U.S. Department
of Transportation
**Federal Transit
Administration**

REGION IV
Alabama, Florida, Georgia,
Kentucky, Mississippi,
North Carolina, Puerto
Rico, South Carolina,
Tennessee, Virgin Islands

230 Peachtree St.,
N.W., Suite 1400
Atlanta, GA 30303
404-865-5600

March 29, 2024

Larry Williams
State Program Supervisor
US Fish and Wildlife Service
Florida Ecological Services Office
7915 Baymeadows Way, Suite 200
Jacksonville, FL 32256-7517

Subject: Broward Commuter Rail (BCR) South Project - Natural Resources Evaluation Report

Dear Mr. Williams,

The Federal Transit Administration (FTA) is the lead Federal agency for the Broward Commuter Rail (BCR) South project. This project is currently in the development phase. In accordance with the Endangered Species Act (ESA) Section 7, a consultation/concurrence letter is respectfully requested for this project.

The project limits extend along approximately 11.5 miles of existing Florida East Coast Rail (FECR) from Aventura in Miami-Dade County to Fort Lauderdale in Broward County. The proposed BCR South project will add commuter rail service to the existing freight rail and intercity passenger rail services that currently operate on the FECR corridor. The project proposes three new passenger stations along the corridor at the following locations:

- Hollywood (between Tyler Street and Taylor Street)
- Fort Lauderdale-Hollywood International (FLL) Airport
- South Fort Lauderdale (between SW 15th Street and SW 17th Street)

Attached with this correspondence, please find the Natural Resources Evaluation (NRE) report completed for this proposed project. No significant impacts are anticipated to any Federally listed species from the proposed project. In addition, No Essential Fish Habitat occurs within the project area and no involvement with Essential Fish Habitat is anticipated.

We kindly request the USFWS review the enclosed NRE report and provide communication on concurrence with the proposed ESA Section 7 effect determinations. The FTA looks forward to consulting with your office on this proposed project. If we can be of further assistance, please contact Mr. Ron Smith of my staff at 404-865-5643 or ronald.smith@dot.gov.

Sincerely,

Yvette G. Taylor

Yvette G. Taylor, PhD
Regional Administrator

Enclosure: Natural Resources Evaluation (NRE) Report

CC: Mr. John Wrublik, USFWS, Vero Beach Branch Office

NATURAL RESOURCES EVALUATION REPORT

Florida Department of Transportation District 4
Broward Commuter Rail South
Broward County, Florida
Financial Management Number: 452240-1

February 2024

Natural Resources Evaluation Report

Project Development and Environment (PD&E) Study

Broward Commuter Rail South

Broward County, Florida

February 5, 2024

Financial Project ID: 452240-1

Revision: Draft

Executive Summary

Federal and state listed species with potential to occur in the project corridor were identified through research and coordination with US Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission. Field investigations of the project area were also conducted to evaluate the potential presence of protected species and habitats.

The project corridor is heavily urbanized and lacks natural habitats for wildlife. No significant impacts are anticipated to any protected species from the proposed project. Effect determinations are provided in **Tables ES.1** and **ES.2**. Impacts are anticipated to an existing stormwater pond which is considered an Other Surface Water, but no impacts to wetlands are anticipated from the proposed project. No permits are required from the US Army Corps of Engineers. An Environmental Resource Permit will be required from South Florida Water Management District due to impacts to existing stormwater management systems and for any increases in impermeable cover. No Essential Fish Habitat occurs in the project area and no involvement with Essential Fish Habitat is anticipated.

Table ES.1 Effect Determinations for Listed Wildlife Species

Common Name	Scientific Name	Federal Status	State Status	Indications of Presence During Surveys	Effect Determination
Eastern Indigo Snake	*Drymarchon corais couperi*	FT	*	No	May Affect Not Likely to Adversely Affect
Everglade snail kite	*Rostrhamus sociabilis plumbeus*	FE	-	No	No Effect
Florida bonneted bat	*Eumops floridanus*	FE	*	No	No Effect
Florida scrub-jay	*Aphelocoma coerulescens*	FT	*	No	No Effect
Wood stork	*Mycteria americana*	FT	*	No	No Effect

Notes: FE = Federally Endangered, FT = Federally Threatened, * = Federally listed species are also considered to be state listed.

