phase, the proposed project will avoid and minimize impacts to listed species, including impacts to trees meeting the FBB criteria to the maximum extent practical while still accomplishing the objectives of the project.

## 5.0 WETLANDS AND OTHER SURFACE WATERS

In accordance with the FDOT PD&E Manual, *Executive Order 11990, Protection of Wetlands* as well as applicable federal and state regulatory requirements (*Section 404 of the Clean Water Act* and *Chapter 373, Florida Statute*, respectively), a wetland and OSW evaluation was conducted for the project. The objectives of this evaluation were to identify existing wetlands and OSW's, evaluate potential impacts to them, and to assess the function and value of wetlands potentially impacted by the project.

### 5.1 ASSESSMENT METHODOLOGY

Additional ROW is being acquired primarily for drainage purposes/ponds. Pedestrian transect surveys and windshield reviews were used to conduct the field reviews and confirm identified wetland and/or OSW areas. Existing conditions field reviews were conducted on February 24 and 27, 2017, and then verification surveys were conducted to confirm previously identified wetlands, swales, or OSW's conditions within a 500-foot buffer of the project on September 22, 2020, and November 20 and 21, 2023.

### 5.2 DATA COLLECTION

A desktop review was performed prior to performing the field assessments to establish baseline wetland and OSW information. The following resources were reviewed for the presence of wetlands and OSW's:

- *Environmental Systems Research Institute (ESRI) and Google Earth aerial imagery*
- *FDOT's ETDM Screening Summary Report Number 14254 (Incorporated by Reference)*

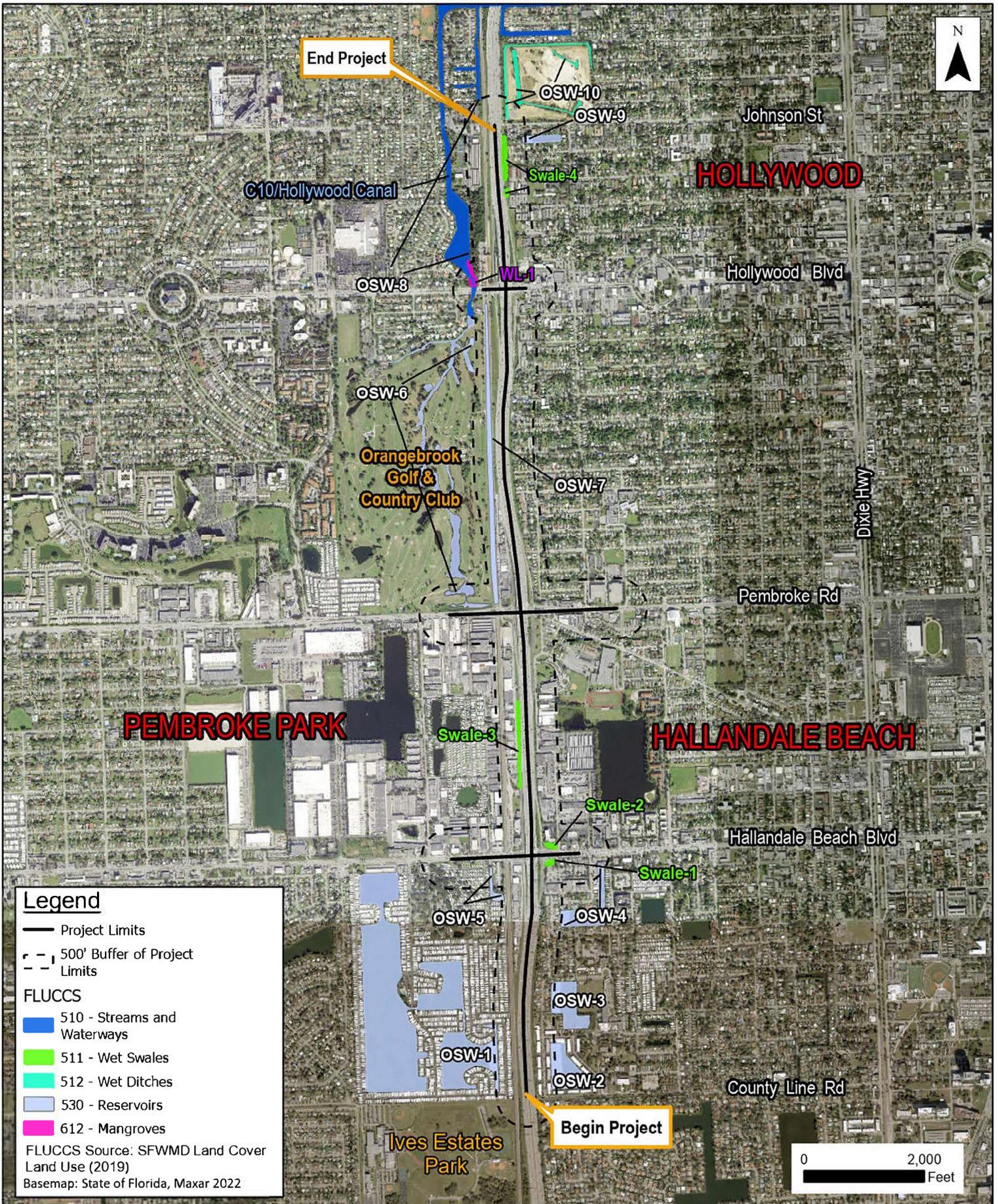


- FDOT's ETDM EST
- FNAI Cooperative Land Cover Map
- NRCS Soil Survey for Broward County
- NRCS Web Soil Survey
- USFWS National Wetlands Inventory (NWI) Maps

Wetland and surface water boundaries were determined through field surveys and reviews of aerial photography, hydrologic connectivity, and historical boundaries of existing wetland systems. Wetlands were delineated in overall conformance with the criteria specified in the *US Army Corps of Engineers (USACE) Wetland Delineation Manual, 1987: Regional Supplement to Atlantic and Gulf Coast Plain Region (Version 2.0) (USACE, 2010)*, and the *Florida Department of Environmental Protection (FDEP) Florida Wetlands Delineation Manual (FDEP, 1995)* which is based on *Chapter 62-340, F.A.C.* Each area was classified using the *Florida Land Use, Cover and Forms Classification System (FLUCCS, FDOT, 1999)*. *Arc GIS, Version 10.3.1*, was then used to create the wetland and surface water shapefiles from field, delineation, and aerial imagery data. All wetlands and surface waters are FDEP Assumed Waters. Representative ground level photographs are included in **Appendix C**.

### 5.3 EXISTING WETLANDS AND OTHER SURFACE WATERS

**Figure 5.1** illustrates the location of wetlands and OSWs, and **Table 5.1** summarizes those areas found within 500 feet of the project corridor. The size, hydrologic contiguity, and vegetative structural diversity are described in this table. One mangrove wetland (WL-1) adjacent to the C-10 Canal is present with hydric soils, and hydrology. This wetland is considered jurisdictional to SFWMD and FDEP and the hydrology of this area is hydrologically connected to the C-10 Canal. In addition, four man-made stormwater swales are present along I-95. These swales contain standing water and hydrophytic vegetation. Hydric soils are not present, and their hydrology appeared dependent on rainfall, stormwater runoff, and groundwater. These swales are part of an existing SFWMD permitted stormwater drainage system. Other man-made surface waters were observed within the project area, including stormwater ponds associated with developments. Most of these stormwater ponds do not contain littoral vegetation although some contained spike rush (*Eleocharis spp.*), water hyssop (*Bacopa spp.*), and bald cypress (*Taxodium distichum*) at the time of the field reviews.



**Legend**

- Project Limits
- - - 500' Buffer of Project Limits

**FLUCCS**

- 510 - Streams and Waterways
- 511 - Wet Swales
- 512 - Wet Ditches
- 530 - Reservoirs
- 612 - Mangroves

FLUCCS Source: SFWMD Land Cover Land Use (2019)  
 Basemap: State of Florida, Maxar 2022

SR91/95 from South of SR858/Hallandale Beach Blvd. to North of SR820/Hollywood Blvd. PD&E Study  
 Broward County

Wetland and Other Surface Water Location Map

Figure 5.1





Table 5.1 – Wetlands, Wet Swales and Surface Waters within 500 Feet of the Corridor

ID	FLUCCS Code	NWI Code	Approx. Area Within 500' Buffer (AC)	Dominant Wetland Vegetation	Hydric Soils (Historic)	Hydrologic Connection to Waters of the US
<b>Wetlands</b>						
WL-1	612	E1UBLx	0.39	White mangrove ( <i>Laguncularia racemosa</i> ) fringe, co-mingled with bald cypress ( <i>Taxodium distichum</i> ), leather fern ( <i>Acrostichum danaeifolium</i> ), Everglades palm ( <i>Acoelorrhaphe wrightii</i> ), and pond apple ( <i>Annona glabra</i> )	Yes (Ok)	Yes
<b>Other Surface Waters</b>						
Swale-1	511	N/A	0.15	Water hyssop ( <i>Bacopa monieri</i> ), bald cypress	No (Ur)	No
Swale-2	511	N/A	0.17	Water hyssop, bald cypress, Pennywort ( <i>Hydrocotyle spp.</i> ), and primrose willow ( <i>Ludwigia spp.</i> )	No (Ur)	No
Swale-3	511	N/A	0.48	Duck potato ( <i>Sagittaria latifolia</i> ), spike rush, and primrose willow	No (Ur)	No
Swale-4	511	N/A	0.80	Bald cypress appears as part of existing landscaping within FDOT ROW between I-95 and adjacent residences	No (Us)	No
OSW-1	530	N/A	1.11	Not present	N/A (W)	No
OSW-2	530	N/A	1.14	Not present	N/A (W)	No
OSW-3	530	N/A	0.48	Not present	N/A (W)	No
OSW-4	530	N/A	0.43	Not present	N/A (W)	No
OSW-5	530	N/A	0.38	Bald cypress and marsh fern ( <i>Thelypteris palustris</i> )	No (Ur)	No
OSW-6	530	N/A	2.17	Torpedo grass ( <i>Panicum repens</i> ), water hyssop, spike rush, and primrose willow	Yes (DF), No (ArO), Yes (I)	Yes
OSW-7	530	N/A	7.65	Not present	Yes (DF), No (ArO)	Yes
OSW-8	510	E1UBLx/ R5UBHx	1.49	Cocoplum ( <i>Chrysobalanus icaco</i> ) and pond apple on bank, no SAV	No (ArO), N/A (W)	Yes
OSW-9	530	N/A	0.11	Not present	No (ArO)	Yes
OSW-10	512	N/A	4.65	Australian pine ( <i>Casuarina equisetifolia</i> ), Brazilian pepper ( <i>Schinus terebinthifolia</i> ), cattails ( <i>Typha spp.</i> )	Yes (Ok)	No



**FLUCCS:** 510 = Streams and Waterways; 511 = Wet swales; 512 = Wet ditches; 530 = Reservoirs; 612 = Mangroves

**NWI:** E1UBLx = Estuarine, subtidal, unconsolidated bottom, subtidal, excavated; R5UBHx = Riverine, unknown perennial, unconsolidated bottom, permanently flooded, excavated

**Soils:** Ok = Okeelanta muck, W = Water; Us = Udorthents, shaped; Ur = Urban Land 0-2% slopes; DF = Dade Fine Sand; ArO = Arents, organic substratum- urban land complex; I = Immokalee, limestone substratum-urban land complex

A brief description of each of the wetland and OSW sites is provided below.

### 5.3.1 Wetlands

**WL-1 (FLUCCS 612)** – Within the project study area, WL-1 is comprised of approximately 0.39-acre mangrove fringe bordering the brackish C-10 Canal, west of I-95. The wetland is within the canal adjacent to Stan Goldman Park and Lions Park, just north of Hollywood Boulevard. The dominant wetland vegetation is white mangrove with patches of pond apple, bald cypress, Everglades palm, and leather fern. Upland vegetation consists of ficus (*Ficus* sp.), Australian pine, Brazilian pepper, seagrape (*Coccoloba uvifera*), umbrella tree (*Schefflera actinophylla*), Cuban royal palm (*Roystonea regia*), coconut palm (*Cocos nucifera*), and tropical almond (*Terminalia catappa*). This wetland may provide foraging habitat for fish, birds, reptiles, and mammals.

### 5.3.2 Other Surface Waters

**Swale-1 (FLUCCS 511)** – Swale-1 is an approximately 0.15-acre wet stormwater swale, located on the southeast corner of I-95 and Hallandale Beach Boulevard. This stormwater swale had standing water at the time of the field visit, November 21, 2023, and appeared to be a wet drainage feature. This swale is dominated by herbaceous wetland vegetation such as water hyssop and bald cypress. This area appeared to be regularly maintained at the time of the field visit, with a few landscaped trees on the edge of the swale. This swale may provide foraging habitat for birds, reptiles, and small mammals.

**Swale-2 (FLUCCS 511)** – Swale-2 is an approximately 0.17-acre wet stormwater swale, located on the northeast side of I-95 and Hallandale Beach Boulevard. This swale contained water hyssop, primrose willow, bald cypress, pennywort, and leather fern. Along the edge of swale were landscaped trees and shrubs. This swale may provide limited foraging habitat for birds, reptiles, and small mammals.



**Swale-3 (FLUCCS 511)** – Swale-3 is an approximately 0.48-acre drainage swale located on the west side of I-95 between Pembroke Road and Hallandale Beach Boulevard. The swale is dominated by upland Bahia grass (*Paspalum notatum*) along the edges of the swale, with dense wetland vegetation in the center of the swale consisting of duck potato, spike rush, and primrose willow. Multiple culverts surround and discharge to this drainage feature. No standing water was observed during field reviews. This swale may provide limited foraging habitat for birds, reptiles, and small mammals.

**Swale-4 (FLUCCS 511)** – Swale-4 is an approximately 0.80-acre drainage swale located at the northern project limits, on the east side of I-95. The swale is dominated by bald cypress with herbaceous vegetation and invasives consisting mainly of American evergreen (*Syngonium podophyllum*), bluemink (*Ageratum houstonianum*), Britton's wild petunia (*Ruellia caerulea*), tropical almond, pothos vine (*Epipremnum pinnatum*), Brazilian pepper, creeping-oxeyes (*Sphagneticola tribolata*), gulf swampweed (*Hygrophila costata*), pennywort, duck potato, and maiden fern (*Thelypteris kunthii*). A review of historical aerials showed the area grassed but without trees circa 1967, with development occurring to the east of I-95 in 1969. Landscaping becomes evident circa 1971. An I-95 drainage culvert discharges to this swale, and four drainage structures were identified along the base of the slope. This swale may provide limited foraging habitat for birds, reptiles, and small mammals.

**OSW-1 (FLUCCS 530)** – OSW-1 is a large, stormwater pond located within Park Lake Estates residential community, west of I-95, south of Hallandale Beach Boulevard between Marine Drive and Lake Shore Drive. Multiple culverts surround and discharge to this drainage feature. The system comprises of approximately 1.11 acres within the 500-foot project buffer and is dominated by open water with no littoral vegetation. This surface water may provide limited foraging habitat for birds, reptiles, and small mammals.

**OSW-2 (FLUCCS 530)** – OSW-2 is a stormwater pond within Ro-Len Lakes Gardens residential community, east of I-95 between SW 10<sup>th</sup> Avenue and 11<sup>th</sup> Avenue. Multiple culverts surround and discharge to this drainage feature. The system comprises of approximately 1.14 acres within the 500-foot project buffer and is dominated by open water with no littoral vegetation. This surface water may provide limited foraging habitat for birds, reptiles, and small mammals.



**OSW-3 (FLUCCS 530)** – OSW-3 is a stormwater pond within a residential community and Hallandale Elementary School, east of I-95 and just north of SW 8<sup>th</sup> Street. Multiple culverts surround and discharge to this drainage feature. The system comprises approximately 0.48 acres within the 500-foot project buffer and is dominated by open water with no littoral vegetation. This surface water may provide limited foraging habitat for birds, reptiles, and small mammals.

**OSW-4 (FLUCCS 530)** – OSW-4 is a stormwater pond within a single-family residential community and commercial facilities east of I-95, between Hallandale Beach Boulevard and SW 3<sup>rd</sup> Street. Multiple culverts surround and discharge to this drainage feature. The system comprises of approximately 0.43 acres within the 500-foot project buffer and is dominated by open water. This surface water may provide limited foraging habitat for birds, reptiles, and small mammals.

**OSW-5 (FLUCCS 530)** – OSW-5 is a stormwater pond within Green Acres Village residential community and commercial facilities, west of I-95 between Green Acres Road and Country Club Lane. Multiple culverts surround and discharge to this drainage feature. The system comprises of approximately 0.38 acres within the 500-foot project buffer and is dominated by open water with marsh fern and bald cypress around the pond edge. This surface water may provide limited foraging habitat for birds, reptiles, and small mammals.

**OSW-6 (FLUCCS 530)** – OSW-6 is a stormwater area within the Orangebrook Golf and Country Club, comprising of approximately 2.17 acres within the 500-foot project buffer. Multiple culverts surround and discharge to this drainage feature, which connects to other ponds within the country club. Littoral vegetation is dominated by torpedo grass with other wetland vegetation consisting of spike rush, primrose willow, and water hyssop. This surface water may provide foraging habitat for birds, reptiles, and small mammals.

**OSW-7 (FLUCCS 530)** – OSW-7 is a linear, stormwater drainage pond that is concrete-lined and runs between Orangebrook Golf and Country Club and the railroad tracks, west of I-95. OSW-8 is approximately 7.65 acres within the 500-foot project buffer and is dominated by open water with no littoral vegetation and a fence around its perimeter. This surface water may provide foraging habitat for birds, reptiles, and small mammals.



**OSW-8 (FLUCCS 510)** – OSW-8 is part of the C-10 Canal and comprises of approximately 1.49 acres within the 500-foot project buffer. Several culverts are present and discharge to the canal. This canal runs under Hollywood Boulevard and connects to the Orangebrook Golf & Country Club to the south. The system is dominated by open water, approximately 3-6 feet in depth; white mangrove, Australian pine, Brazilian pepper, bald cypress, leather fern, coco plum, pond apple, and other native and exotic vegetation (WL-1) border the canal. This surface water provides foraging habitat for birds, reptiles, and small mammals (e.g., Florida manatee).