Table ES.2 Effect Determinations for Listed Plant Species

Common Name	Scientific Name	Federal Status	State Status	Effect Determination
Beach Jacquemontia	*Jacquemontia reclinata*	FE	*	No Effect
Blodgett's Silverbush	*Argythamnia blodgettii*	FT	*	No Effect
Cape Sable Thoroughwort	*Chromolaena frustrata*	FE	*	No Effect
Carter's Mustard	*Warea carteri*	FE	*	No Effect
Carter's Small-flowered Flax	*Linum carteri carteri*	FE	*	No Effect
Crenulate Lead-plant	*Amorpha crenulata*	FE	*	No Effect
Deltoid Spurge	*Chamaesyce deltoidea ssp. deltoidea*	FE	*	No Effect
Everglades Bully	*Sideroxylon reclinatum ssp. austrofloridense*	FT	*	No Effect
Florida Brickell-bush	*Brickellia mosieri*	FE	*	No Effect
Florida Pineland Crabgrass	*Digitaria pauciflora*	FT	*	No Effect
Florida Prairie-clover	*Dalea carthagenensis floridana*	FE	*	No Effect
Florida Semaphore Cactus	*Consolea corallicola*	FE	*	No Effect
Pineland Sandmat	*Chamaesyce deltoidea pinetorum*	FT	*	No Effect
Sand Flax	*Linum arenicola*	FE	*	No Effect
Small's Milkpea	*Galactia smallii*	FE	*	No Effect
Tiny Polygala	*Polygala smallii*	FE	*	No Effect

Notes: FE = Federally Endangered, FT = Federally Threatened, * = Federally listed species are also considered to be state listed.

Table of Contents

Tables

Figures

Appendices

1.0 Project Description and Purpose and Need

1.1 Project Description

The proposed Broward Commuter Rail (BCR) South Project will add commuter rail service to the existing freight rail and intercity passenger rail services that currently operate on the Florida East Coast Railway (FECR) corridor between the City of Aventura, located in Miami-Dade County, and the City of Fort Lauderdale, located in Broward County, approximately 11.5 miles. The project proposes three new passenger stations, depicted on **Figure 1.1** and at the following locations:

- Hollywood (between Tyler Street and Taylor Street)
- Fort Lauderdale-Hollywood International (FLL) Airport
- South Fort Lauderdale (between SW 15th Street and SW 17th Street)

Miami-Dade County has been planning the implementation of commuter rail service in the FEC corridor from Downtown Miami to the Brightline Station in Aventura, under a separate study known as the Northeast Corridor (NEC). The NEC is in the Project Development (PD) phase with the Federal Transit Administration (FTA) and has recently received environmental approval for the NEC project. Consistent with the Miami-Dade NEC, the proposed BCR South weekday service is intended to have 60-minute base headways, with 30-minute peak service, and 60-minute weekend and holiday service. The weekday peak hours are estimated to be between 5:00 a.m. and 9:00 a.m. and 4:00 p.m. to 8:00 p.m. Detailed schedules will be based on additional corridor modeling and adjusted during subsequent phase. The BCR South project entered FTA's PD phase in December of 2022.

CONCEPTUAL – SUBJECT TO CHANGE

Figure 1.1: BCR South Project Location and Alignment Map

1.2 Purpose and Need

The purpose of this project is to implement commuter rail service along the existing FECR corridor from Aventura in Miami-Dade County into Broward County, Florida. The project would provide a new and reliable option for north-south commuters by connecting to major activity centers and neighborhoods adjacent to the line and support economic development and land use plans and policies in eastern Broward County.

BCR South will provide a sustainable and permanent transportation investment that is strongly supported by local land use plans, Broward County, the City of Hollywood, the City of Hallandale, the City of Dania Beach, the City of Fort Lauderdale, and the surrounding communities.
The primary needs for the project are based on providing an alternate mode of transportation for critical north–south regional and local travel capacity and serving the existing and future population growth in the region and corresponding sustainable land use and economic development in the study area.

The secondary needs for the project are based on enhancing intermodal connectivity by developing a seamlessly integrated multimodal network and improving transit service in the eastern high-density travel market. The project also enhances intermodal connectivity by providing quality access to transit-dependent populations and improving the environment and transportation safety. It will help address congestion issues by providing person trip capacity via a regional commuter rail transit option in the FECR railroad corridor.

2.0 Alternatives

This section provides a description of the Build Alternative used to evaluate the environmental impacts of the BCR South Commuter Rail Project.

2.1 General

The Build Alternative includes rail track modifications along the corridor length, new commuter rail stations, and commuter parking improvements. Three stations are proposed along the corridor with the northern termini occurring at the South Fort Lauderdale Station in Broward County. The BCR South platforms will be located next to sidings/dwell tracks, not on the mainline.