**OSW-9 (FLUCCS 530)** – OSW-9 is a stormwater pond located within single-family residential homes, east of I-95 between Johnson and Lincoln Streets. This system comprises of approximately 0.11 acres within the 500-foot project buffer and is dominated by open water. Multiple culverts surround and discharge to this drainage feature. No littoral vegetation was observed. This surface water may provide foraging habitat for birds, reptiles, and small mammals.

**OSW-10 (FLUCCS 512)** – OSW-10 consists of two wet ditches located within the City-owned vacant parcel (Sunset Property). The total acreage of the OSW on the property is 4.65 acres. The central portion of the site consists of interconnected dredged wet ditches heavily vegetated with cattails, Brazilian pepper, and surrounding overgrown grasses. A perimeter wet ditch is present on the west, north and east side of the property and is overgrown with wetland vegetation, grasses, and Brazilian pepper. There was no observed connection of this property to residential canal to the north. These surface waters may provide foraging habitat for birds, reptiles, and small mammals.

## 5.4 WETLAND AND OTHER SURFACE WATER IMPACTS

Potential impacts associated with the project were evaluated. A discussion of direct, indirect, and cumulative impacts associated with the project is summarized in the sections below. No wetland impacts will occur and surface water impacts are limited to existing drainage features/surface waters.

### 5.4.1 Direct Impacts

Direct impacts include fill/excavation of stormwater swales. For the purposes of this wetland impact assessment, impacts to wet swales and OSWs were



calculated based on the preferred alternative. No natural wetland systems will be impacted by the project. Direct impacts to permitted stormwater swales within the existing I-95 ROW and the wet ditch/stormwater pond at the Sunset Property are anticipated due to construction activities. It is estimated that a total of 2.22 acres of OSWs (stormwater features) will be impacted. **Table 5.2** summarizes the direct impacts to stormwater swales (acreage) for the preferred alternative. Swales being impacted will be replaced with swales.

**Table 5.2 –Summary of Potential Wetland and OSW Impacts**

ID	FLUCCS Code	Size (Ac)*	Direct Impacts	
			Wetlands	Other Surface Waters
WL-1	612	0.39	0.00	-
Swale-1	511	0.15	-	0.00
Swale-2	511	0.17	-	0.00
Swale-3	511	0.43	-	0.43
Swale-4	511	0.72	-	0.72
OSW-1	530	1.11	-	0.00
OSW-2	530	1.14	-	0.00
OSW-3	530	0.48	-	0.00
OSW-4	530	0.43	-	0.00
OSW-5	530	0.38	-	0.00
OSW-6	530	2.17	-	0.00
OSW-7	530	7.65	-	0.00
OSW-8	510	1.49	-	0.00
OSW-9	530	0.11	-	0.00
OSW-10*	512	4.65	-	1.07
<b>Total Direct Impacts</b>			<b>0.00</b>	<b>2.22</b>

\* Size based wetland/surface water within a 500 ft buffer, except OSW 10 which is based on the area within the pond footprint.



### 5.4.2 Indirect Impacts

No impacts to wetlands are proposed. Additionally, in accordance with State criteria, water quality will be treated prior to discharge to receiving waters. Therefore, indirect impacts are not anticipated as a result of this project.

### 5.4.3 Avoidance and Minimization

One mangrove wetland is located within the C-10 Canal, just north of Hollywood Boulevard and west of I-95 (WL-1). Impacts to WL-1 have been avoided. Man-made stormwater swales and surface water littoral shelves are located immediately adjacent to the existing roadway. Therefore, complete avoidance and minimization of impacts to these swales and surface waters is not possible nor practicable and still meet the purpose and need of the project. Avoidance and minimization will continue to be incorporated as practical throughout the PD&E and Design processes.

The proposed roadway improvements' stormwater management facilities for the preferred alternative will meet FDOT drainage criteria, SFWMD permit criteria, and use BMPs in accordance with the current *FDOT's Standard Specifications for Road and Bridge Construction*.

## 5.5 WETLAND FUNCTIONAL ASSESSMENT AND MITIGATION

Impacts to WL-1 are not anticipated. Therefore, a Uniform Mitigation Assessment Method (UMAM) evaluation was not prepared. Impacts to surface waters do not require a functional assessment and mitigation is not anticipated for this project.

## 5.6 CUMULATIVE IMPACTS

Cumulative impact is the impact on the environment which results from the action's incremental impact when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. I-95, Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard are existing roadways, and the proposed drainage improvements will provide an anticipated incremental improvement to cumulative water quality over current conditions. Cumulative impacts associated with any future development must comply with environmental regulations and



standards of water quality, as well as consider habitat requirements for applicable listed species. Therefore, I-95 from south of Hallandale Beach Boulevard to north of Hollywood Boulevard Project is not expected to contribute to additional impacts beyond the direct impacts described in **Section 5.4**.

## 5.7 WETLAND FINDING

The Preferred Alternative has been evaluated in accordance with Federal Executive Order 11990 "Protection of Wetlands". There will be no involvement with wetlands. Approximately 2.22 acres of OSWs will be impacted. As the project advances through subsequent phases, avoidance and minimization of wetland impacts will continue to be considered to the maximum extent practicable.

## 6.0 ESSENTIAL FISH HABITAT

This project was evaluated for impacts to EFH in accordance with the *Magnuson-Stevens Fishery Conservation and Management Act*, and the *FDOT PD&E Manual*. EFH describes all waters and substrate necessary for fish to spawn, breed, feed, or grow to maturity. The NMFS is the agency with jurisdiction and although the *NMFS EFH Mapper* does not indicate EFH or HAPC in the project area, the *ETDM Summary Report #14254* references the presence of moderate quality estuarine (mangrove) wetlands which are designated as EFH and HAPC. HAPC's are subsets of EFH that are rare, ecologically important, susceptible to human-induced degradation, or located in an environmentally stressed area.

### 6.1 ASSESSMENT METHODOLOGY

Due to the presence of EFH (mangroves) within the project corridor, two benthic resource surveys were conducted by a team of biologists on August 23, 2017, and September 16, 2020. The survey on September 16, 2020, was conducted during an ebb tide, high tide was approximately at 9:20 am. The purpose of these surveys was to ascertain the presence of SAV (e.g., seagrass), listed fish species, or any other significant benthic resource, in the vicinity where the Hollywood Boulevard Bridge crosses this canal. An additional benthic survey was not conducted in 2023 as there is no in-water work proposed in the canal.

## 6.2 EFH OCCURRENCES

Potential EFH (mangroves- WL-1) were observed north of the Hollywood Boulevard Bridge and occurs along both the east and west sides of the C-10 Canal and consists of white mangroves. This area may provide foraging, nursery, and refuge habitat for juvenile fish. No other EFH was observed during the field reviews. The benthic substrate was sandy/silty with a moderate layer of organic material and shell hash. South of the bridge, rock rubble was dominant along the canal edges. No seagrass, other SAV, or coral were observed within the entire survey area. Green macroalgae was observed both north and south of the bridge. Additionally, other incidental fish and wildlife observations included: common snook (*Centropomus undecimalis*), spotted tilapia (*Pelmatolapia mariae*), blue land crab (*Cardisoma guanhumi*), and iguana (*Iguana iguana*).

### 6.2.1 Habitat Areas of Particular Concern

Designated HAPC's are present within the project area in the form of mangrove habitats. HAPC's are high priority areas for conservation, management, and research and are necessary for sustainable fisheries and ecosystems.

### 6.2.2 Managed Species

Federally managed fishery species associated with mangrove habitat include species in the snapper-grouper complex. The snapper-grouper complex includes 73 species of fish. Mangrove and seagrass habitats are associated with postlarval, juvenile, and adult gray snapper (*Lutjanus griseus*), lane snapper (*Lutjanus synagris*), and schoolmaster snapper (*Lutjanus apodus*); juvenile Atlantic goliath grouper (*Epinephelus itajara*) and mutton snapper (*Lutjanus analis*); and adult white grunt (*Haemulon plumieri*).

## 6.3 EFH IMPACTS

### 6.3.1 Direct, Indirect, and Cumulative Impacts

No widening of the Hollywood Bridge over the C-10 Canal is proposed and no in-water work is proposed within the C-10 Canal. Therefore, there will be no direct, indirect, or cumulative impacts to the mangroves and no involvement with EFH, HAPC, or managed species are anticipated.



## 7.0 AGENCY COORDINATION

### 7.1 ETDM ETAT REVIEW

The project was reviewed through the FDOT's ETDM process where members of the ETDM ETAT provide input and comments; the ETDM Screening Summary Report (No. 14254) (published February 22, 2016) is incorporated by reference. ETAT comments were reviewed and addressed as necessary.

### 7.2 OTHER AGENCY COORDINATION

Coordination with USFWS was previously conducted and concurrence was received on December 13, 2021 (see **Appendix I**). Due to updates to the refined alternative, concurrence from USFWS will be requested again.

### 7.3 PERMITS REQUIRED

The environmental permits anticipated for this project are summarized in **Table 7.1** and described below.

**Table 7.1 - Anticipated Environmental Permits**

Permit Type	Issuing Agency
Environmental Resource Permit (ERP)	SFWMD
Water Use Permit (for Construction Dewatering)	SFWMD
Section 404 Dredge and Fill Permit	FDEP/USACE
National Pollutant Discharge Elimination Permit (NPDES)	FDEP

The SFWMD requires an ERP when construction of any project results in the modification or creation of a surface water management system or results in impacts to wetlands or waters of the state. It is anticipated that an Individual ERP will be required for this project. Widening of the bridge over the C-10 Canal or drainage modifications (outfalls) is not proposed at this time.



A Section 404 Dredge and Fill Permit will be required. Under the FDEP's delegated authority to administer the NPDES program, development of a Stormwater Pollution Prevention Plan (SWPPP) is required as part of the permit. The SWPPP identifies the type and location of erosion control measures used to contain runoff from construction sites to keep it from entering surface waters.

## 8.0 CONCLUSIONS

The preferred alternative will incur a total of 2.22 acres of impacts to stormwater swales, supporting hydrophytic vegetation. The project will have no involvement with wetlands. Compensation for unavoidable drainage swale impacts will occur in coordination with FDEP, USACE, and SFWMD.

It was determined the preferred alternative **May Affect, Not Likely Adversely Affect** the federally listed eastern indigo snake, wood stork, and FBB. The preferred alternative will have **No Effect** on the Everglade snail kite, American crocodile and Florida manatee. The project corridor currently falls within the CFA of two wood stork colonies. Suitable foraging habitat compensation will be accomplished through new drainage features including a 3-acre pond at the north end of the project.

The project will also have **No Effect Anticipated** on the state-listed gopher tortoise, and **No Adverse Effect Anticipated** on the Florida burrowing owl, little blue heron, and tricolored heron. If a burrowing owl burrow is encountered within or adjacent to the ROW, an FWC Migratory Bird Nest Removal permit will be required, and coordination with FWC will be initiated.

Coordination with NMFS is not required, as no involvement with EFH will occur.

The FDOT will continue to coordinate with the regulatory and commenting agencies, and local governments during final design, construction and permitting to seek avoidance, minimization and mitigation measures for wetlands, and protected species.



## 8.1 COMMITMENTS

The FDOT made the following natural resource commitments as part of this PD&E Study:

- The most recent USFWS Standard Protection Measures for the Eastern Indigo Snake will be adhered to during construction.
- In coordination with USFWS, FDOT will perform additional FBB surveys during design, as applicable.
- Impacted wet swales will be replaced within the core foraging area of the active wood stork breeding colony. It is proposed to construct a littoral shelf associated with the proposed stormwater pond at the Sunset property. If the replacement of these swales within the core foraging area is not practicable, the FDOT will coordinate with the USFWS to identify acceptable compensation outside the core foraging area, such as purchasing wetland credits from a "FWS Approved" mitigation bank.



**APPENDIX A**  
**USFWS Concurrence 2021**



**Florida Department of Transportation**  
3400 West Colonial Avenue  
Fort Lauderdale, FL 33301

**RON DESANTIS**  
GOVERNOR



U.S. Fish and Wildlife Service  
Florida Ecological Service Office

FWS Log No. 04EF2000-2016-CPA-0043

The U.S. Fish and Wildlife Service has reviewed the information provided and finds that the proposed action is not likely to adversely affect any federally listed species or designated critical habitat protected by the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 et seq.). A record of this consultation is on file at the Florida Ecological Service Office.

This fulfills the requirements of section 7 of the Act and further action is not required. If modifications are made to the project, if additional information involving potential effects to listed species becomes available, or if a new species is listed, reinitiation of consultation may be necessary.

December 6, 2021

Mr. John Wrublik  
South Florida Ecological Services Office  
US Fish and Wildlife Service  
1339 20<sup>th</sup> Street  
Vero Beach, FL 32960

**JOSE RIVERA**  
Digitally signed by JOSE RIVERA  
Date: 2021.12.13 07:30:07 -05'00'

José J. Rivera, Division Supervisor, Environmental Review

12/13/2021

Date

**Subject: ESA Section 7 Consultation/Concurrence Request Letter**  
**Project Name: I-95 (SR 9) from South of Hallandale Beach Boulevard (S- 858) to North of Hollywood Boulevard (SR-820)**  
**Financial Management No.: 436903-1-22-02**  
**ETDM No. 14254**  
**County: Broward County**

Dear Mr. Wrublik,

The Florida Department of Transportation (FDOT) is requesting concurrence from the U.S. Fish and Wildlife Service (USFWS) on the Effect Determinations made as part of the Natural Resources Evaluation (NRE) for the proposed Project Development and Environment Study (PD&E) for I-95 (SR-9) from South of Hallandale Beach Boulevard (SR-858) to North of Hollywood Boulevard (SR-820) in Broward County, Florida. The project is proposing improvements to I-95 interchanges located at Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard and along an approximate 3-mile-long section of I-95 from South of Hallandale Beach Boulevard to North of Hollywood Boulevard.

This project will evaluate the potential modification of existing entrance and exit ramps and the potential addition of collector-distributor roadways serving the three interchanges within the project limits. The primary need for this project is to increase capacity at the interchanges of I-95 and Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard as well as the arterial intersections. Secondary considerations for the purpose and need of this project include safety, system linkage, modal interrelationships, transportation demand, social demands, economic development, and evacuation.

The following Federally listed species under the jurisdiction of USFWS were identified as having the potential to occur within the project study area as per the table below. The evaluation was conducted in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.) and the FDOT PD&E Manual.

Scientific Name	Common Name	Listing Status	Effect Determination*
<i>Drymarchon corais couperi</i>	Eastern Indigo Snake	FT	MANLAA
<i>Mycteria americana</i>	Wood Stork	FT	MANLAA
<i>Trichechus manatus</i>	West Indian Manatee	FT	NE
<i>Halophila johnsonii</i>	Johnson's Seagrass	FT	NE
<i>Rostrhamus sociabilis plumbeus</i>	Everglade Snail Kite	FE	NE
<i>Crocodylus acutus</i>	American Crocodile	FT	NE
<i>Eumops floridanus</i>	Florida Bonneted Bat	FT	MANLAA

Note: FT = Federally-designated Threatened; FE = Federally-designated Endangered

\*MANLAA = May Affect Not Likely to Adversely Affect; NE = No effect

### ***Eastern Indigo Snake***

Xeric habitat (i.e., dry, open land) is present adjacent to the project ROW and was observed during field reviews. Active or inactive gopher tortoise burrows were not observed during the field reviews and no potential Eastern indigo snake habitat will be impacted. To minimize adverse effects to the Eastern indigo snake during construction, the FDOT will adhere to the Standard Protection Measures for the Eastern Indigo Snake (USFWS, 2013). Additionally, the Programmatic Indigo Snake Key (USFWS, August 2013) was also reviewed. Based on this key, site conditions, and incorporation of standard protection measures, the FDOT determined the project *May Effect Not Likely to Adversely Affect* the Eastern indigo snake.

### ***Wood Stork***

The project corridor is located within the Core Foraging Area (CFA) of two active wood stork nesting colonies (Sawgrass Ford and Emerald Estates). Individuals of this species were not observed during field reviews. The Wood Stork Effect Determination Key (USFWS, May 18, 2010), and Habitat Management Guidelines for the Wood Stork in the Southeast Region (HMG) (USFWS, 1990) were reviewed for this project. Minor impacts to SFH are anticipated; about 1.35 acres of drainage swales, however, new swales are proposed as part of the proposed drainage system and/or credits will be purchased from a USFWS-approved mitigation bank. Based on this information and the Wood stork key, FDOT determined the project *May Effect, Not Likely to Adversely Affect* the wood stork.

### ***West Indian Manatee***

According to the USFWS Manatee Fort Lauderdale Field Station Accessibility Map, the C-10 is accessible to manatees however, a control structure is present in the canal approximately 167 feet south of Hollywood Boulevard, prohibiting further manatee access into Orangebrook Golf Course. Manatees were not observed during field reviews and in-water work is not proposed at the C-10 Canal. Based on the information above and the Manatee Effect Determination Key (USFWS, April 2013), the FDOT determined the project will have *No Effect* on the West Indian (Florida) manatee.

### ***Johnson's Seagrass***

Benthic surveys were conducted on August 23, 2017, and September 16, 2020, in the C-10/Hollywood Canal within 100-feet north and south of the Hollywood Boulevard Bridge. The results of both surveys did not reveal the presence of any seagrass or other benthic resources. Based on the current project location, previous survey results, and in-water work is not proposed, the FDOT determined the project will have *No Effect* on Johnson's seagrass.

### ***Everglade Snail Kite***

This project is located within the USFWS Consultation Area for the Everglade snail kite and minimal foraging habitat (lakes and wetlands with relatively shallow emergent vegetation) exists throughout the project corridor. Individuals or nests of this species were not observed during the field reviews, and have not been recorded within proximity to the project. Since the project incurs minor impact to minimal foraging habitat and no individuals or nests were observed or recorded, the FDOT has determined the project will have *No Effect* on the Everglade snail kite.

### ***American Crocodile***

The project corridor is located within the USFWS Consultation Area for the American crocodile. A warning sign was observed on the north side of Hollywood Boulevard adjacent to Stan Goldman Memorial Park, and this species may forage within the C-10/Hollywood Canal. However, individuals were not observed during the field review and nests have not been recorded in the project area. Recent coordination with the Florida Fish and Wildlife Conservation Commission (FWC) revealed that crocodile sightings in this area have not occurred since 2016. Individuals or nests of this species were not observed during field reviews. Based on the project location, minimal suitable habitat, FWC coordination, field review results, and no in-water work proposed at the C-10/ Hollywood Canal, the FDOT determined the project will have *No Effect* to the American crocodile.