2.1.1 Stations

The proposed BCR South stations include:

- Hollywood Station located between Fillmore Street and Tyler Street
- Fort Lauderdale-Hollywood International Airport (FLL) Station located between the two Terminal Drive overpasses that access the airport from I-595 and US 1
- South Fort Lauderdale Station located between SW 15th Street and SW 17th Street

All three stations include the following amenities:

- Ticket Zone with at least two Ticket Vending Machines (TVM) (Operator Specific)
- Staff Information Booth
- ADA compliant clear zone(s)
- Fixed Canopy
- Benches for seating compliant with Department of Justice 28 CFR Part 36 ADA Standards for Accessible Design
- Lighting (direct with minimum 5-foot candles (FC) on all portions of platform and off-platform areas)
- Information sign(s) (e.g., passenger information, logo, route maps, and schedules)
- Station stop ID sign(s)
- Trash receptacle(s)
- Hose bibs along platform for maintenance
- Emergency fire hydrant
- Wayfinding totem
- Public-Address System (Operator Specific)
- Emergency Call Boxes
- CCTV (Operator Specific)
- Wi-Fi access
- Handrails as necessary along platform, ramps, and sloping sidewalk

- Inter-track fence
- Level-boarding platform (Operator Specific)
- Staff and Customer bathroom facilities

2.1.2 Track Work

The corridor consists of existing double mainline tracks previously constructed by FECR and Brightline for freight and intercity passenger service. Track work proposed in the Build Alternative includes adding sidings for the station platform locations and mainline track shifts at Hollywood Station. The sidings run the length of the stations and extend an addition to the length needed to tie back into the mainline double tracks. Crossovers are included in the vicinity of the stations to allow for flexibility of train operations as the commuter trains approach the stations.
The existing Brightline and planned NEC commuter station and tracks at Aventura will remain with no additional construction required for the BCR South service stop. The Aventura station is a proposed commuter rail station to be constructed by Miami-Dade County as part of the NEC. The BCR South project would be an extension of the same service north with three proposed stations.

2.1.3 Parking

Provisions for commuter parking at two of the three stations proposed were also examined in developing the Build Alternative. These parking alternatives are further described below in detailing station improvements proposed.

The following Sections describe the Build Alternative in detail at each station.

2.2 Hollywood Station

The Hollywood Station is located between Filmore Street and Tyler Street in Hollywood, FL, west of downtown. At this station the rail corridor is bordered by N 21st Avenue to the east and Dixie Highway to the west.

The station concept includes providing the following:

- Two track sidings with two mainline track shifts to center the tracks and platforms within the FECR ROW.
- Two 17 feet wide by 500 feet long side platforms
- 150 feet bus drop-offs along N 21st Avenue and Dixie Highway (south of Fillmore Street)
- 100 feet vehicle drop-offs along N 21st Avenue and Dixie Highway (south of Fillmore Street)

- Sidewalk connectivity between the parking garage alternatives, the bus drop-off, and the vehicle drop-offs; this includes existing sidewalk repairs or reconstruction along the route and ADA ramps at the intersections along the route
- Two lanes, one-way traffic reconstructed N 21st Avenue and Dixie Highway between Fillmore Street and Tyler Street to accommodate bus and vehicle drop-offs
- Mill and overlay work at all at-grade highway-rail grade crossings
- Pedestrian access via Filmore Street and Tyler Street highway-rail grade crossings (no pedestrian overpass). Platform will be end loaded 17 feet wide platforms.
- The City's Complete Streets program was reviewed, and the station concept should accommodate future City construction without having to impact the main BCR South features.

2.2.1 Track Layout

Per the Timetable Speeds chart dated 3/18/2021 and the Track Charts dated 3/22/2021 provided by Brightline, the following existing train speeds are running through Hollywood Station:

- 60 MPH Freight (FECR)
- 79 MPH Passenger (Brightline)

Due to the close highway-rail grade crossing spacing, the siding / dwell tracks are extended south of Van Buren / Harrison Street before they can connect back to the mainline tracks. To accommodate the four tracks in the station area, the existing FECR mainline tracks will be shifted to be centered within the FECR right-of-way (ROW). Crossovers are proposed on either side of the stations to provide flexibility on accessing either siding for passenger service. The Hollywood Station track schematic is shown above in **Figure 2.1**. Refer to the Preliminary Engineering Report (PER) Attachment H-1 for track layout details, Attachment H-2 for roadway detailed layouts and dimensioning, and Attachment H-3 & H-4 for typical sections.