### ***Florida Bonneted Bat***

The project corridor is within USFWS Florida Bonneted Bat Consultation Area as well as the more restrictive South Florida Urban Bat Area. Within the project corridor there is little open space except for the Orangebrook Golf Course and the City's vacant parcel previously associated with the former, privately owned, Sunset Golf Course. Individuals were not observed during field reviews but potential roosting habitat (i.e., landscape trees and bridges) is present. A roost survey was conducted in accordance with the 2019 USFWS bat guidance and was based on discussions with USFWS. The FDOT performed a roost survey of qualifying trees in July 2021 and evidence

ESA Section 7 Consultation/Concurrence Request Letter  
I-95 from South of Hallandale Beach Boulevard to North Hollywood Boulevard PD&E Study

December 6, 2021

of FBB utilization or roosts were not observed. Based on FDOT's commitment to perform another roost survey during design, and to continue coordination with USFWS regarding survey methods and additional Best Management Practices (BMPs), there are reasonable assurances that the requirements of the ESA will be met prior to construction. Therefore, the FDOT's determination of effect for the FBB is *May Affect, Not Likely to Adversely Affect*.

The purpose of this letter is to request written concurrence, on behalf of FDOT, on the determinations of effects to the listed species described above. Please call me at 954-777-4665 if you have any questions.

Sincerely,

DocuSigned by:  
  
3B218C692E7F49A...

Fernando Ascanio  
Senior Environmental Scientist  
FDOT – District 4

cc: Ann Broadwell, FDOT District 4, Environmental Administrator  
Kenzot Jasmine, P.E., FDOT District 4, Project Manager  
Molly Winn, FDOT District 4, Environmental Specialist  
Ryan Solis-Rios, P.E., The Corradino Group  
Mark Clark, CEP, CECOS  
Shannon Kelley, CECOS

Attachment: Natural Resources Evaluation (NRE)



**APPENDIX B**  
**Future Land Use Comprehensive Plan**

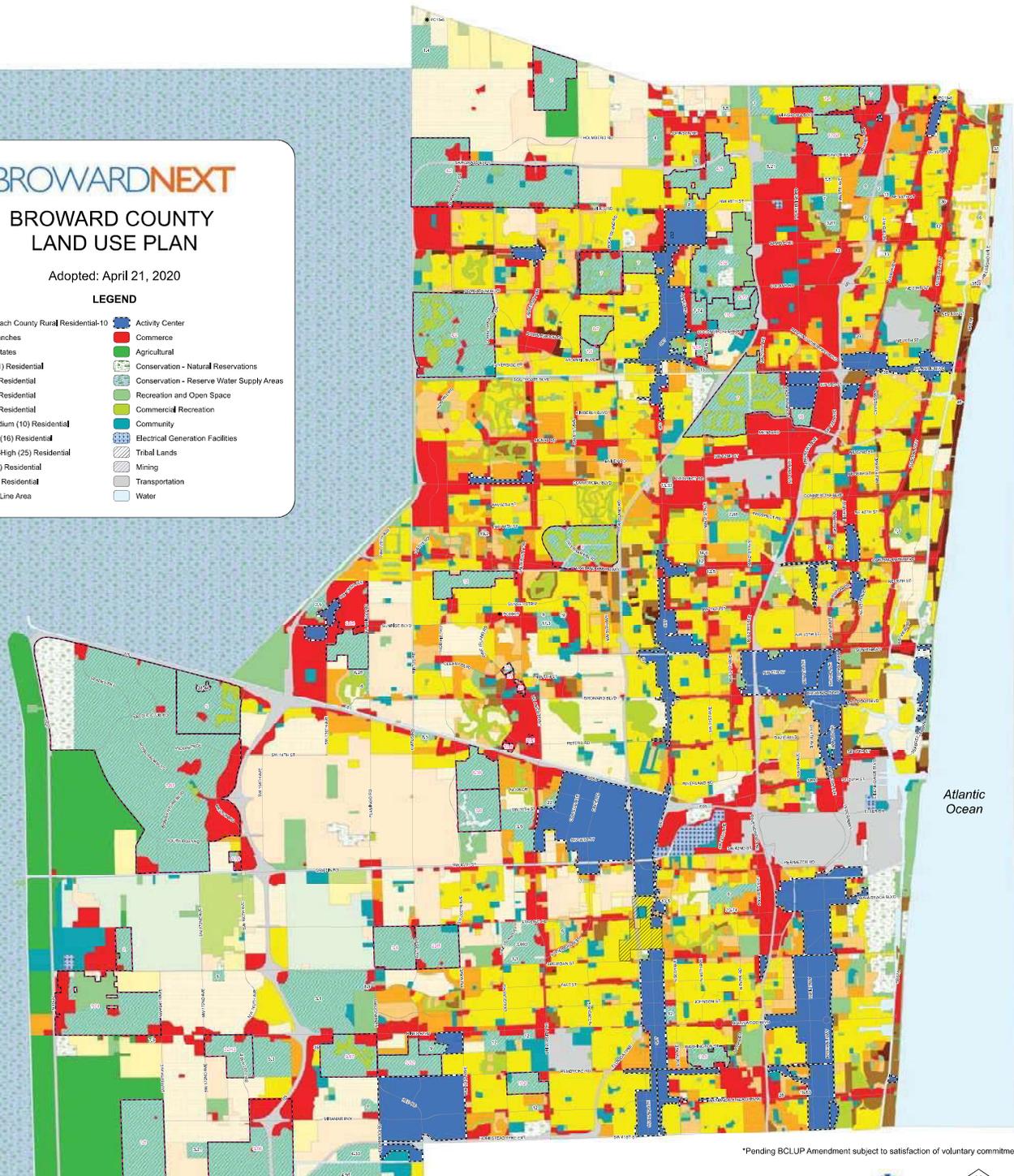
# BROWARDNEXT

## BROWARD COUNTY LAND USE PLAN

Adopted: April 21, 2020

### LEGEND

- |  |   |
|--|---|
|  Palm Beach County Rural Residential-10 |  Activity Center                           |
|  Rural Ranches                          |  Commerce                                  |
|  Rural Estates                          |  Agricultural                              |
|  Estate (1) Residential                 |  Conservation - Natural Reservations       |
|  Low (2) Residential                    |  Conservation - Reserve Water Supply Areas |
|  Low (3) Residential                    |  Recreation and Open Space                 |
|  Low (5) Residential                    |  Commercial Recreation                     |
|  Low-Medium (10) Residential            |  Community                                 |
|  Medium (16) Residential                |  Electrical Generation Facilities          |
|  Medium-High (25) Residential           |  Tribal Lands                              |
|  High (50) Residential                  |  Mining                                    |
|  Irregular Residential                  |  Transportation                            |
|  Dashed-Line Area                       |  Water                                     |



Atlantic Ocean

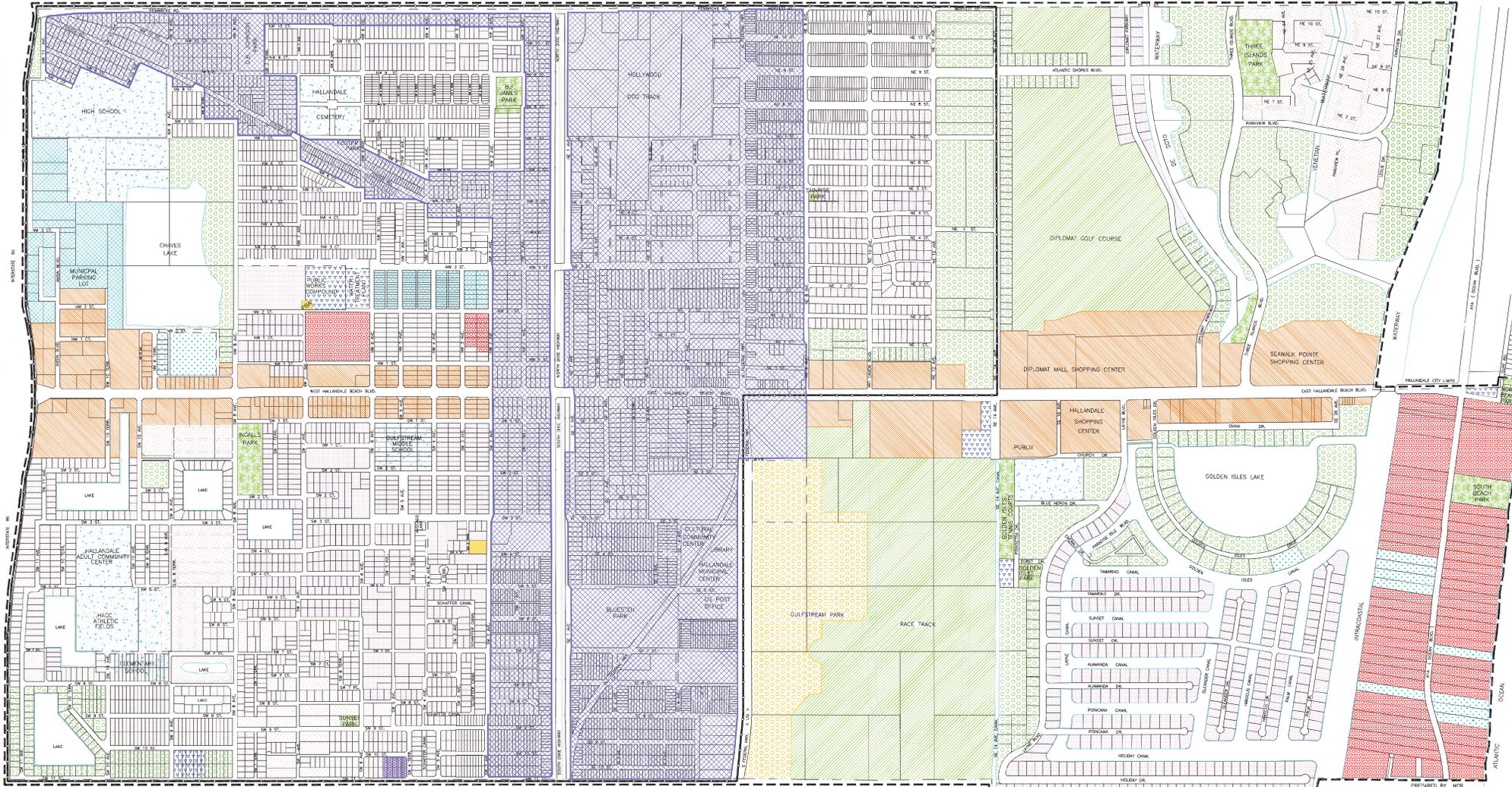
\*Pending BCLUP Amendment subject to satisfaction of voluntary commitments

Municipal land use plans must be consistent with the Broward County Land Use Plan. The Broward County Planning Council reviews each municipal land use plan pursuant to the Broward County Charter and certifies those municipal land use plans which have been found to be in "substantial conformity" with the Broward County Land Use Plan. When certified by the Council, the municipal land use plan becomes the effective land use plan for the municipal jurisdiction. The land use designations on the Broward County Land Use Plan serve as the basis for municipal jurisdiction. The municipal land use plans may be more restrictive than the Broward County Land Use Plan and may depict uses and categories other than those shown on the Broward County Land Use Plan for specific parcels. Areas designated on the Broward County Land Use Plan Map or particular uses are approximations. The exact boundaries for zoning will be determined by the municipality within the reasonable limits of the designation on the map. For further information regarding identification of the effective land use plan for a specific area or for interpretation of the land use designation for a specific parcel, please contact the Broward County Planning Council at 954.357.8695.





# CITY OF HALLANDALE BEACH FUTURE LAND USE MAP



**RESIDENTIAL NET DU/ACRE**

[Pattern]	LOW DENSITY UP TO 7.0
[Pattern]	LOW-MEDIUM DENSITY UP TO 14.0
[Pattern]	MEDIUM DENSITY UP TO 18.0
[Pattern]	HIGH DENSITY UP TO 25.0
[Pattern]	HIGH DENSITY-2 UP TO 50.0

**COMMERCIAL**

[Pattern]	NEIGHBORHOOD
[Pattern]	GENERAL
[Pattern]	RECREATION
[Pattern]	LIGHT INDUSTRIAL
[Pattern]	EMPLOYMENT CENTER

**COMMUNITY FACILITIES**

[Pattern]	PUBLIC PARKS
[Pattern]	INSTITUTIONAL
[Pattern]	UTILITIES
[Pattern]	HISTORIC

**LOCAL ACTIVITY CENTER**  
THE VILLAGE AT GULFSTREAM PARK LAC

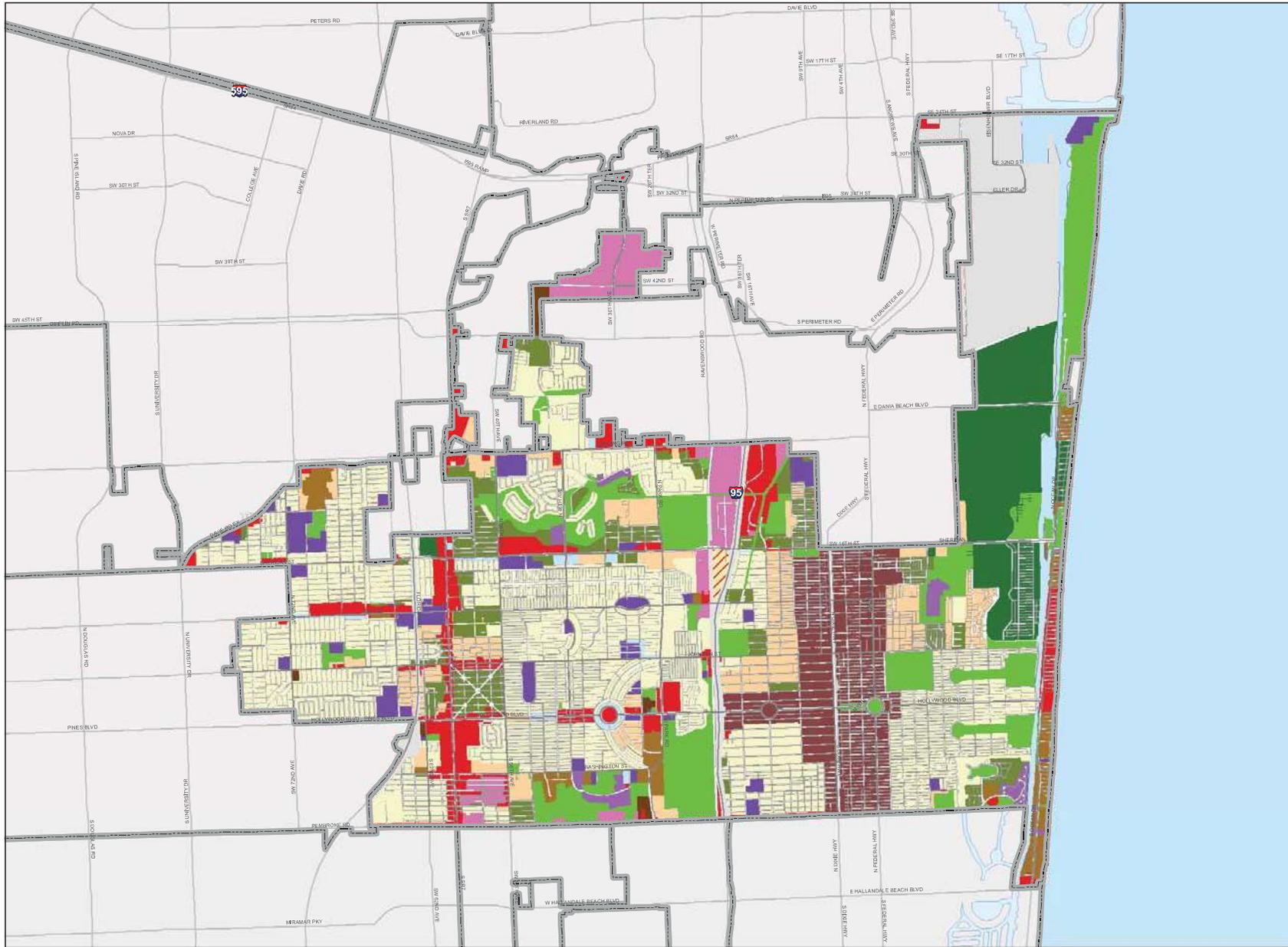
**REGIONAL ACTIVITY CENTER**

- NOTES:**
- (1) RECREATIONAL USES, FUTURE AND EXISTING, REFER TO: FIGURE 8-2, VOLUME II, COMPREHENSIVE PLAN.
  - (2) WATER WELLS AND CONES OF INFLUENCE, REFER TO: FIGURE 7-6, VOLUME II, COMPREHENSIVE PLAN.
  - (3) HISTORICAL DISTRICTS AND STRUCTURES, REFER TO: FIGURE 4-19, VOLUME II, COMPREHENSIVE PLAN.
  - (4) HALLANDALE FUTURE LAND USE PLAN COMPLIES WITH BROWARD COUNTY TRAFFIC WAYS PLAN, REFER TO: FIGURE 3-12, VOLUME II, COMPREHENSIVE PLAN.
  - (5) CITY OF HALLANDALE BEACH FLEXIBILITY ZONES, REFER TO: FIGURE 2-2, VOLUME II, COMPREHENSIVE PLAN.