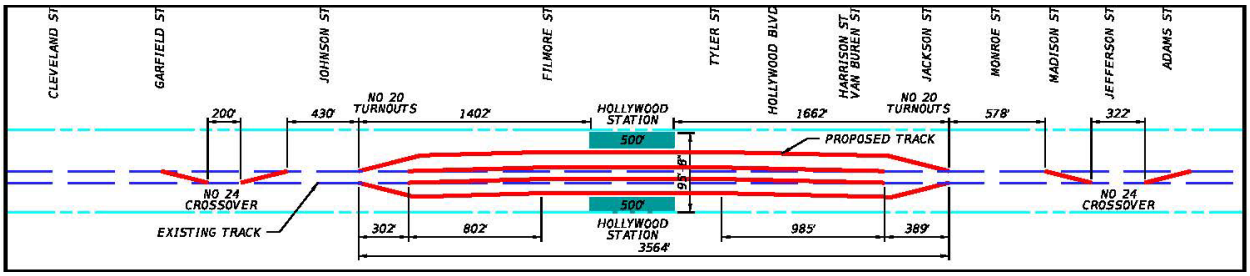


Figure 2.1: Hollywood Station Track Schematic

2.2.2 Parking

The City of Hollywood has indicated they can provide the BCR South parking spaces with their University Station project jointly developed by the city and private sector for attainable housing and 15,000 square feet of retail space for Barry University's College of Health Sciences. No additional improvements to the parking garage shown in purple in **Figure 2.2** are proposed as part of this project.

The Build Alternative includes additional ADA parking spaces provided on either side of Polk Street just east of the N 21st Avenue intersection. Pedestrian connectivity between parking and the station is included as part of this Build Alternative.

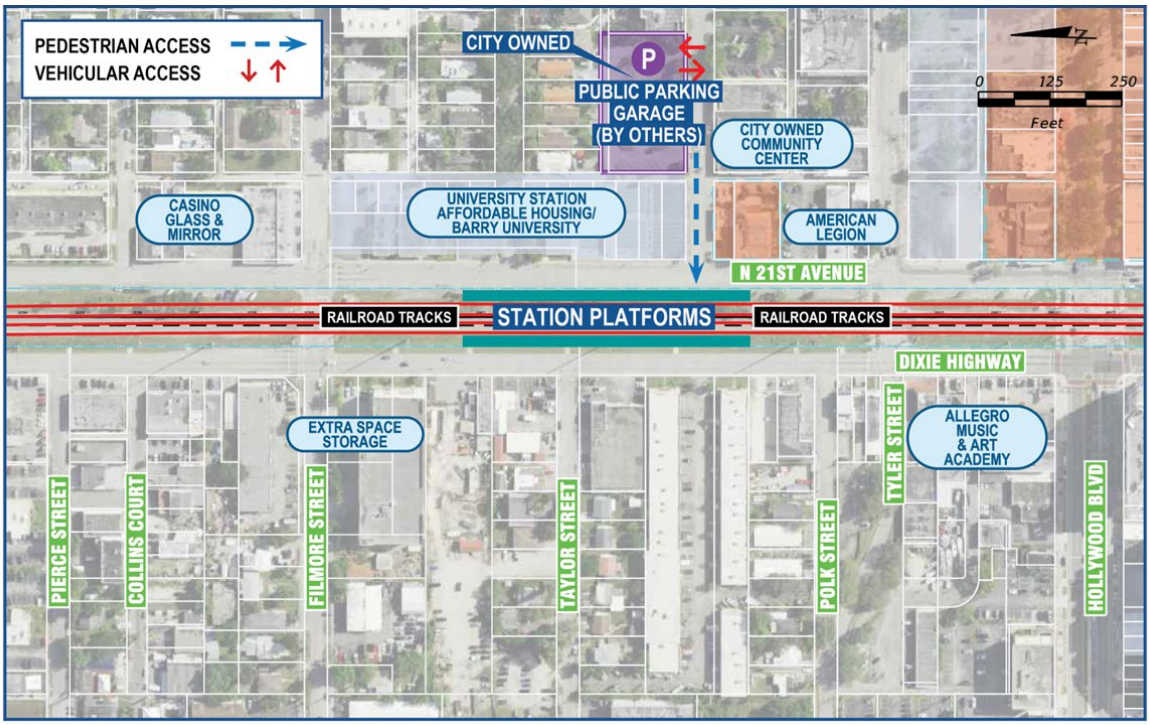


Figure 2.2: Hollywood Station Parking Build Alternative

2.2.3 Bus Stops/Vehicle Drop-offs

Any new or relocated bus stop for BCR South will meet the same style as the recently constructed Hollywood Boulevard Complete Streets project, if practicable. The following is a summary of the bus stops near Hollywood Station.

- The newly constructed Hollywood Boulevard complete streets eastbound and westbound bus stops just west of Dixie Highway will remain.
- A southbound bus stop will be added at Dixie Highway on the far side of Fillmore Street.
- To provide for passenger and ride share vehicles, a drop-off is proposed on the far side of the new Dixie Highway bus stop.

- The existing northbound bus stop along N 21st Avenue on the near side of Fillmore Street will be moved to the far side to allow for the left turn lane on the narrower N 21st Avenue Complete Streets roadway section at the station.
- A new N 21st Avenue northbound vehicle drop-off will be located on the far side of Polk Street.

2.2.4 Traffic Signals / Crosswalks

Due to the track shifts and additions for the station, several of the parallel street traffic signals and crosswalks will be affected.

- Eleven relocated or new traffic signals including pedestrian push buttons, mast arms, loop detection, signal preemption, signal timings, etc.
- New pedestrian mid-block signal across N 21st Avenue at Polk Street
- New pedestrian mid-block signal across Dixie Highway at Polk Street

2.2.5 Railroad Crossings

The Build Alternative includes upgraded highway-rail grade crossings at Filmore Street, Tyler Street, Hollywood Boulevard and Van Buren / Harrison Street, including:

- New railroad flashers / gates set outside the new siding track on the east and west sides.
- New or relocated advance warning devices (signs, detectable warning surface, etc.).
- New and reconstructed sidewalks for station access and connectivity.
- Additional railroad crossing panels for siding and on mainline FECR track shifts.
- Other safety features to be determined from the Safety Analysis Memorandum and coordination with FECR, Brightline and FRA.

2.3 Fort Lauderdale-Hollywood International Airport (FLL Airport) Station

Passengers at the BCR South FLL Airport Station will primarily be airport travelers who have arrived via airplane to the station terminal or passengers who are departing the commuter train to reach the airport terminal. The FLL Airport station will not support commuter passengers arriving by car and no additional parking is being provided at the station for commuters. In this way, the FLL Airport Station will function as a connecting service to bring commuter rail passengers to the airport and take airport passengers to other stations on the BCR South commuter rail line.

The curved platform will be elevated with a pedestrian walkway to connect to the bus-drop off area on the west side of the tracks, shown in **Figure 2.3**. See PER Attachment A-2 for roadway concept and dimensions.

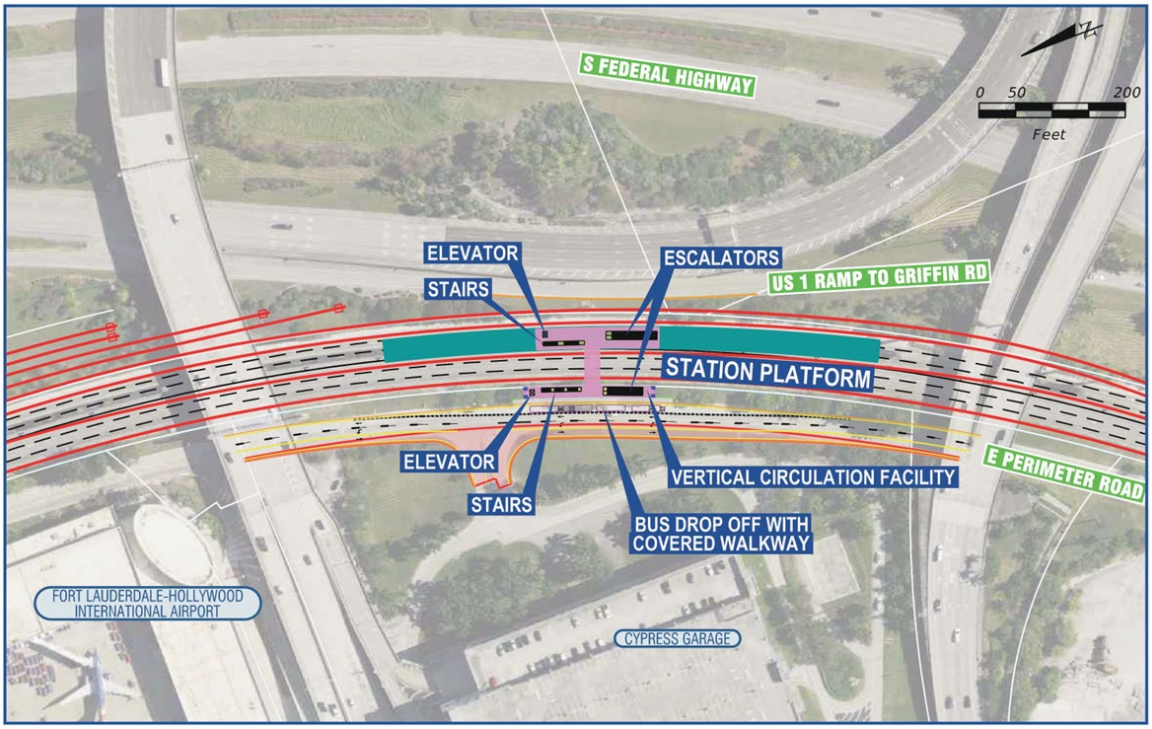


Figure 2.3: FLL Station Layout (No Parking)

Pedestrians will be able to take a designated shuttle bus going to and from the station covered platform to the airport terminals. County buses may also access the drop-off area for the station.