**TRANSPORTATION CONCURRENCE EXCEPTION AREAS**

[Symbol]	URBAN INFILL AREA
[Symbol]	URBAN REDEVELOPMENT AREA
[Symbol]	CITY LIMITS

PREPARED BY: MGR  
SCALE: 1"=250'  
DATE: 10/08/2012



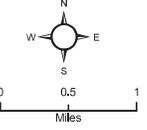
City of Hollywood  
Comprehensive Plan

Map LU-12

Future Land Use

- Legend**
- Hollywood City Boundary
  - Hollywood Future Land Use**
  - F.L.U. Designations**
  - LOW RESIDENTIAL
  - LOW MEDIUM RESIDENTIAL
  - MEDIUM RESIDENTIAL
  - MEDIUM HIGH RESIDENTIAL
  - HIGH RESIDENTIAL
  - COMMUNITY FACILITY
  - INDUSTRIAL
  - OFFICE
  - GENERAL BUSINESS
  - RIGHTS OF WAY
  - TRANSPORTATION
  - UTILITIES
  - RAC ZONE
  - PARKS AND OPEN SPACE
  - CONSERVATION AREA
  - TOD
  - TOC (NO SITE DESIGNATED)

Printed September 13, 2007



Calvin, Giordano & Associates, Inc.  
PROFESSIONAL ENGINEERS

GIS  
Produced and maintained by the CGA  
Geographic Information Systems Services

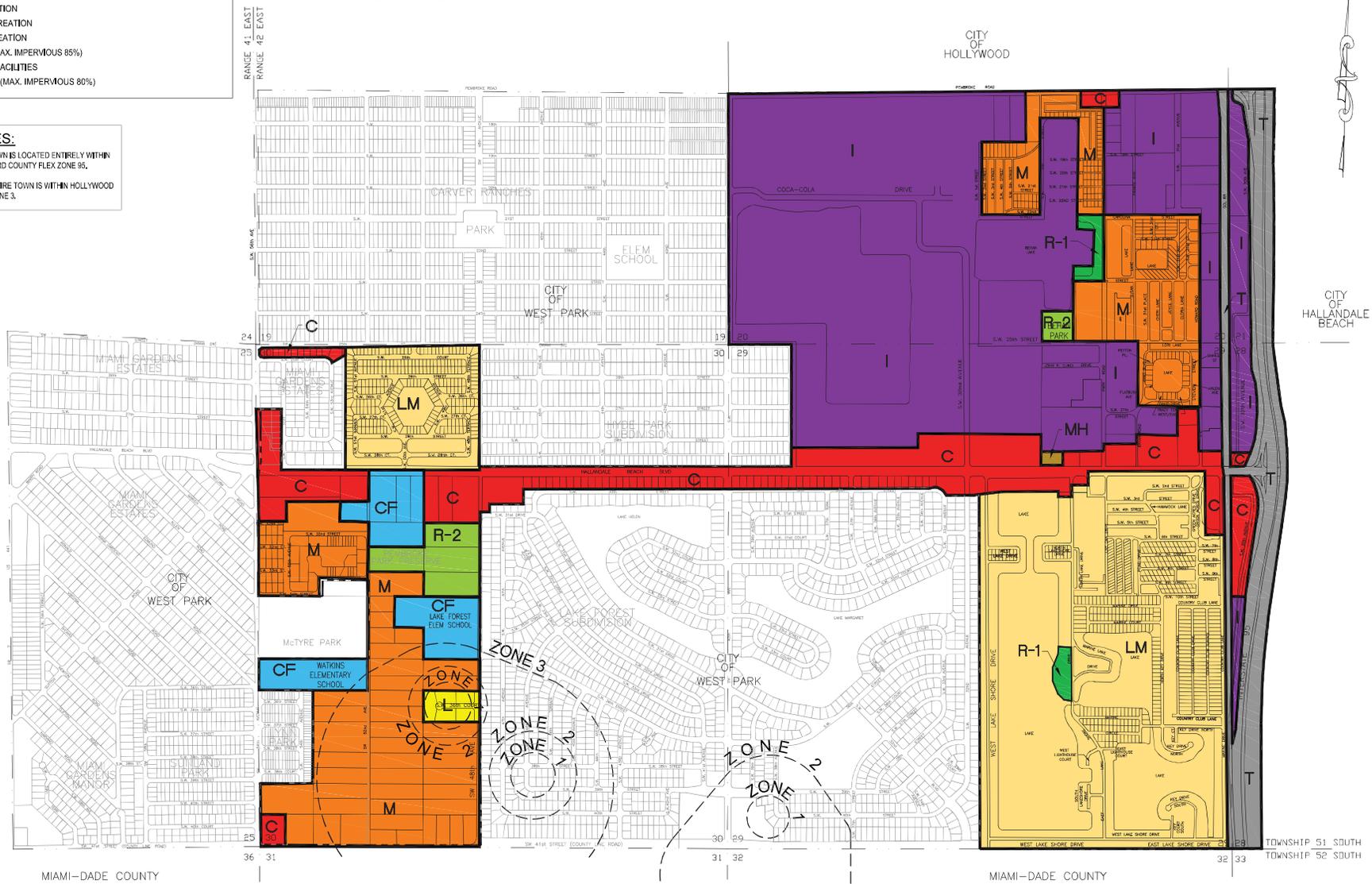
**LEGEND**

- L  LOW DENSITY (RES.) (0-5 DU/AC)
- LM  LOW MEDIUM DENSITY (RES.) (5-10 DU/AC)
- M  MEDIUM DENSITY (RES.) (10-16 DU/AC)
- MH  MEDIUM HIGH DENSITY (RES.) (16-25 DU/AC)
- T  TRANSPORTATION
- R-1  PRIVATE RECREATION
- R-2  PUBLIC RECREATION
- I  INDUSTRIAL (MAX. IMPERVIOUS 85%)
- CF  COMMUNITY FACILITIES
- C  COMMERCIAL (MAX. IMPERVIOUS 80%)

**NOTES:**

1. THE TOWN IS LOCATED ENTIRELY WITHIN BROWARD COUNTY FLEX ZONE 95.
2. THE ENTIRE TOWN IS WITHIN HOLLYWOOD WELLZONE 3.

AMENDMENTS SINCE 1989		
DATE	OPD. NO.	PURPOSE
6/25/03	03-06-04	SP 35 FUM
9/17/04	04-10-01	WEST PARK TRAIL - DEMONSTRATION
6/15/09	09-777	McTYRE PARK DEMONSTRATION
11/22/2014	14/03/006	2016 ERA



NO.	DATE	REVISION	BY

Designed: MJM  
 Drawn: SCM  
 Checked: MJM

**MICHAEL MILLER PLANNING ASSOCIATES, INC.**  
 7522 Willes Rd., Suite B-203  
 Coral Springs, Florida 33067  
 Tel. (954) 757-9609 Fax. (954) 757-7089

PREPARED FOR  
**TOWN OF PEMBROKE PARK**

**FUTURE LAND USE MAP  
 2015-2030**

FUTURE LAND USE MAP  
 09/23/16  
 SCALE  
 1" = 500'

SHEET NO.  
**1**  
 PROJECT  
 2032



**APPENDIX C**  
**Ground-Level Photographs**



Photo 1: WL-1 Tropical almond fringe looking north in the Hollywood Canal.



Photo 2: WL-1 White mangrove looking northeast in the Hollywood Canal.



Photo 3: Swale-1 a wet drainage swale located east of I-95 and south of Hallandale Beach Boulevard.



Photo 4: Swale-2 a wet drainage swale with water hyacinth located to the east of I-95 and north of Hallandale Beach Boulevard



Photo 5: Swale-3 on the west side of I-95 between Pembroke Road and Hallandale Beach Boulevard.

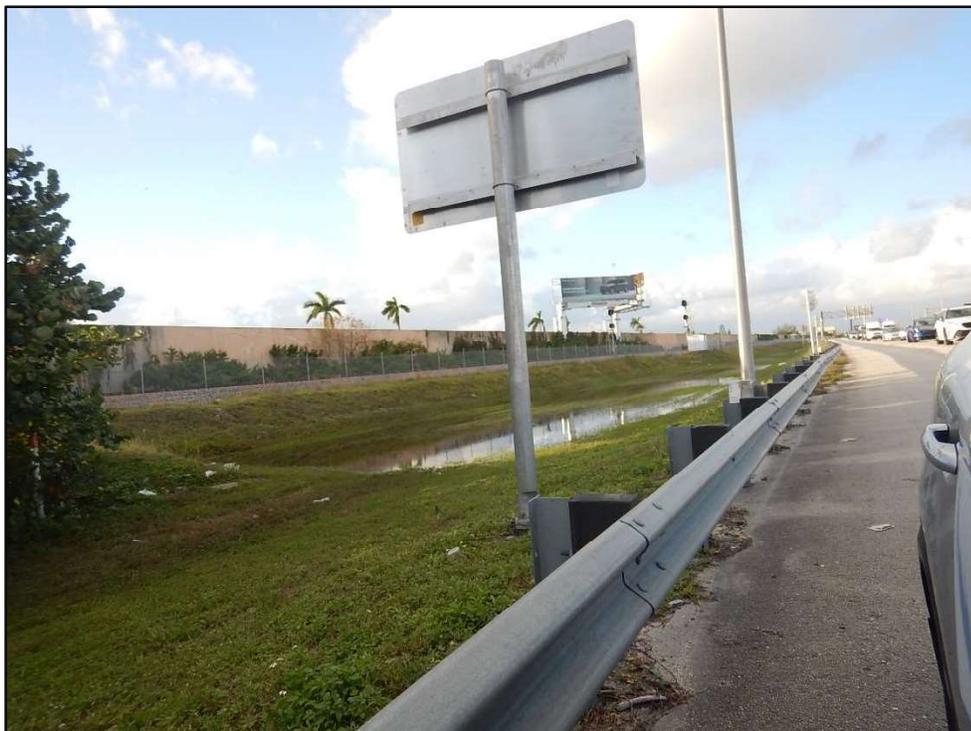


Photo 6: Swale-6 identified at the south project limit, west of I-95, south of Hallandale Beach Blvd.



Photo 7: OSW-5 – Portion of the stormwater retention pond within the 500' buffer within Green Acres Village.



## **APPENDIX D**

### **Standard Protection Measures for the Eastern Indigo Snake**

# 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 or 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](mailto:gaes_assistance@fws.gov)  
Florida Field Office: Phone: (352) 448-9151, email: [fw4flesregs@fws.gov](mailto: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 brillante 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, coleccionar 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 E**  
**Eastern Indigo Snake Key**



# United States Department of the Interior



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

August 1, 2017

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

Subject: Consultation Key for the Eastern Indigo Snake – Revised

Dear Mr. Kinard:

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

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

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

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

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

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

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

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

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

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

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

**Scope of the Key**

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

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

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

**Habitat**

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

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

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

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

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

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

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

### **Minimization Measures**

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

### **Determinations**

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

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

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

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

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

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

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

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

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

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

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

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

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

E. Any permit will be conditioned such that all gopher tortoise burrows, active or inactive, will be excavated prior to site manipulation in the vicinity of the burrow<sup>1</sup>. 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<sup>2</sup>

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

End Key

<sup>1</sup> 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>.

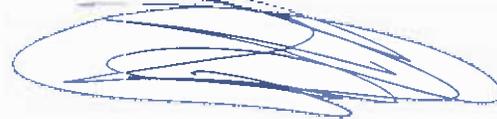
<sup>2</sup> Please note, if the proposed project will impact less than 25 acres of vegetated eastern indigo snake habitat (not urban/ human-altered) completely surrounded by urban development, and an eastern indigo snake has been observed on site, NLAA is not the appropriate conclusion. The Service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

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

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

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

Sincerely,



Roxanna Hinzman  
Field Supervisor  
South Florida Ecological Services

Cc:

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

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**APPENDIX F**  
**Wood Stork Key**



## United States Department of the Interior



FISH AND WILDLIFE SERVICE  
South Florida Ecological Services Office  
1339 20<sup>th</sup> 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<sup>1</sup>. 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)<sup>2</sup> of an active colony site<sup>3</sup> ..... "may affect"<sup>4</sup>
- Project impacts Suitable Foraging Habitat (SFH)<sup>5</sup> at a location greater than 0.76 km (0.47 mile) from a colony site..... "go to B"

<sup>1</sup> 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.

<sup>2</sup> 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).

<sup>3</sup> 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.

<sup>4</sup> Consultation may be concluded informally or formally depending on project impacts.

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

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

B. Project impact to SFH is less than 0.20 hectare (one-half acre)<sup>6</sup>.....NLAA<sup>1</sup>”

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<sup>7</sup> 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<sup>8</sup>..... NLAA<sup>1</sup>”

Project not as above..... “may affect<sup>4</sup>”

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<sup>7</sup> of the wetlands affected, and provides foraging value similar

<sup>6</sup> 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.

<sup>7</sup> 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.

<sup>8</sup> 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<sup>8</sup>.....“NLAA<sup>1</sup>”

Project does not satisfy these elements .....“may affect<sup>4</sup>”

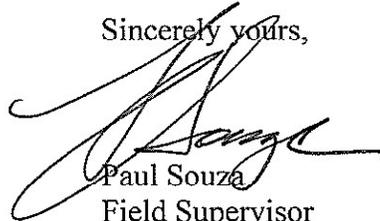
This Key does not apply to Comprehensive Everglades Restoration Plan projects, as they will require project-specific consultations with the Service.

Monitoring and Reporting Effects

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

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

Sincerely yours,



Paul Souza  
Field Supervisor  
South Florida Ecological Services Office

Enclosures

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

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



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

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

## **Introduction**

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

## **General**

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

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

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

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

#### **I. Feeding habitat.**

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

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

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

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

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

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

## II. Nesting habitat.

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

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

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

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

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

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

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

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

### **III. Roosting habitat.**

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

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

### **IV. Management zones and guidelines for feeding sites.**

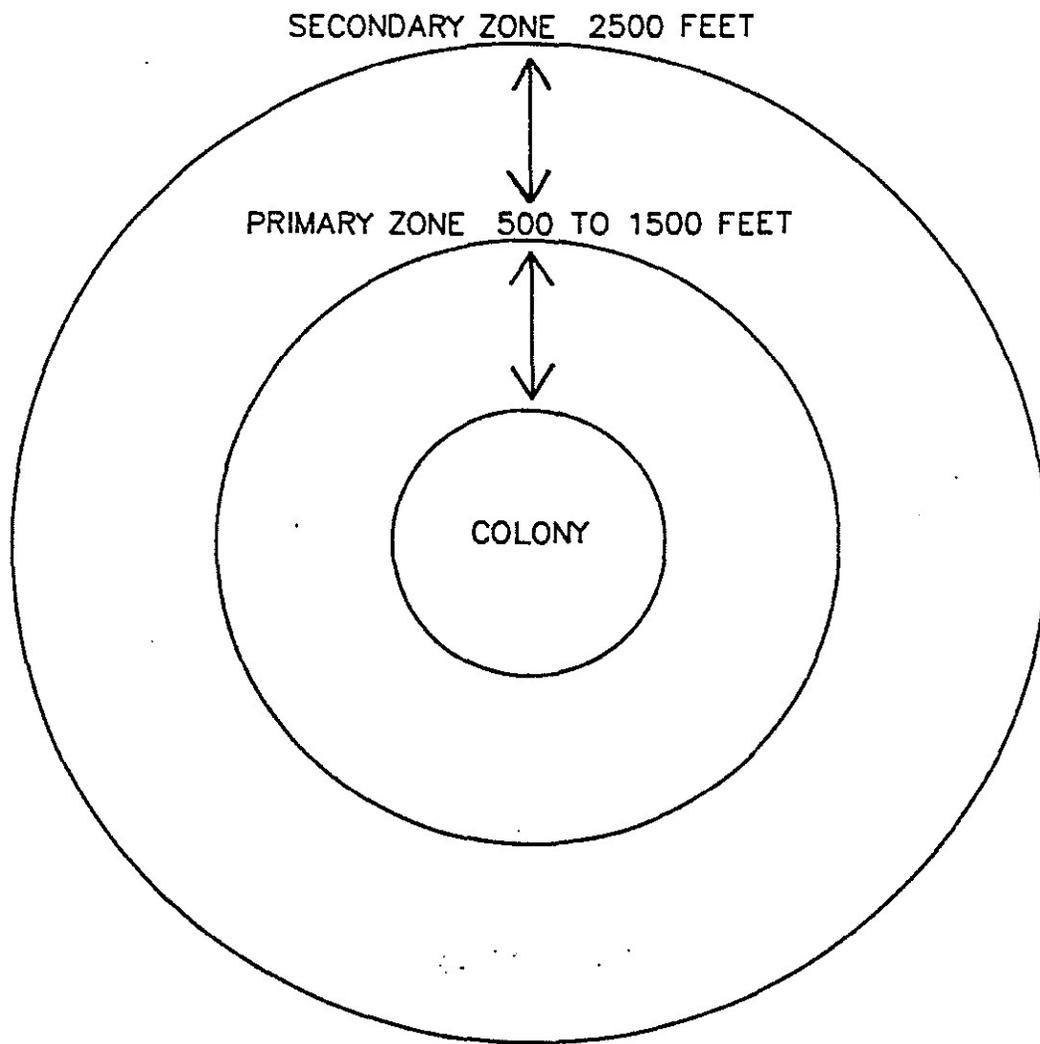
To the maximum extent possible, feeding sites should be protected by adherence to the following protection zones and guidelines:

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

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

**V. Management zones and guidelines for nesting colonies.**

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



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

#### **VI. Roosting site guidelines.**

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

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

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

## VII. Legal Considerations.

### A. Federal Statutes

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

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

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

### B. State Statutes

#### 1. State of Alabama

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

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

#### 2. State of Florida

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

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

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

### 3. State of Georgia

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

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

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

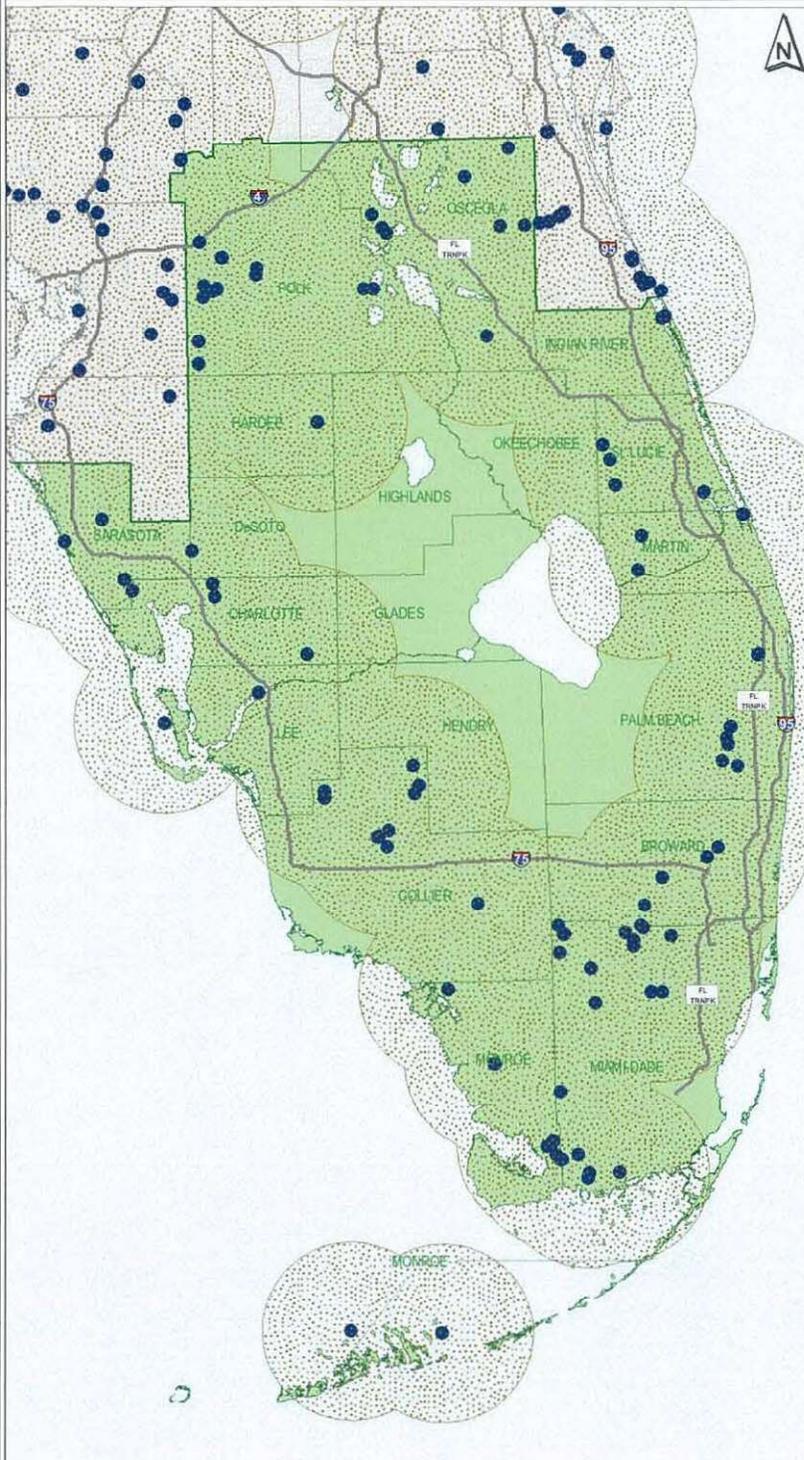
The wood stork is listed as endangered pursuant to the Endangered Wildlife Act of 1973 (Section 27-3-130 of the Code). Section 391-4-13-.06 of the Rules and Regulations of the Georgia Department of Natural Resources prohibits harassment, capture, sale, killing, or other actions which directly cause the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

### 4. State of South Carolina

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

5/21/2010

# Wood Stork



## Nesting Colonies Core Foraging Areas

1999 to 2005

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



Produced by:  
South Florida Ecological Services Office  
<http://vero.beach.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<sup>2</sup>) and the vulnerability of the prey items to capture (Gawlik 2002). For wood storks, prey vulnerability appears to be largely controlled by physical access to the foraging site, water depth, the density of submerged vegetation, and the species-specific characteristics of the prey. For example, fish populations may be very dense, but not available (vulnerable) because the water depth is too deep (greater than 30 cm) for storks or the tree canopy at the site is too dense for storks to land. Calm water, about 5-40 cm (2-16 in) in depth, and free of dense aquatic vegetation is ideal (Coulter and Bryan 1993).

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

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

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

**Table 1: Vegetation classes**

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

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

**Table 2: Habitat Foraging Suitability**

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

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

**Table 3. Foraging Suitability Percentages**

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

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

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

**Hydroperiod:** The hydroperiod of a wetland can affect the prey densities in a wetland. For instance, research on Everglades fish populations using a variety of quantitative sampling techniques (pull traps, throw traps, block nets) have shown that the density of small forage fish increases with hydroperiod. Marshes inundated for less than 120 days of the year average  $\pm 4$  fish/m<sup>2</sup>; whereas, those flooded for more than 340 days of the year average  $\pm 25$  fish/m<sup>2</sup> (Loftus and Eklund 1994, Trexler et al. 2002).

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

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

**Table 4. SFWMD Hydroperiod Classes – Everglades Protection Area**

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

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

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

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

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

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

In consideration of this assessment, the Service used the data presented in Trexler et al.'s (2002) study on the number of fish per square-meter per hydroperiod for fish 8 cm or less to be applicable for estimating the total biomass per square-meter per hydroperiod for all fish. In determining the biomass of fish per square-meter per hydroperiod, the Service relied on the summary data provided by Turner et al. (1999), which provides an estimated fish biomass of 6.5 g/m<sup>2</sup> 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 <sup>2</sup>
Class 2	60-120	4 fish/m <sup>2</sup>
Class 3	120-180	9 fish/m <sup>2</sup>
Class 4	180-240	16 fish/m <sup>2</sup>
Class 5	240-300	20 fish/m <sup>2</sup>
Class 6	300-330	23 fish/m <sup>2</sup>
Class 7	330-365	25 fish/m <sup>2</sup>

**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<sup>2</sup>. In these studies, the data was provided in g/m<sup>2</sup> dry-weight and was converted to g/m<sup>2</sup> 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<sup>2</sup> 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<sup>2</sup> and to be composed of 25 fish/m<sup>2</sup>. 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<sup>2</sup>, with an average weight of 0.26 grams per fish, the biomass of a Class 3 hydroperiod would be 2.3 grams/m<sup>2</sup> (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 <sup>2</sup>
Class 2	60-120	1.0 gram/m <sup>2</sup>
Class 3	120-180	2.3 grams/m <sup>2</sup>
Class 4	180-240	4.2 grams/m <sup>2</sup>
Class 5	240-300	5.2 grams/m <sup>2</sup>
Class 6	300-330	6.0 grams/m <sup>2</sup>
Class 7	330-365	6.5 grams/m <sup>2</sup>

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

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

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

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

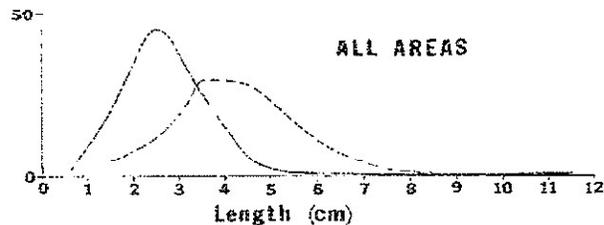


FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

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

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

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

To estimate the fraction of the fish biomass that might be consumed by wood storks, the Service, using Trexler et al.'s (2002) throw-trap data set, determined the mean biomass of each fish species that fell within the wood stork prey size limits of 1.5 to 9.0 cm. The mean biomass of each fish species was estimated from the length and wet mass relationships for Everglades' ichthyofauna developed by Kushlan et al. (1986). The proportion of each species that was outside of this prey length and biomass range was estimated using the species mean and variance provided in Table 1 in Kushlan et al. (1986). These biomass estimates assumed the length and mass distributions of each species was normally distributed and the fish biomass could be estimated by eliminating that portion of each species outside of this size range. These biomass estimates of available fish prey were then standardized to a sum of 6.5 g/m<sup>2</sup> 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<sup>2</sup>, 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<sup>2</sup> sample. Using this approach summed over all species in long hydroperiod wetlands, only 3.685 g/m<sup>2</sup> of the 6.5 g/m<sup>2</sup> 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<sup>2</sup> 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<sup>2</sup> 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<sup>2</sup> 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<sup>2</sup> / 6.5 g/m<sup>2</sup> = 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<sup>2</sup>, adjusted by 51 percent for appropriate size and species composition, provides an available biomass of 1.196 grams/m<sup>2</sup>. 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 <sup>2</sup>
Class 2	60-120	0.52 gram/m <sup>2</sup>
Class 3	120-180	1.196 grams/m <sup>2</sup>
Class 4	180-240	2.184 grams/m <sup>2</sup>
Class 5	240-300	2.704 grams/m <sup>2</sup>
Class 6	300-330	3.12 grams/m <sup>2</sup>
Class 7	330-365	3.38 grams/m <sup>2</sup>

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

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

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

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

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

**Table 10 Actual Biomass Consumed by Wood Storks**

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

**Sample Project of Biomass Calculations and Corresponding Concurrence Determination**

*Example 1:*

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

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

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

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

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

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

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

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

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

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

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

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

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

\*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<sup>2</sup> instead of a class 3 hydroperiod with a 0.39 grams/m<sup>2</sup> [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								
<b>TOTAL</b>	<b>5</b>	<b>2.92</b>	<b>3</b>	<b>3.19</b>	<b>3</b>	<b>8.62</b>	<b>(5)</b>	<b>2.51</b>

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

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**APPENDIX G**  
**Manatee Key**



## United States Department of the Interior



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

April 25, 2013

Donald W. Kinard  
Chief, Regulatory Division  
U.S. Army Corps of Engineers  
701 San Marco Boulevard, Room 372  
Jacksonville, Florida 32207-8175

Dear Mr. Kinard:

This letter acknowledges the U.S. Fish and Wildlife Service's (Service) receipt of your April 12, 2013, letter requesting concurrence on the U.S. Army Corps of Engineers' (Corps) implementation of the revised Manatee Key and its enclosures dated April 2013. This letter represents the Service's views on the potential effects of the proposed action in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*) and the Marine Mammal Protection Act of 1972, as amended (MMPA) (16 U.S.C. 1361 *et seq.*). For future reference, we have assigned this concurrence letter to Service Consultation Code 2013-I-0151.

The Manatee Key is a tool that has been used by the Corps' Regulatory Division since 1992 to assist in making its effect determinations, as required under 50 CFR 402.14(a), on permit applications for in-water activities such as, but not limited to, maintenance dredging, the placement of fill material for shoreline stabilization, the construction or placement of other in-water structures, as well as the construction of docks, marinas, boat ramps, boat slips, dry storage or any other watercraft access structures or facilities. Your agency has determined utilization of the 2013 Manatee Key, and its enclosures, to review projects in waters accessible to the endangered West Indian manatee (*Trichechus manatus*) may affect, but is not likely to adversely affect the manatee or its designated critical habitat.

Since July 2011, the Service has worked closely with the Corps and the Florida Fish and Wildlife Conservation Commission (FWC) on revising the March 2011 version of the Manatee Key and its associated maps. Minor changes to the March 2011 Manatee Key were made to ensure consistency with the manatee programmatic consultation co-developed by the Corps and the Service in cooperation with the FWC.

For all new or expanding multi-slip facilities located in a county with a State-approved MPP in place that reach a "may affect, not likely to adversely affect" determination using the 2013 Manatee Key, the Service concurs with these determinations and no further consultation with the Service is necessary.

For all applications to construct residential dock facilities that reach a “may affect, not likely to adversely affect” determination using the 2013 Manatee Key, the Service concurs with these determinations and no further consultation with the Service is necessary. As such, the Service will not receive permit applications from the Corps for these types of facilities.

For those counties with a watercraft-related mortality rate that averages less than one dead manatee a year, we conclude take is not reasonably certain to occur as a result of new or expanding watercraft access facilities in these counties. Therefore, for multi-slip facilities proposed to be built or expanded in those counties that reach a “may affect, not likely to adversely affect” determination using the 2013 Manatee Key, the Service concurs with these effect determinations and no further consultation with the Service is necessary.

For all applications to repair or replace existing multi-slip facilities that do not provide new watercraft access and reach a “may affect, not likely to adversely affect” determination using the 2013 Manatee Key, the Service concurs with these determinations. As such, the Service will not receive permit applications from the Corps for these types of existing facilities since they were covered by the Service’s March 17, 2011, consultation on the 2011 Manatee Key.

All other future applications for multi-slip facilities reaching a “may affect, not likely to adversely affect” determination using the 2013 Manatee Key will be forwarded to the Service for concurrence. The Corps agreed to forward to the Service those applications that are consistent with the Manatee Key.

All culverts 8 inches to 8 feet in diameter must be grated to prevent manatee entrapment. To effectively prevent manatee access, grates must be permanently fixed, spaced a maximum of 8 inches apart (may be less for culverts smaller than 16 inches in diameter) and may be installed diagonally, horizontally, or vertically. Culverts less than 8 inches or greater than 8 feet in diameter are exempt from this requirement. If new culverts and/or the maintenance or modification of existing culverts are grated as described above, the determination of “may affect, not likely to adversely affect” is appropriate and no further consultation with the Service is necessary.

We have examined the April 2013 version of the Manatee Key and its enclosures and agree with its structure and content. Currently, the FWC does not require implementation of the signage component of the standard construction conditions for in-water work for the State’s review of the permit application. However, the Corps and the Service will require applicants to implement the signage component of the standard construction conditions for any in-water work authorized by a Department of the Army permit. Therefore, except as noted above, for all future applications reviewed with the April 2013 version of the Manatee Key in which the Corps reaches a “may affect, not likely to adversely affect” determination with respect to the manatee and/or its designated critical habitat, the Service hereby concurs with those determinations in accordance with 50 CFR 402.14(b)1. As such, the March 2011 version of the Manatee Key and its associated maps, as well as other earlier versions of the Manatee Key, are no longer applicable.

The Service does not anticipate the proposed action will result in the incidental take of manatees. Furthermore, the Service is not including an incidental take authorization for marine mammals at this time because the incidental take of marine mammals is not expected to occur and has not been authorized under section 101(a)(5) of the MMPA and/or its 1994 Amendments. Following issuance of such regulations or authorizations, the Service may reinstate consultation to include an incidental take statement for marine mammals, if deemed appropriate.

This concurrence letter fulfills the requirements of section 7 of the Act and no further action is required. If modifications are made to the Manatee Key, if additional information involving potential effects to listed species becomes available, or if a new species is listed or new critical habitat is designated that may be affected by the project, then reinitiation of consultation may be necessary.

This concurrence letter represents the collective assessment of the April 2013 version of the Manatee Key and its enclosures from the Service's three field offices in Florida: Panama City, North Florida, and South Florida. If you have any questions or concerns about this consultation, please feel free to contact Kalani Cairns at 772-469-4240.

Sincerely yours,



Larry Williams  
State Supervisor

cc: electronic copy only  
Corps, Jacksonville, Florida (Stuart Santos)  
Service, Atlanta, Georgia (Jack Arnold)  
Service, Jacksonville, Florida (Dawn Jennings)  
Service, Panama City, Florida (Don Imm)

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**THE CORPS OF ENGINEERS, JACKSONVILLE DISTRICT, AND THE STATE OF  
FLORIDA EFFECT DETERMINATION KEY FOR THE MANATEE IN FLORIDA  
April 2013**

**Purpose and background of the key**

The purpose of this document is to provide guidance to improve the review of permit applications by U.S. Army Corps of Engineers' (Corps) Project Managers in the Regulatory Division regarding the potential effects of proposed projects on the endangered West Indian manatee (*Trichechus manatus*) in Florida, and by the Florida Department of Environmental Protection or its authorized designee or Water Management District, for evaluating projects under the State Programmatic General Permit (SPGP) or any other Programmatic General Permits that the Corps may issue for administration by the above agencies. Such guidance is contained in the following dichotomous key. The key applies to permit applications for in-water activities such as, but not limited to: (1) dredging [new or maintenance dredging of not more than 50,000 cubic yards], placement of fill material for shoreline stabilization, and construction/placement of other in-water structures as well as (2) construction of docks, marinas, boat ramps and associated trailer parking spaces, boat slips, dry storage or any other watercraft access structures or facilities.

At a certain step in the key, the user is referred to graphics depicting important manatee areas or areas with inadequate protection. The maps can be downloaded from the Corps' web page at <http://www.saj.usace.army.mil/Missions/Regulatory/SourceBook.aspx>. We intend to utilize the most recent depiction of these areas, so should these areas be modified by statute, rule, ordinance and/or other legal mandate or authorization, we will modify the graphical depictions accordingly. These areas may be shaded or otherwise differentiated for identification on the maps.

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

**Scope of the key**

This key should only be used in the review of permit applications for effect determinations on manatees and should not be used for other listed species or for other aquatic resources such as Essential Fish Habitat (EFH). Corps Project Managers should ensure that consideration of the project's effects on any other listed species and/or on EFH is performed independently. This key may be used to evaluate applications for all types of State of Florida (State Programmatic General Permits, noticed general permits, standard general permits, submerged lands leases, conceptual and individual permits) and Department of the Army (standard permits, letters of permission, nationwide permits, and regional general permits) permits and authorizations. The final effect determination will be based on the project location and description; the potential effects to manatees, manatee habitat, and/or manatee critical habitat; and any measures (such as project components, standard construction precautions, or special conditions included in the authorization) to avoid or minimize effects to manatees or manatee critical habitat. 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 shall refer to the Manatee Programmatic Biological Opinion, dated March 21, 2011, for guidance on eliminating or minimizing potential adverse effects resulting from the proposed project. If unable to resolve the adverse effects, the Corps may refer the applicant to the U.S. Fish and Wildlife Service (Service) for further assistance in attempting to revise the proposed project to a “may affect, not likely to adversely affect” level. The Service will coordinate with the Florida Fish and Wildlife Conservation Commission (FWC) and the counties, as appropriate. Projects that provide new access for watercraft and key to “may affect, not likely to adversely affect” may or may not need to be reviewed individually by the Service.