The station concept includes providing the following:

- A single 30-foot wide 675-foot-long station platform centered between sidings/dwell tracks
- Relocated freight storage tracks via several ladder tracks north of westbound Terminal Drive bridge to offset the storage lost from introducing the platform and sidings/dwell tracks
- Reconfigured existing stormwater pond due to relocated freight storage tracks
- Vertical circulation on platform to/from pedestrian overpass (escalator, stairs, elevator)
- Pedestrian overpass (23'-6" vertical clearance over tracks, 58' span, 20' wide)
- Staff parking spaces next to the bus drop-off
- Sidewalk connectivity to the airport terminals is being evaluated for potential inclusion
- Widening of Perimeter Road between Terminal Drive overpasses to accommodate bus drop-off lane
- Shuttle bus drop-off facility with vertical circulation (escalator, stairs, elevator) includes 195-foot bus drop-off lane along Perimeter Road
- Upgraded highway-rail grade crossing at Griffin Road due to mainline track shifts
    - New railroad flashers / gates on the east and west sides
    - New or relocated advance warning devices (signs, detectable warning surface, etc)
    - Additional railroad crossing panels for mainline FECR track shifts
    - Other safety features to be determined from Safety Analysis Memorandum and coordination with FECR, Brightline and FRA

2.3.1 Track Layout

Refer to the PER Attachment A-1 for more detailed track layouts with dimensions and stationing and Attachment A-3 and A-4 for typical sections.

Per the Timetable Speeds chart dated 3/18/2021 and the Track Charts dated 3/22/2021 provided by Brightline, the following existing train speeds are running through FLL Airport Station:

- 40 MPH Freight (FECR)
- 40 MPH Passenger (Brightline)

The existing mainline and storage track curvature limits the ability of trains to travel fast through this airport area. The proposed station platform is in the center of two new siding / dwell tracks with the two mainline tracks relocated to the outside. The station work and existing bridge piers will require the existing FECR storage tracks to be reconfigured. Refer to **Figure 2.4** for a schematic of track work.

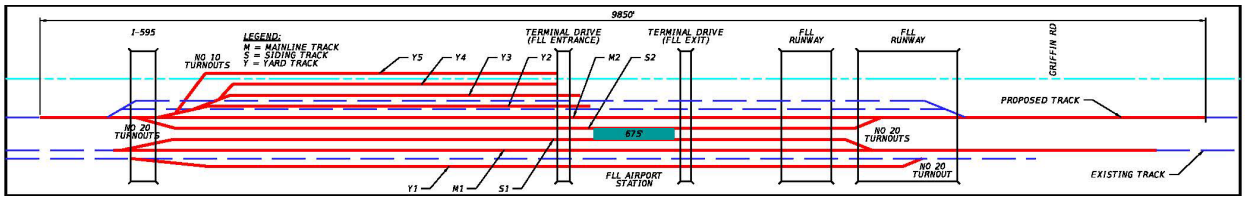


Figure 2.4: FLL Station Track Layout

To accommodate the storage track reconfiguration, the following will be provided:

- Proposed single storage track 14 feet to the west of the west Mainline track.
- Continuation of the northeast ladder storage tracks to the east to add four new storage tracks at 14 feet centers. These storage tracks will be stubbed out prior to the passenger station area near the Terminal Drive Overpass.
- Crash protection walls will be provided at the Terminal Drive overpass structures and under I-595, as required.
- The additional ladder storage tracks will require the modification of the existing US 1 pond on the east side of tracks to fill in more to the south infield area. The offset storage will be achieved by expanding the pond to the south and reconnecting the airport's irrigation facilities. See **Figure 2.5** for the pond modifications and ladder track layout.

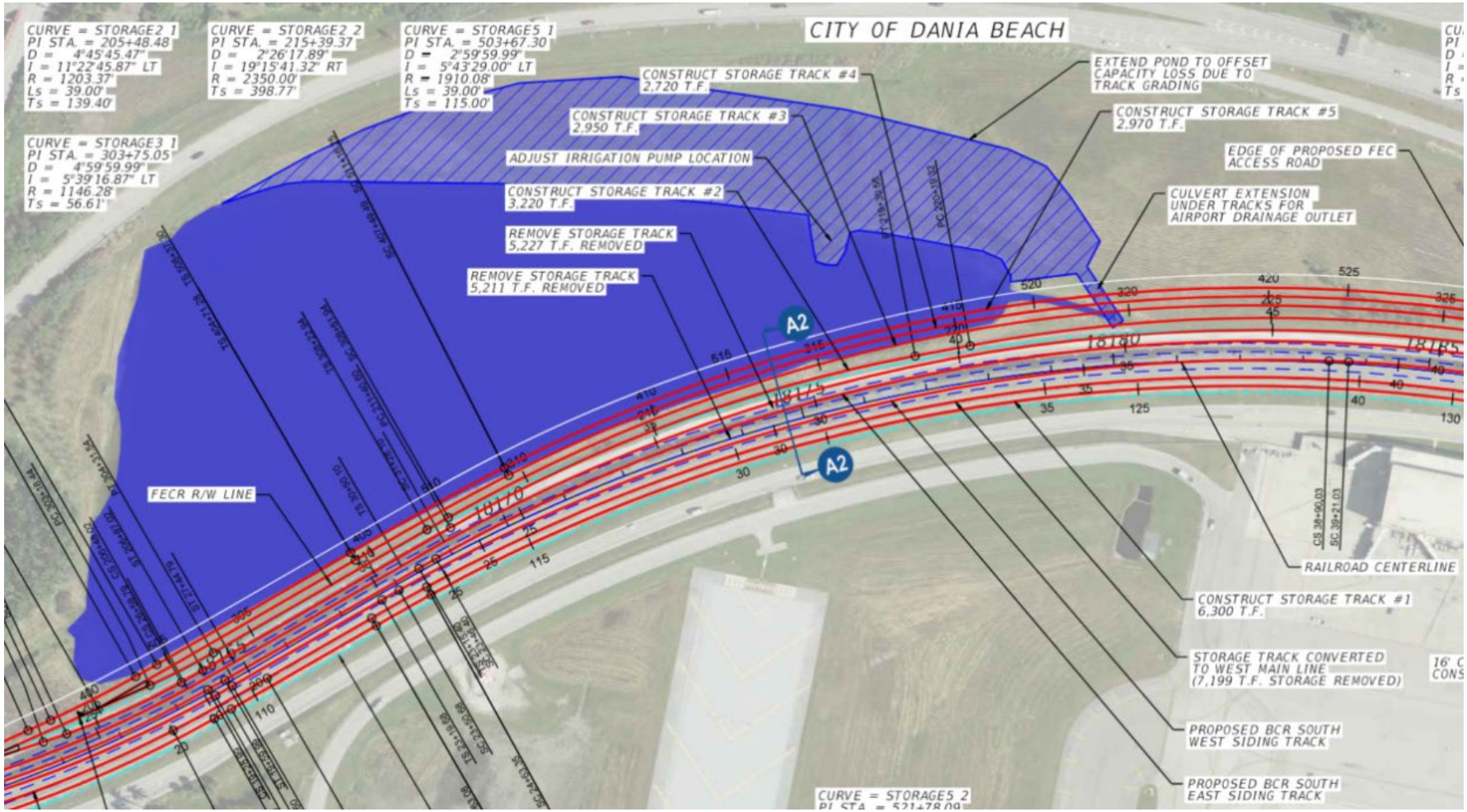


Figure 2.5: FLL Station Pond Modification

2.3.2 Parking

Parking will not be provided at the FLL Airport station.

2.3.3 Bus Stops/Vehicle Drop-offs

The FLL Airport station will have a covered walkway leading from the bus stop to the vertical circulation/pedestrian bridge to access the platform. Pedestrians will only be able to take a designated shuttle bus circulating to and from the platform to the airport terminals. The County buses will have limited access to the bus drop-off areas for the station.

Passenger vehicle drop-off areas will not be available at the station for commuters, therefore the FLL Airport station will not support commuter passengers arriving by car.

2.3.4 Traffic Signals/Crosswalks

There are no existing traffic signals nor crosswalks in the vicinity of the FLL Airport station.

2.3.5 Railroad Crossings

There are no railroad crossings in the vicinity of the FLL Airport station. However, the Griffin Road highway-railway grade crossing, south of the FLL Airport, will have profile adjustments related to the main track shifts.

2.4 South Fort Lauderdale Station (SFTL Station)

The SFTL Station is located between SW 15th Street and SW 17th Street in Fort Lauderdale, south of downtown. The platform is centered on SW 16th Street between Flagler Avenue and the FECR tracks. Flagler Avenue remains an alley from SW 16th Street to SW 17th Street.

The station concept includes providing the following:

- A single 17 feet wide by 500 feet long side platform on the east side
- A temporary dwell track extension of the siding on the east side of mainline tracks, all within existing rail right of way
- Separate 150 feet bus drop-off lane either along Andrews Avenue or SW 1st Avenue (Broward County is holding internal transit meetings to determine various services)
- 100 feet vehicle drop-off along SW 16th Street circular drive
- Sidewalk connectivity between the parking garage, the bus drop-off, and the vehicle drop-offs; this includes existing sidewalk repairs or reconstruction along the route and ADA ramps at the intersections along the route.
- Accommodation for a future City Complete Streets typical section at SW 17th Street will include the new warning devices and railroad crossing surface (concrete panels) placed so the City does not have to rework these elements with the future project.