**MANATEE KEY**  
**Florida<sup>1</sup>**  
**April 2013**

**The key is not designed to be used by the Corps' Regulatory Division for making their effect determinations for dredging projects greater than 50,000 cubic yards, the Corps' Planning Division in making their effect determinations for civil works projects or by the Corps' Regulatory Division for making their effect determinations for projects of the same relative scope as civil works projects. These types of activities must be evaluated by the Corps independently of the key.**

A. **Project is not located in waters accessible to manatees and does not directly or indirectly affect manatees (see Glossary).....No effect**

Project is located in waters accessible to manatees **or** directly or indirectly affects manatees ..... B

B. Project consists of one or more of the following activities, all of which are *May affect*:

1. blasting or other detonation activity for channel deepening and/or widening, geotechnical surveys or exploration, bridge removal, movies, military shows, special events, etc.;
2. installation of structures which could restrict or act as a barrier to manatees;
3. new or changes to existing warm or fresh water discharges from industrial sites, power plants, or natural springs or artesian wells (but only if the new or proposed change in discharge requires a Corps permit to accomplish the work);
4. installation of new culverts and/or maintenance or modification of existing culverts (where the culverts are 8 inches to 8 feet in diameter, ungrated and in waters accessible, or potentially accessible, to manatees)<sup>2</sup>;
5. mechanical dredging from a floating platform, barge or structure<sup>3</sup> that restricts manatee access to less than half the width of the waterway;
6. creation of new slips or change in use of existing slips, even those located in a county with a State-approved Manatee Protection Plan (MPP) in place and the number of slips is less than the MPP threshold, to accommodate docking for repeat use vessels, (e.g., water taxis, tour boats, gambling boats, etc; or slips or structures that are not civil works projects, but are frequently used to moor large vessels (>100') for shipping and/or freight purposes; does not include slips used for docking at boat sales or repair facilities or loading/unloading at dry stack storage facilities and boat ramps); [Note: For projects within Bay, Dixie, Escambia, Franklin, Gilchrist, Gulf, Hernando, Jefferson, Lafayette, Monroe (south of Craig Key), Nassau, Okaloosa, Okeechobee, Santa Rosa, Suwannee, Taylor, Wakulla or Walton County, the reviewer should proceed to Couplet C.]
7. any type of in-water activity in a Warm Water Aggregation Area (WWAA) or No Entry Area (see Glossary and accompanying Maps<sup>4</sup>); [Note: For residential docking facilities in a Warm Water Aggregation Area that is not a Federal manatee sanctuary or No Entry Area, the reviewer should proceed to couplet C.]
8. creation or expansion of canals, basins or other artificial shoreline and/or the connection of such features to navigable waters of the U.S.; [Note: For projects proposing a single residential dock, the reviewer should proceed to couplet C; otherwise, project is a *May Affect*.]

9. installation of temporary structures (docks, buoys, etc.) utilized for special events such as boat races, boat shows, military shows, etc., but only when consultation with the U.S. Coast Guard and FWS has not occurred; [Note: See programmatic consultation with the U.S. Coast Guard on manatees dated May 10, 2010.].
- Project is other than the activities listed above..... C
- C. Project is located in an Important Manatee Area (IMA) (see Glossary and accompanying Maps<sup>4</sup>) ..... D
- Project is not located in an Important Manatee Area (IMA) (see Glossary and accompanying Maps<sup>4</sup>) ..... G
- D. Project includes dredging of less than 50,000 cubic yards ..... E
- Project does not include dredging ..... G
- E. Project is for dredging a residential dock facility or is a land-based dredging operation..... N
- Project not as above..... F
- F. Project proponent **does not elect** to follow all dredging protocols described on the maps for the respective IMA in which the project is proposed ..... *May affect*
- Project proponent **elects** to follow all dredging protocols described on the maps for the respective IMA in which the project is proposed..... G
- G. Project provides new<sup>5</sup> access for watercraft, *e.g.*, docks or piers, marinas, boat ramps and associated trailer parking spaces, new dredging, boat lifts, pilings, floats, floating docks, floating vessel platforms, boat slips, dry storage, mooring buoys, or other watercraft access (residential boat lifts, pilings, floating docks, and floating vessel platforms installed in existing slips are not considered new access) or improvements allowing increased watercraft usage..... H
- Project does not provide new<sup>5</sup> access for watercraft, *e.g.*, bulkheads, seawalls, riprap, maintenance dredging, boardwalks and/or the maintenance (repair or rehabilitation) of currently serviceable watercraft access structures provided all of the following are met: (1) the number of slips is not increased; (2) the number of existing slips is not in question; and (3) the improvements do not allow increased watercraft usage..... N
- H. Project is located in the Braden River Area of Inadequate Protection (Manatee County) (see Glossary and accompanying AIP Map<sup>4</sup>) ..... *May affect*
- Project is not located in the Braden River Area of Inadequate Protection (Manatee County) (see Glossary and accompanying AIP Map<sup>4</sup>)..... I
- I. Project is for a multi-slip facility (see Glossary) ..... J
- Project is for a residential dock facility or is for dredging (see Glossary)..... N
- J. Project is located in a county that currently has a State-approved MPP in place (BREVARD, BROWARD, CITRUS, CLAY, COLLIER, DUVAL, INDIAN RIVER, LEE, MARTIN, MIAMI-DADE, PALM BEACH, ST. LUCIE, SARASOTA, VOLUSIA) or shares contiguous waters with a county having a State-approved MPP in place (LAKE, MARION, SEMINOLE)<sup>6</sup> ..... K
- Project is located in a county not required to have a State-approved MPP ..... L

- K. Project has been developed or modified to be consistent with the county’s State-approved MPP **and** has been verified by a FWC review (or FWS review if project is exempt from State permitting) **or** the number of slips is below the MPP threshold ..... N
- Project has not been reviewed by the FWC or FWS **or** has been reviewed by the FWC or FWS **and** determined that the project is not consistent with the county’s State-approved MPP ..... *May affect*
- L. Project is located in one of the following counties: CHARLOTTE, DESOTO<sup>7</sup>, FLAGLER, GLADES, HENDRY, HILLSBOROUGH, LEVY, MANATEE, MONROE<sup>7</sup>, PASCO<sup>7</sup>, PINELLAS ..... M
- Project is located in one of the following counties: BAY, DIXIE, ESCAMBIA, FRANKLIN, GILCHRIST, GULF, HERNANDO, JEFFERSON, LAFAYETTE, MONROE (south of Craig Key), NASSAU, OKALOOSA, OKEECHOBEE, PUTNAM, SANTA ROSA, ST. JOHNS, SUWANNEE, TAYLOR, WAKULLA, WALTON ..... N
- M. The number of slips does not exceed the residential dock density threshold (see Glossary) ..... N
- The number of slips exceeds the residential dock density threshold (see Glossary) ..... *May affect*
- N. Project impacts to submerged aquatic vegetation<sup>8</sup>, emergent vegetation or mangrove will have beneficial, insignificant, discountable<sup>9</sup> or no effects on the manatee<sup>10</sup> ..... O
- Project impacts to submerged aquatic vegetation<sup>8</sup>, emergent vegetation or mangrove may adversely affect the manatee<sup>10</sup> ..... *May affect*
- O. Project proponent **elects** to follow standard manatee conditions for in-water work<sup>11</sup> and requirements, as appropriate for the proposed activity, prescribed on the maps<sup>4</sup> ..... P
- Project proponent **does not elect** to follow standard manatee conditions for in-water work<sup>11</sup> and appropriate requirements prescribed on the maps<sup>4</sup> ..... *May affect*
- P. If project is for a new or expanding<sup>5</sup> multi-slip facility and is located in a county with a State-approved MPP in place **or** in Bay, Dixie, Escambia, Franklin, Gilchrist, Gulf, Hernando, Jefferson, Lafayette, Monroe (south of Craig Key), Nassau, Okaloosa, Okeechobee, Putnam, St. Johns, Santa Rosa, Suwannee, Taylor, Wakulla or Walton County, the determination of “*May affect, not likely to adversely affect*” is appropriate<sup>12</sup> and no further consultation with the Service is necessary.
- If project is for a new or expanding<sup>5</sup> multi-slip facility and is located in Charlotte, Desoto, Flagler, Glades, Hendry, Hillsborough, Levy, Manatee, Monroe (north of Craig Key), Pasco, or Pinellas County, further consultation with the Service is necessary for “*May affect, not likely to adversely affect*” determinations.
- If project is for repair or rehabilitation of a multi-slip facility and is located in an Important Manatee Area, further consultation with the Service is necessary for “*May affect, not likely to adversely affect*” determinations. If project is for repair or rehabilitation of a multi-slip facility and: (1) is **not** located in an Important Manatee Area; (2) the number of slips is not increased; (3) the number of existing slips is not in question; and (4) the improvements to the existing watercraft access structures do not allow increased watercraft usage, the determination of “*May affect, not likely to adversely affect*” is appropriate<sup>12</sup> and no further consultation with the Service is necessary.
- If project is a residential dock facility, shoreline stabilization, or dredging, the determination of “*May affect, not likely to adversely affect*” is appropriate<sup>12</sup> and no further consultation with the Service is necessary. **Note:** For residential dock facilities located in a Warm Water Aggregation Area or in a No Entry area, seasonal restrictions may apply. See footnote 4 below for maps showing restrictions.
- If project is other than repair or rehabilitation of a multi-slip facility, a new<sup>5</sup> multi-slip facility, residential dock facility, shoreline stabilization, or dredging, and does not provide new<sup>5</sup> access for watercraft or

improve an existing access to allow increased watercraft usage, the determination of “*May affect, not likely to adversely affect*” is appropriate<sup>12</sup> and no further consultation with the Service is necessary.

<sup>1</sup> On the St. Mary’s River, this key is only applicable to those areas that are within the geographical limits of the State of Florida.

<sup>2</sup> All culverts 8 inches to 8 feet in diameter must be grated to prevent manatee entrapment. To effectively prevent manatee access, grates must be permanently fixed, spaced a maximum of 8 inches apart (may be less for culverts smaller than 16 inches in diameter) and may be installed diagonally, horizontally or vertically. For new culverts, grates must be attached prior to installation of the culverts. Culverts less than 8 inches or greater than 8 feet in diameter are exempt from this requirement. If new culverts and/or the maintenance or modification of existing culverts are grated as described above, the determination of “*May affect, not likely to adversely affect*” is appropriate<sup>11</sup> and no further consultation with the Service is necessary.

<sup>3</sup> If the project proponent agrees to follow the standard manatee conditions for in-water work as well as any special conditions appropriate for the proposed activity, further consultation with the Service is necessary for “*May affect, not likely to adversely affect*” determinations. These special conditions may include, but are not limited to, the use of dedicated observers (see Glossary for definition of dedicated observers), dredging during specific months (warm weather months vs cold weather months), dredging during daylight hours only, adjusting the number of dredging days, does not preclude or discourage manatee egress/ingress with turbidity curtains or other barriers that span the width of the waterway, etc.

<sup>4</sup> Areas of Inadequate Protection (AIPs), Important Manatee Areas (IMAs), Warm Water Aggregation Areas (WWAAs) and No Entry Areas are identified on these maps and defined in the Glossary for the purposes of this key. These maps can be viewed on the [Corps’ web page](#). If projects are located in a No Entry Area, special permits may be required from FWC in order to access these areas (please refer to Chapter 68C-22 F.A.C. for boundaries; maps are also available at [FWC’s web page](#)).

<sup>5</sup> New access for watercraft is the addition or improvement of structures such as, but not limited to, docks or piers, marinas, boat ramps and associated trailer parking spaces, boat lifts, pilings, floats, floating docks, floating vessel platforms, (maintenance dredging, residential boat lifts, pilings, floating docks, and floating vessel platforms installed in existing slips are not considered new access), boat slips, dry storage, mooring buoys, new dredging, etc., that facilitates the addition of watercraft to, and/or increases watercraft usage in, waters accessible to manatees. The repair or rehabilitation of any type of currently serviceable watercraft access structure is not considered new access provided all of the following are met: (1) the number of slips is not increased; (2) the number of existing slips is not in question; and (3) the improvements to the existing watercraft access structures do not result in increased watercraft usage.

<sup>6</sup> Projects proposed within the St. Johns River portion of Lake, Marion, and Seminole counties and contiguous with Volusia County shall be evaluated using the Volusia County MPP.

<sup>7</sup> For projects proposed within the following areas: the Peace River in DeSoto County; all areas north of Craig Key in Monroe County, and the Anclote and Pithlachascotee Rivers in Pasco County, proceed to Couplet M. For all other locations in DeSoto, Monroe (south of Craig Key) and Pasco Counties, proceed to couplet N.

<sup>8</sup> Where the presence of the referenced vegetation is confirmed within the area affected by docks and other piling-supported minor structures and the reviewer has concluded that the impacts to SAV, marsh or mangroves would not adversely affect the manatee or its critical habitat, proceed to couplet O.

Where the presence of the referenced vegetation is confirmed within the area affected by docks and other piling-supported minor structures and the reviewer has concluded that the impacts to SAV, marsh or mangroves would adversely affect the manatee or its critical habitat, the applicant can elect to avoid/minimize impacts to that vegetation. In that instance, where impacts are unavoidable and the applicant elects to abide by or employ construction techniques that exceed the criteria in the following documents, the reviewer should conclude that the impacts to SAV, marsh or mangroves would not adversely affect the manatee or its critical habitat and proceed to couplet O.

- “Construction Guidelines in Florida for Minor Piling-Supported Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh or Mangrove Habitat,” prepared jointly by the U.S. Army Corps of Engineers and the National Marine Fisheries Service (August 2001) [refer to the [Corps’ web page](#)], and
- “Key for Construction Conditions for Docks or Other Minor Structures Constructed in or over Johnson’s seagrass (*Halophila johnsonii*),” prepared jointly by the National Marine Fisheries Service and U.S. Army Corps of Engineers (October 2002), for those projects within the known range of Johnson’s seagrass occurrence (Sebastian Inlet to central Biscayne Bay in the lagoon systems on the east coast of Florida) [refer to the [Corps’ web page](#)],

Where the presence of the referenced vegetation is confirmed within the area affected by docks and other piling-supported minor structures and the reviewer has concluded that the impacts to SAV, marsh or mangroves would adversely affect the manatee or its critical habitat, and the applicant does not elect to follow the above Guidelines, the Corps will need to request formal consultation on the manatee with the Service as *May affect*.

For activities other than docks and other piling-supported minor structures proposed in SAV, marsh, or mangroves (*e.g.*, new dredging, placement of riprap, bulkheads, etc.), if the reviewer determines the impacts to the SAV, marsh or mangroves will not adversely affect the manatee or its critical habitat, proceed to couplet O, otherwise the Corps will need to request formal consultation on the manatee with the Service as *May affect*.

<sup>9</sup> See Glossary, under “is not likely to adversely affect.”

<sup>10</sup> Federal reviewers, when making your effects determination, consider effects to manatee designated critical habitat pursuant to section 7(a)(2) of the Endangered Species Act. State reviewers, when making your effects determination, consider effects to manatee habitat within the entire State of Florida, pursuant to Chapter 370.12(2)(b) Florida Statutes.

<sup>11</sup> See the [Corps' web page](#) for manatee construction conditions. At this time, manatee construction precautions c and f are not required in the following Florida counties: Bay, Escambia, Franklin, Gilchrist, Gulf, Jefferson, Lafayette, Okaloosa, Santa Rosa, Suwannee, and Walton.

<sup>12</sup> By letter dated April 25, 2013, the Corps received the Service’s concurrence with “*May affect, not likely to adversely affect*” determinations made pursuant to this key for the following activities: (1) selected non-watercraft access projects; (2) watercraft-access projects that are residential dock facilities, excluding those located in the Braden River AIP; (3) launching facilities solely for kayaks and canoes, and (4) new or expanding multi-slip facilities located in Bay, Dixie, Escambia, Franklin, Gilchrist, Gulf, Hernando, Jefferson, Lafayette, Monroe (south of Craig Key), Nassau, Okaloosa, Okeechobee, Santa Rosa, Suwannee, Taylor, Wakulla or Walton County.

Additionally, in the same letter dated April 25, 2013, the Corps received the Service’s concurrence for “*May affect, not likely to adversely affect*” determinations specifically made pursuant to Couplet G of the key for the repair or rehabilitation of currently serviceable multi-slip watercraft access structures provided all of the following are met: (1) the project is not located in an IMA, (2) the number of slips is not increased; (3) the number of existing slips is not in question; and (4) the improvements to the existing watercraft access structures do not allow increased watercraft usage. Upon receipt of such a programmatic concurrence, no further consultation with the Service for these projects is required.

## GLOSSARY

**Areas of inadequate protection (AIP)** – Areas within counties as shown on the maps where the Service has determined that measures intended to protect manatees from the reasonable certainty of watercraft-related take are inadequate. Inadequate protection may be the result of the absence of manatee or other watercraft speed zones, insufficiency of existing speed zones, deficient speed zone signage, or the absence or insufficiency of speed zone enforcement.

**Boat slip** – A space on land or in or over the water, other than on residential land, that is intended and/or actively used to hold a stationary watercraft or its trailer, and for which intention and/or use is confirmed by legal authorization or other documentary evidence. Examples of boat slips include, but are not limited to, docks or piers, marinas, boat ramps and associated trailer parking spaces, boat lifts, floats, floating docks, pilings, boat davits, dry storage, etc.

**Critical habitat** – For listed species, this consists of: (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act (ESA), on which are found those physical or biological features (constituent elements) (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the ESA, upon a determination by the Secretary that such areas are essential for the conservation of the species. Designated critical habitats are described in 50 CFR 17 and 50 CFR 226.

**Currently serviceable** – Currently, serviceable means usable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

**Direct effects** – The direct or immediate effects of the project on the species or its habitat.

**Dredging** – For the purposes of this key, the term dredging refers to all in-water work associated with dredging operations, including mobilization and demobilization activities that occur in water or require vessels.

**Emergent vegetation** – Rooted emergent vascular macrophytes such as, but not limited to, cordgrass (*Spartina alterniflora* and *S. patens*), needle rush (*Juncus roemerianus*), swamp sawgrass (*Cladium mariscoides*), saltwort (*Batis maritima*), saltgrass (*Distichlis spicata*), and glasswort (*Salicornia virginica*) found in coastal salt marsh-related habitats (tidal marsh, salt marsh, brackish marsh, coastal marsh, coastal wetlands, tidal wetlands).

**Formal consultation** – A process between the Services and a Federal agency or applicant that: (1) determines whether a proposed Federal action is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat; (2) begins with a Federal agency's written request and submittal of a complete initiation package; and (3) concludes with the issuance of a biological opinion and incidental take statement by either of the Services. If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required (except when the Services concur, in writing, that a proposed

action “is not likely to adversely affect” listed species or designated critical habitat). [50 CFR 402.02, 50 CFR 402.14]

**Important manatee areas (IMA)** – Areas within certain counties where increased densities of manatees occur due to the proximity of warm water discharges, freshwater discharges, natural springs and other habitat features that are attractive to manatees. These areas are heavily utilized for feeding, transiting, mating, calving, nursing or resting as indicated by aerial survey data, mortality data and telemetry data. Some of these areas may be federally-designated sanctuaries or state-designated “seasonal no entry” zones. Maps depicting important manatee areas and any accompanying text may contain a reference to these areas and their special requirements. Projects proposed within these areas must address their special requirements.

**Indirect effects** – Those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur. Examples of indirect effects include, but are not limited to, changes in water flow, water temperature, water quality (*e.g.*, salinity, pH, turbidity, nutrients, chemistry), prop dredging of seagrasses, and manatee watercraft injury and mortality. Indirect effects also include watercraft access developments in waters not currently accessible to manatees, but watercraft access can, is, or may be planned to waters accessible to manatees by the addition of a boat lift or the removal of a dike or plug.

**Informal consultation** – A process that includes all discussions and correspondence between the Services and a Federal agency or designated non-Federal representative, prior to formal consultation, to determine whether a proposed Federal action may affect listed species or critical habitat. This process allows the Federal agency to utilize the Services’ expertise to evaluate the agency’s assessment of potential effects or to suggest possible modifications to the proposed action which could avoid potentially adverse effects. If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required (except when the Services concur, in writing, that a proposed action “is not likely to adversely affect” listed species or designated critical habitat). [50 CFR 402.02, 50 CFR 402.13]

**In-water activity** – Any type of activity used to construct/repair/replace any type of in-water structure or fill; the act of dredging.

**In-water structures – watercraft access structures** – Docks or piers, marinas, boat ramps, boat slips, boat lifts, floats, floating docks, pilings (depending on use), boat davits, etc.

**In-water structures – other than watercraft access structures** – Bulkheads, seawalls, riprap, groins, boardwalks, pilings (depending on use), etc.

**Is likely to adversely affect** – The appropriate finding in a biological assessment (or conclusion during informal consultation) if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions and the effect is not: discountable, insignificant, or beneficial (see definition of “is not likely to adversely affect”). An “is likely to adversely affect” determination requires the initiation of formal consultation under section 7 of the ESA.

**Is not likely to adversely affect** – The appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. **Discountable effects** are those extremely unlikely to occur. **Insignificant effects** relate to the size of the impact and should never reach the scale where take occurs. **Beneficial effects** are contemporaneous positive effects without any adverse effects to the species. Based on best judgment, a person would not (1) be able to meaningfully measure, detect, or evaluate insignificant effects or (2) expect discountable effects to occur.

**Manatee Protection Plan (MPP)** – A manatee protection plan (MPP) is a comprehensive planning document that addresses the long-term protection of the Florida manatee through law enforcement, education, boat facility siting, and habitat protection initiatives. Although MPPs are primarily developed by the counties, the plans are the product of extensive coordination and cooperation between the local governments, the FWC, the Service, and other interested parties.

**Manatee Protection Plan thresholds** – The smallest size of a multi-slip facility addressed under the purview of a Manatee Protection Plan (MPP). For most MPPs, this threshold is five slips or more. For Brevard, Clay, Citrus, and Volusia County MPPs, this threshold is three slips or more.

**Mangroves** – Rooted emergent trees along a shoreline that, for the purposes of this key, include red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*) and white mangrove (*Laguncularia racemosa*).

**May affect** – The appropriate conclusion when a proposed action may pose any effects on listed species or designated critical habitat. When the Federal agency proposing the action determines that a “may affect” situation exists, then they must either request the Services to initiate formal consultation or seek written concurrence from the Services that the action “is not likely to adversely affect” listed species. For the purpose of this key, all “may affect” determinations equate to “likely to adversely affect” and Corps Project Managers should request the Service to initiate formal consultation on the manatee or designated critical habitat. **No effect** – the appropriate conclusion when the action agency determines its proposed action will not affect a listed species or designated critical habitat.

**Multi-slip facility** – Multi-slip facilities include commercial marinas, private multi-family docks, boat ramps and associated trailer parking spaces, dry storage facilities and any other similar structures or activities that provide access to the water for multiple (five slips or more, except in Brevard, Clay, Citrus, and Volusia counties where it is three slips or more) watercraft. In some instances, the Corps and the Service may elect to review multiple residential dock facilities as a multi-slip facility.

**New access for watercraft** – New dredging and the addition, expansion or improvement of structures such as, but not limited to, docks or piers, marinas, boat ramps and associated trailer parking spaces, boat lifts, pilings, floats, floating docks, floating vessel platforms, (residential boat lifts, pilings, floats, and floating vessel platforms installed in existing slips are not considered new access), boat slips, dry storage, mooring buoys, etc., that facilitates the addition of watercraft to, and/or increases watercraft usage in, waters accessible to manatees.

**Observers** – During dredging and other in-water operations within manatee accessible waters, the standard manatee construction conditions require all on-site project personnel to watch for manatees to ensure that those standard manatee construction conditions are met. Within important manatee areas (IMA) and under special circumstances, heightened observation is needed. **Dedicated Observers** are those having some prior experience in manatee observation, are dedicated only for this task, and must be someone other than the dredge and equipment operators/mechanics. **Approved Observers** are dedicated observers who also must be approved by the Service (if Federal permits are involved) and the FWC (if state permits are involved), prior to work commencement. Approved observers typically have significant and often project-specific observational experience. Documentation on prior experience must be submitted to these agencies for approval and must be submitted a minimum of 30 days prior to work commencement. When dedicated or approved observers are required, observers must be on site during all in-water activities, and be equipped with polarized sunglasses to aid in manatee observation. For prolonged in-water operations, multiple observers may be needed to perform observation in shifts to reduce fatigue (recommended shift length is no longer than six hours). Additional information concerning observer approval can be found at [FWC's web page](#).

**Residential boat lift** – A boat lift installed on a residential dock facility.

**Residential dock density ratio threshold** – The residential dock density ratio threshold is used in the evaluation of multi-slip projects in some counties without a State-approved Manatee Protection Plan and is consistent with 1 boat slip per 100 linear feet of shoreline (1:100) owned by the applicant.

**Residential dock facility** – A residential dock facility means a private residential dock which is used for private, recreational or leisure purposes for single-family or multi-family residences designed to moor no more than four vessels (except in Brevard, Clay, Citrus, and Volusia counties which allow only two vessels). This also includes normal appurtenances such as residential boat lifts, boat shelters with open sides, stairways, walkways, mooring pilings, dolphins, etc. In some instances, the Corps and the Service may elect to review multiple residential dock facilities as a multi-slip facility.

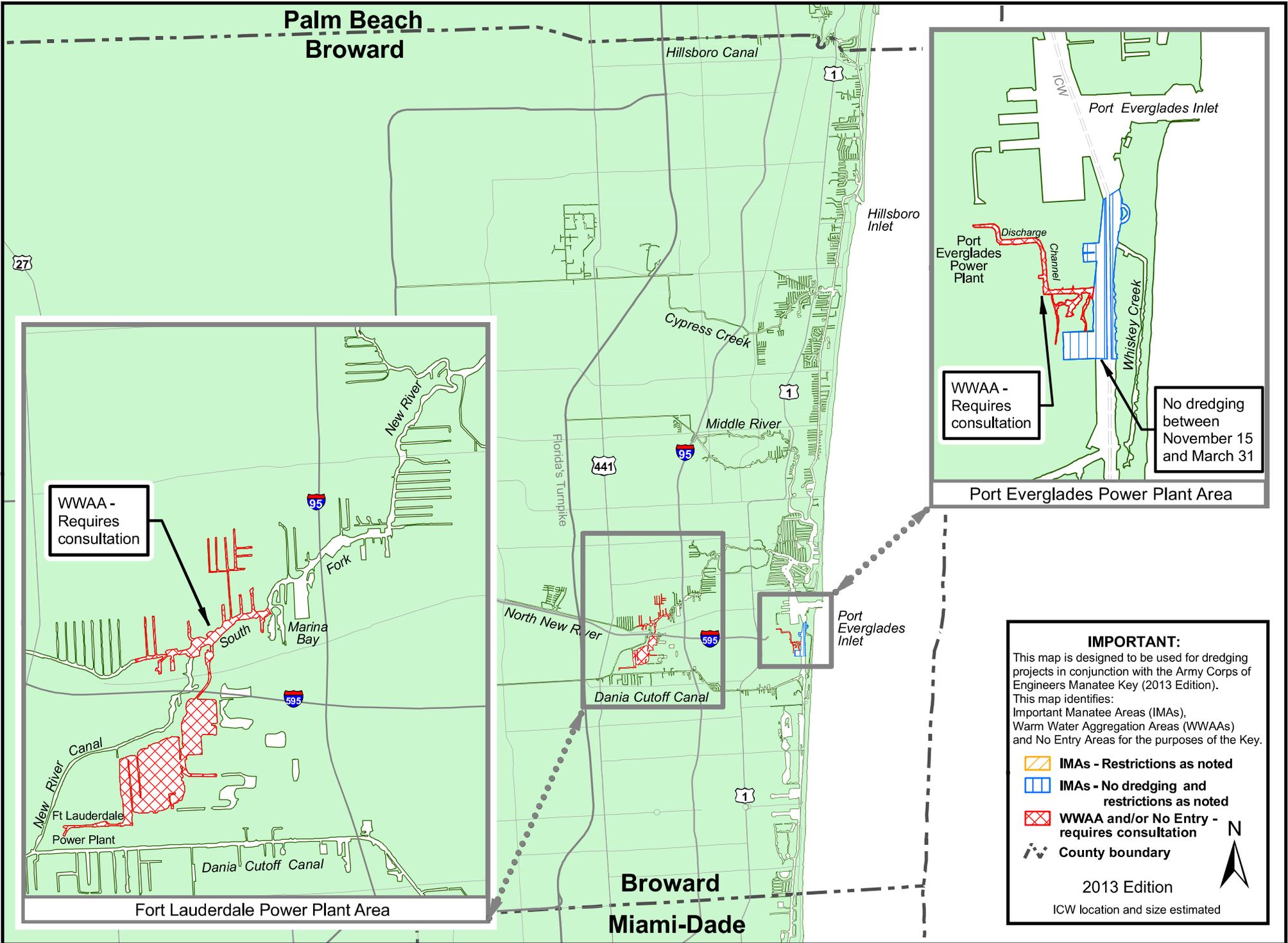
**Submerged aquatic vegetation (SAV)** – Rooted, submerged, aquatic plants such as, but not limited to, shoal grass (*Halodule wrightii*), paddle grass (*Halophila decipiens*), star grass (*Halophila engelmanni*), Johnson's seagrass (*Halophila johnsonii*), sago pondweed (*Potamogeton pectinatus*), clasping-leaved pondweed (*Potamogeton perfoliatus*), widgeon grass (*Ruppia maritima*), manatee grass (*Syringodium filiforme*), turtle grass (*Thalassia testudinum*), tapegrass (*Vallisneria americana*), and horned pondweed (*Zannichellia palustris*).

**Warm Water Aggregation Areas (WWAAs) and No Entry Areas** – Areas within certain counties where increased densities of manatees occur due to the proximity of artificial or natural warm water discharges or springs and are considered necessary for survival. Some of these areas may be federally-designated manatee sanctuaries or state-designated seasonal “no entry” manatee protection zones. Projects proposed within these areas may require consultation in order to offset expected adverse impacts. In addition, special permits may be required from the FWC in order to access these areas.

**Watercraft access structures** – Docks or piers, marinas, boat ramps and associated trailer parking spaces, boat slips, boat lifts, floats, floating docks, pilings, boat davits, dry storage, etc.

**Waters accessible to manatees** – Although most waters of the State of Florida are accessible to the manatee, there are some areas such as landlocked lakes that are not. There are also some weirs, salinity control structures and locks that may preclude manatees from accessing water bodies. If there is any question about accessibility, contact the Service or the FWC.

# Broward County



Palm Beach  
Broward

Hillsboro Canal

1

Hillsboro Inlet

Cypress Creek

1

Middle River

441

95

Florida's Turnpike

North New River

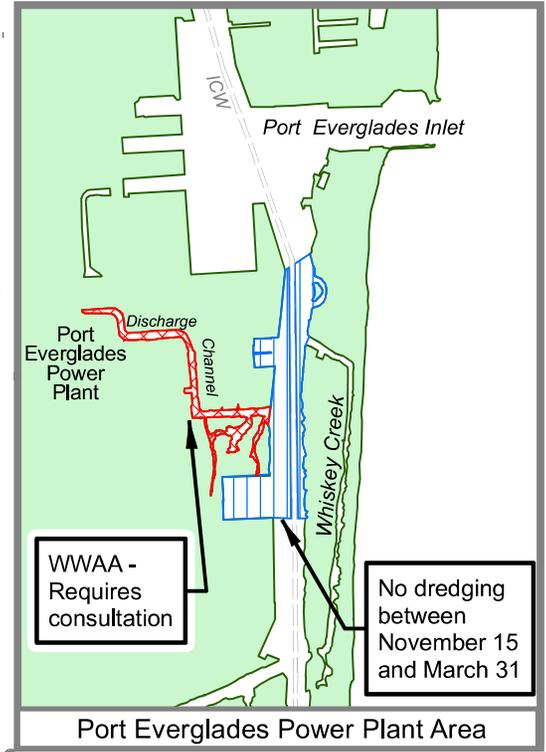
595

Dania Cutoff Canal

Port Everglades Inlet

1

Broward  
Miami-Dade



WWAA -  
Requires  
consultation

No dredging  
between  
November 15  
and March 31

Port Everglades Power Plant Area

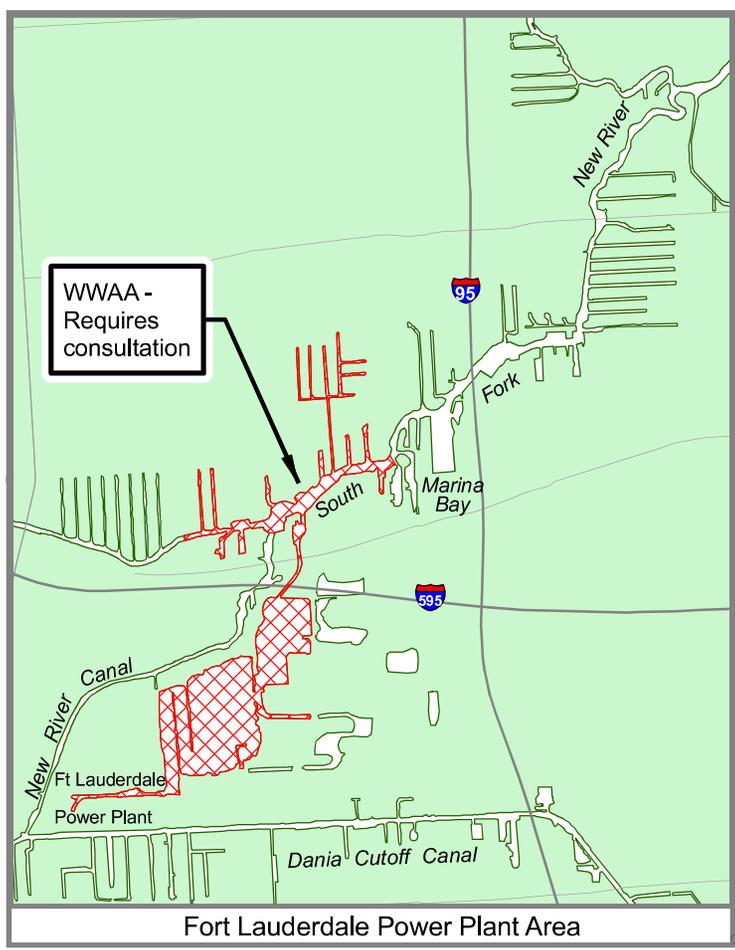
WWAA -  
Requires  
consultation

**IMPORTANT:**  
This map is designed to be used for dredging projects in conjunction with the Army Corps of Engineers Manatee Key (2013 Edition). This map identifies: Important Manatee Areas (IMAs), Warm Water Aggregation Areas (WWAAs) and No Entry Areas for the purposes of the Key.

-  IMAs - Restrictions as noted
-  IMAs - No dredging and restrictions as noted
-  WWAA and/or No Entry - requires consultation
-  County boundary

N

2013 Edition  
ICW location and size estimated



Fort Lauderdale Power Plant Area



**APPENDIX H**  
**FBB Survey Report 2021**

**FM# 436903-1**  
**Bat Roost Survey**  
**7/29/2021**

Site #	Lat/Long	Tree Type	Tree Height (feet)	DBH (inch)	Guano (Y/N)	Roost (Y/N)	Assumed Presence (Y/N)
1	26°1'1"N 80°10'3"W	Royal Palm	<15	<8	N	N	N
2	26°0'53"N 80°10'3"W	Royal Palm	<15	<8	N	N	N
3	26°0'53"N 80°10'3"W	Royal Palm	<16	<8	N	N	N
4	26°0'48"N 80°10'2"W to 26°0'45"N 80°10'2"W	15 Royal Palm	<16	<8	N	N	N
5	26°0'42"N 80°10'2"W to 26°0'41"N 80°10'1"W	7 Cabbage Palm	<15	<8	N	N	N
6	26°0'35"N 80°10'1"W	5 Sable Palm	<15	<8	N	N	N
7	26°0'20"N 80°10'2"W	Live Oak	<15	18	N	N	N
8	26°0'20"N 80°10'3"W	Live Oak	<15	14	N	N	N
9	25°59'48"N 80°9'60"W	Dead Sable Palm	<15	11	N	N	N
10	25°59'48"N 80°9'0"W	Dead Royal Palm	<15	15	N	N	N
11	25°59'47"N 80°9'60"W	Royal Palm	<15	15	N	N	N
12	25°59'47"N 80°10'0"W	Royal Palm	<15	10	N	N	N
13	25°59'47"N 80°10'0"W	Mahogany	<15	13	N	N	N
14	25°59'47"N 80°10'0"W	Sable Palm	<15	11	N	N	N
15	25°59'47"N 80°10'0"W	Mahogany	<15	10	N	N	N
16	25°59'47"N 80°10'1"W	Sable Palm	<15	15	N	N	N
17	25°59'47"N 80°10'1"W	Mahogany	<15	14	N	N	N
18	25°59'47"N 80°10'1"W	Sable Palm	<15	13	N	N	N
19	25°59'18"N 80°9'58"W	8 Royal Palms	<15	<8	N	N	N
20	25°58'25"N 80°9'58"W to 25°58'27"N 80°9'58"W	12 Royal Palms	<15	<8	N	N	N
21	25°58'23"N 80°9'58"W	4 Canary Palms	<15	<8	N	N	N
22	25°58'11"N 80°9'58"N	4 Cypress Trees	<15	<8	N	N	N
23	25°58'11"N 80°9'58"N	12 Royal Palms	<15	<8	N	N	N
24	25°58'7"N 80°9'57"N	14 Royal Palms	<15	<8	N	N	N
25	25°58'29"N 80°9'56"N	9 Royal Palms	<15	<8	N	N	N
26	25°58'34"N 80°9'57"N	11 Royal Palms	<15	<8	N	N	N
27	25°58'38"N 80°9'57"W to 25°58'44"N 80°9'5"W	40 Sable Palms	<15	<8	N	N	N

**FM# 436903-1**  
**Bat Roost Survey**  
**7/29/2021**

28	25°58'53"N 80°9'55"W	26 Cabbage Palms	<15	<8	N	N	N
29	25°59'4"N 80°9'55"W	6 Royal Palms	<15	<8	N	N	N
30	25°59'8"N 80°9'55"W	3 Royal Palms	<15	<8	N	N	N
31	25°59'9"N 80°9'55"W	2 Royal Palms	<15	<8	N	N	N
32	25°59'40"N 80°9'56"W	18 Sable Palms	<15	<8	N	N	N
33	25°59'49"N 80°9'56"W	11 Sable Palms	<15	<8	N	N	N
34	25°59'53"N 80°9'57"W	5 Sable Palms	<15	<8	N	N	N
35	26°0'14"N 80°10'0"W	12 Sable Palms	<15	<8	N	N	N
36	26°0'28"N 80°9'59"W	46 Sable Palms	<15	<8	N	N	N
37	26°0'28"N 80°9'59"W	10 Sable Palms	<15	<8	N	N	N
38	26°0'37"N 80°9'58"W	7 Royal Pals	<15	<8	N	N	N
39	26°0'41"N 80°9'58"W	Sable Palm	<15	12	N	N	N
40	26°0'41"N 80°9'58"W	3 Black Olive	<15	<8	N	N	N
41	26°0'41"N 80°9'58"W	5 Royal Palm	<15	<8	N	N	N
42	26°1'4"N 80°10'1"W	Multiple Cypress	<15	<8	N	N	N

## **Appendix B: Full Acoustic / Roost Survey Framework**

*Purpose:* The purpose of this survey is to: (1) determine if Florida bonneted bats are likely to be actively roosting or using the site; (2) locate active roost(s) and avoid the loss of the structure, if possible; and, (3) avoid or minimize the take of individuals. In some cases, changes in project designs or activities can help avoid and minimize take. For example, project proponents may be able to retain suspected roosts or conserve roosting and foraging habitats. Changing the timing or nature of activities can also help reduce the losses of non-volant young or effects to pregnant or lactating females. If properly conducted, acoustic surveys are the most effective way to determine presence and assess habitat use. If the applicant is unable to follow or does not want to follow the Full Acoustic/Roost Survey framework when recommended according to the Key, the Corps (or other Action Agency) will not be able to use these Guidelines and will need to provide a biologically supported rationale using the best available information for their determination in their request for consultation.

*General Description:* This is a *comprehensive survey effort*, and robust acoustic surveys (*i.e.*, surveys conducted 30 minutes prior to sunset to 30 minutes after sunrise, over multiple nights) are a fundamental component of the approach. Depending upon acoustic results and habitat type, it may also include: observations at emergence (*e.g.*, emergence surveys during which observers look and listen for bats to come out of roost structures around sunset), visual inspection of trees/snags (*i.e.*, those with cavities, hollows, and loose bark) and other roost structures with tree-top cameras, or follow-up targeted acoustic surveys. Methods are dependent upon composition and configuration of project site and willingness and ability of applicant and partners to conserve roosting and foraging habitats on site.

### General Survey Protocol:

*[Note: The Service will provide more information in separate detailed survey protocols in the near future. This will include specific information on: detector types, placement, orientation, verification of proper functioning, analysis, reporting requirements, etc.]*

- Approach is intended for project sites > 5 acres (2 hectares).
- For sites containing roosting habitat, acoustic surveys should primarily focus on assessing roosting habitat within the project site that will be lost or modified (*i.e.*, areas that will not be conserved), and locations on the property within 250 feet (76.2 meters) of areas that will not be conserved. This will help avoid or minimize the loss of an active roost and individuals. Secondly, since part of the purpose is to determine if Florida bonneted bats are using the site, acoustic devices should also be placed near open water and wetlands to maximize chances of detection and aid in assessing foraging habitat that may be lost.
- For sites that do not contain ANY roosting habitat, but do contain foraging habitat (see Figure 3 - Consultation Flowchart and Key, Step 2 [no], Step 13 [yes]), efforts should focus on assessing foraging habitat within the project site that will be lost or modified (*i.e.*, areas that will not be conserved).
- Acoustic surveys should be performed by those who are trained and experienced in setting up, operating, and maintaining acoustic equipment; and retrieving, saving,

analyzing, and interpreting data. Surveyors should have completed one or more of the available bat acoustic courses/workshops, or be able to show similar on-the-job or academic experience (Service 2018).

- Due to the variation in the quality of recordings, the influence of clutter, the changing performances of software packages over time, and other factors, manual verification is recommended (Loeb *et al.* 2015). Files that are identified to species from auto-ID programs must be visually reviewed and manually verified by experienced personnel.
- Acoustic devices should be set up to record from 30 minutes prior to sunset to 30 minutes after sunrise for multiple nights, under suitable weather conditions.
- Acoustic surveys can be conducted any time of year as long as weather conditions meet the criteria. If any of the following weather conditions exist at a survey site during acoustic sampling, note the time and duration of such conditions, and repeat the acoustic sampling effort for that night: (a) temperatures fall below 65°F (18.3°C) during the first 5 hours of survey period; (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first 5 hours of the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale) for 30 minutes or more during the first 5 hours of the survey period (Service 2018). At a minimum, nightly weather conditions for survey sites should be checked using the nearest NOAA National Weather Service station and summarized in the survey reports. Although not required at this time, it has been demonstrated that conducting surveys on warm nights late in the spring can help maximize detection probabilities (Ober *et al.* 2016; Bailey *et al.* 2017).
- Acoustic devices should be calibrated and properly placed. Microphones should be directed away from surrounding vegetation, not beneath tree canopy, away from electrical wires and transmission lines, away from echo-producing surfaces, and away from external noises. Directional microphones should be aimed to sample the majority of the flight path/zone. Omnidirectional microphones should be deployed on a pole in the center of the flight path/zone and oriented horizontally. For monitoring possible roost sites, microphones should be directed to maximize likelihood of detection.
- To standardize recordings, acoustic device recordings should have a 2-second trigger window and a maximum file length of 15 seconds.
- The number of acoustic survey sites and nights needed for the assessment is dependent upon the overall acreage of suitable habitat proposed to be impacted by the action.
  - For non-linear projects, a minimum of 16 detector nights per 20 acres of suitable habitat expected to be impacted is recommended.
  - For linear projects (*e.g.*, roadways, transmission lines), a minimum of five detector nights per 0.6 mi (0.97 km) is recommended. Detectors can be moved to multiple locations within each kilometer surveyed, but must remain in a single location throughout any given night.
  - For any site, and in particular for sites > 250 acres, please contact the Service to assist in designing an appropriate approach.
- If results of acoustic surveys show **high Florida bonneted bat activity** or **Florida bonneted bat roosting likely** (*e.g.*, high activity early in the evening) (see definitions in Glossary), follow-up methods such as emergence surveys, visual inspection of the roosting structures, or follow-up acoustic surveys are recommended to locate potential roosts. Using a combination of methods may be helpful.

- For bat emergence surveys, multiple observers should be stationed at potential roosts if weather conditions (as above) are suitable. Surveyors should be quietly stationed 30 minutes before sunset so they are ready to look and listen for emerging FBBs from sunset to 1½ hours after sunset. When conducting emergence surveys it is best to orient observers so that the roost is silhouetted in the remaining daylight; facing west can help maximize the ability to notice movement of animals out of a roost structure.
- Visual inspection of trees with cavities and loose bark during the day may be helpful. Active RCW trees should not be visually inspected during the RCW breeding season (April 15 through June 15).
- Visual inspection alone is not recommended due to the potential for roosts to be too high for cameras to reach, too small for cameras to fit, or shaped in a way that contents are out of view (Braun de Torrez *et al.* 2016).
- If roosting is suspected on site, use tree-top cameras during the day to search those trees/snags or other structures that have potential roost features (*i.e.*, cavities, hollows, crevices, or other structure for permanent shelter). If unsuccessful (*e.g.*, cannot see entire contents within a given cavity, cannot reach cavity, cannot see full extent of cavity) OR occupied roosts are found with the tree-top camera within the area in which high Florida bonneted bat activity/likely Florida bonneted bats roosting were identified, we recommend emergence surveys and/or acoustics to verify occupancy and/or identify bat species.
- Provide report showing effort, methods, weather conditions, findings, and summary of acoustic data relating to Florida bonneted bats (*e.g.*, # of calls, time of calls, and station number) organized by the date on which the data were collected. Sonograms of all calls with signatures at or below 20kHz shall be included in the report. The report shall be provided to the Corps project manager assigned to the project for which the survey was conducted and to the Service via the email address [verobeach@fws.gov](mailto:verobeach@fws.gov). **Raw acoustic data should be provided to the Service for all surveys. Raw acoustic data should be provided as “all raw data” and “all raw data with signatures at or below 20kHz”. Data can be submitted to the Service via flash drive, memory stick, or hard drive. Data can be submitted digitally to [verobeach@fws.gov](mailto:verobeach@fws.gov) or via mail to U.S. Fish and Wildlife Service, Attn: Florida bonneted bat data manager, 1339 20<sup>th</sup> Street, Vero Beach, Florida 32960.**
- Negative surveys are valid for 1 year after completion of the survey.

If you have comments, or suggestions on this survey protocols, please email your comments to [FBBguidelines@fws.gov](mailto:FBBguidelines@fws.gov). These comments will be reviewed and incorporated in an annual review.

## Literature Cited – Appendix B

- Bailey, A.M., H.K. Ober, A.R. Sovie, and R.A. McCleery. 2017. Impact of land use and climate on the distribution of the endangered Florida bonneted bat. *Journal of Mammalogy*. 98:1586-1593.
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- Ober, H.K., E.C. Braun de Torrez, J.A. Gore, A.M. Bailey, J.K. Myers, K.N. Smith, and R.A. McCleery. 2016. Social organization of an endangered subtropical species, *Eumops floridanus*, the Florida bonneted bat. *Mammalia* 2016:1-9.
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## Appendix C: Limited Roost Survey Framework

*Purpose:* The purpose of this survey is to: (1) determine if Florida bonneted bats are likely to be actively roosting within suitable structures on-site; (2) locate active roost(s) and avoid the loss of the structure, if possible; and, (3) avoid or minimize the take of individuals. In some cases, changes in project designs or activities can help avoid and minimize take. For example, applicants and partners may be able to retain the suspected roosts or conserve roosting and foraging habitats. Changing the timing of activities can also help reduce the losses of non-volant young or effects to pregnant or lactating females.

*General Description:* This is a *reduced survey effort* that may include the following methods: visual inspection of trees/snags (*i.e.*, those with cavities, hollows, and loose bark) and other roost structures with tree-top cameras, observations at emergence (*e.g.*, emergence surveys during which observers look and listen for bats to come out of roost structures around sunset), acoustic surveys, or a combination of these methods. Methods are fairly flexible and dependent upon composition and configuration of project site and willingness and ability of applicant and partners to conserve roosting habitat on site.

### General Survey Protocol:

*[Note: The Service will provide more information in separate, detailed survey protocols in the near future. This will include specific information on: detector types, placement, orientation, verification of proper functioning, analysis, reporting requirements, etc.]*

- Approach is **intended only for small project sites** (*i.e.*, sites  $\leq 5$  acres [2 hectares]).
- Efforts should focus on assessing potential roosting structures within the project site that will be lost or modified (*i.e.*, areas that will not be conserved), or are located on the property within 250 feet (76.2 meters) of areas that will not be conserved.

### **Identification of potential roost structures**

- This step is necessary prior to any of the methods that follow.
- Run line transects through roosting habitat close enough that all trees and snags are easily inspected. Transect spacing will vary with habitat structure and season from a maximum of 91 m (300 ft) between transects in very open pine stands to 46 m (150 ft) or less in areas with dense mid-story. Transects should be oriented north to south, to optimize cavity detectability because many RCW cavity entrances are oriented in a westerly direction (Service 2004).
- Visually inspect all trees and snags or other structures for evidence of cavities, hollows, crevices that can be used for permanent shelter. Using binoculars, examine structures for cavities, loose bark, hollows, or other crevices that are large enough for Florida bonneted bats (diameter of opening  $>$  or  $=$  to 1 inch (2.5 cm) (Braun de Torrez *et al.* 2016).
- When potential roosting structures are found, record their location in the field using a Global Positioning System (GPS) unit.

### **Visual Inspection of trees and snags with tree-top cameras**

- Visually inspect all cavities using a video probe (peeper) and assess the cavity contents.

Active RCW trees should not be visually inspected during the RCW breeding season (April 15 through June 15).

- Visual inspection alone is valid only when the entire cavity is observed and the contents can be identified. Typically, acoustics at emergence will also be needed to definitively identify bat species, if bats are present or suspected.
- If bats are suspected, or if contents cannot be determined, or if the entire cavity cannot be observed with the video probe; follow methods for an Acoustic Survey or an Emergence Survey (below). If the Corps (or other action agency) or applicant does not wish to conduct acoustic or emergence surveys, the Corps (or other action agency) cannot use the key and must request formal consultation with the Service.
- Record tree species or type of cavity structure, tree diameter and height, cavity height, cavity orientation and cavity contents.

### **Emergence Surveys**

- For bat emergence surveys, multiple observers should be stationed at potential roosts if weather conditions (as described below in Acoustic Surveys) are suitable.
- Surveyors should be quietly stationed 30 minutes prior to sunset so they are ready to look and listen for emerging Florida bonneted bats from sunset to 1½ hours after sunset.
- When conducting emergence surveys it is best to orient observers so that the roost is silhouetted in the remaining daylight; facing west can help maximize the ability to notice movement of animals out of a roost structure.
- Record number of bats that emerged, the time of emergence, and if bat calls were heard.

### **Acoustic surveys**

- Acoustic surveys should be performed by those who are trained and experienced in setting up, operating, and maintaining acoustic equipment; and retrieving, saving, analyzing, and interpreting data. Surveyors should have completed one or more of the available bat acoustic courses/workshops, or be able to show similar on-the-job or academic experience (Service 2018).
- Due to the variation in the quality of recordings, the influence of clutter, and the changing performances of software packages over time, and other factors, manual verification is recommended (Loeb *et al.* 2015). Files that are identified to species from auto-ID programs must be visually reviewed and manually verified by experienced personnel.
- Acoustic devices should be set up to record from 30 minutes prior to sunset to 30 minutes after sunrise for multiple nights, under suitable weather conditions.
- Acoustic surveys can be conducted any time of year as long as weather conditions meet the criteria. If any of the following weather conditions exist at a survey site during acoustic sampling, note the time and duration of such conditions, and repeat the acoustic sampling effort for that night: (a) temperatures fall below 65°F (18.3°C) during the first 5 hours of survey period; (b) precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first 5 hours of the survey period; and (c) sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale) for 30 minutes or more during the first 5 hours of the survey period (Service 2018). At a minimum, nightly weather conditions for survey sites should be checked using the nearest NOAA National Weather Service station and summarized in the survey reports. Although not required at this time, it has been demonstrated that conducting surveys on

warm nights late in the spring can help maximize detection probabilities (Ober *et al.* 2016; Bailey *et al.* 2017).

- Acoustic devices should be calibrated and properly placed. Microphones should be directed away from surrounding vegetation, not beneath tree canopy, away from electrical wires and transmission lines, away from echo-producing surfaces, and away from external noises. Directional microphones should be aimed to sample the majority of the flight path/zone. Omnidirectional microphones should be deployed on a pole in the center of the flight path/zone and oriented horizontally. For monitoring possible roost sites, microphones should be directed to maximize likelihood of detection.
- To standardize recordings, acoustic device recordings should have a 2-second trigger window and a maximum file length of 15 seconds.
- Acoustic surveys should be conducted over a minimum of four nights.
- If acoustic devices cannot be left in place for the entire night for multiple nights as above, then a combination of short acoustic surveys (from sunset and extending for 1½ hours), stationed observers for emergence surveys or visual inspection of trees/snags with tree-top cameras may be acceptable. Contact the Service for guidance under this circumstance.

### **Reporting**

- Provide report showing effort, methods, weather conditions, findings, and summary of acoustic data relating to Florida bonneted bat by date (*e.g.*, # of calls, time of calls). Sonograms of all calls with signatures at or below 20kHz shall be included in the report. The report shall be provided to the Corps project manager assigned to the project for which the survey was conducted and to the Service via the email address **verobeach@fws.gov**. **Raw acoustic data should be provided to the Service for all surveys. Raw acoustic data should be provided as “all raw data” and “all raw data with signatures at or below 20kHz”. Data can be submitted to the Service via flash drive, memory stick, or hard drive. Data can be submitted digitally to verobeach@fws.gov or via mail to U.S. Fish and Wildlife Service, Attn: Florida bonneted bat data manager, 1339 20<sup>th</sup> Street, Vero Beach, Florida 32960.**
- Negative surveys are valid for 1 year after completion of the survey

If you have comments, or suggestions on this survey protocols, please email your comments to [FBBguidelines@fws.gov](mailto:FBBguidelines@fws.gov). These comments will be reviewed and incorporated in an annual review.

## Literature Cited – Appendix C

- Bailey, A.M., H.K. Ober, A.R. Sovie, and R.A. McCleery. 2017. Impact of land use and climate on the distribution of the endangered Florida bonneted bat. *Journal of Mammalogy*. 98:1586-1593.
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- U.S. Fish and Wildlife Service. 2004. South Florida Ecological Services Office DRAFT July 12, 2004 Species Conservation Guidelines South Florida Red-cockaded Woodpecker. Appendix A. Red-cockaded Woodpecker South Florida Survey Protocol. July 12, 2004. South Florida Ecological Service Office, Vero Beach Florida. <https://www.fws.gov/verobeach/BirdsPDFs/200407SlopesCompleteRedCockadedWoodpecker.pdf>
- U.S. Fish and Wildlife Service. 2018. Range-wide Indiana bat survey guidelines. <https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2018RangewideIBatSurveyGuidelines.pdf>