- Pedestrian access via SW 15th Street and SW 17th Street highway-rail grade crossings (no pedestrian overpass). Platform will be end loaded and have a center access point in line with the SW 16th Street Plaza vehicle drop-off area.
- Parking garage with access from SW 1st Avenue
    - Turn lane into the proposed SW 1st Avenue parking garage

2.4.1 Track Layout

Per the Timetable Speeds chart dated 3/18/2021 and the Track Charts dated 3/22/2021 provided by Brightline, the following existing train speeds are running through SFTL Station:

- 60 MPH Freight (FECR)
- 79 MPH Passenger (Brightline)

A single platform and siding/dwell track are proposed on the east side of the mainline tracks. A 845 foot dwell track (575 functional length) stub out will be provided on the north side of the station north of SW 15th Street. This component will provide a location for holding a commuter train as needed to meet operational goals and safety inspections.

BCR South track work construction will require coordination with FECR for "track windows" to accomplish the mainline track connections at the No. 20 turnouts and No. 24 crossover south of the station. See **Figure 2.6** for track schematic and refer to the PER Attachment F-1 for full track layout details, Attachment F-2 for roadway layout details, and Attachment F-3 & F-4 for typical sections.

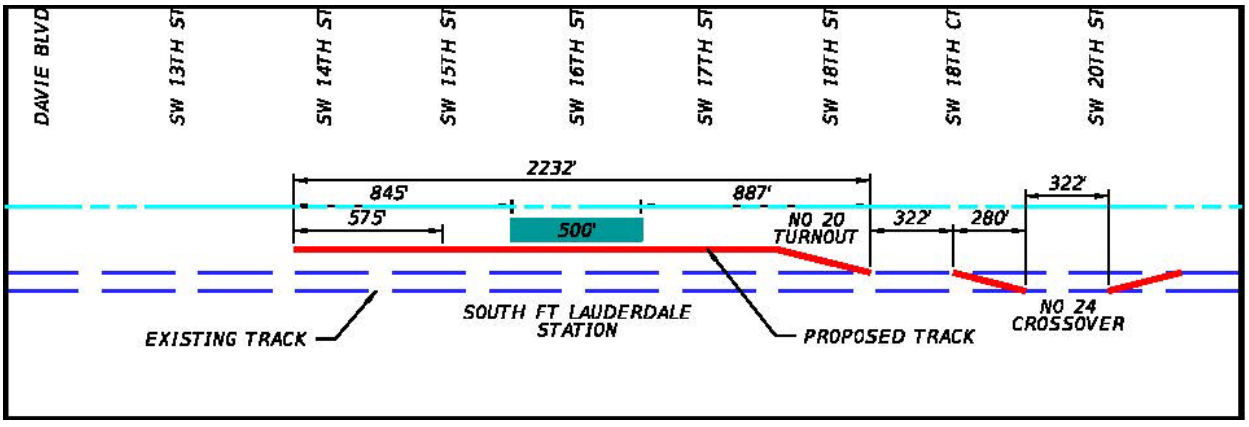


Figure 2.6: SFTL Station Track Schematic

2.4.2 Parking

The City of Fort Lauderdale does not have any large public parking facilities within the ¼-mile area of the station, only on-street parking. Therefore, parking alternative screening was analyzed for this station. Two candidate sites within ¼ mile of the station location were identified that could be developed as parking structures and are shown in **Figure 2.7**. Both sites screened and evaluated can accommodate the required parking for the station. Note that each parking alternative site will be accommodated within the current zoning height of 100 ft.

Parking Alternative 1: Parking Alternative 1 is located between SW 1st Avenue and Flager Ave alley close to the station platform in the block south of SW 16th Street (shown in purple). A new proposed parking garage would be located on this site to accommodate the required parking. This potential parking site has no historic resources, has one property owner, and would require the relocation of two separate business tenants.

Parking Alternative 2: Parking Alternative 2 is located between Andrews Avenue and SW 1st Avenue and is further away from the station platform in the block south of SW 16th Street (shown in yellow). This potential parking site is accessible from SW 17th Street via SW 1st Avenue entrance. This potential parking site has no historic resources, has three property owners, and may require two business relocations. Most of the site is fenced off for future construction and is owned by Broward Health, who is considering a development to include parking.

A Parking Screening Memorandum was prepared for the south Fort Lauderdale station that reflected both sites as being viable for parking. The recommended alternative will be selected in the near future subsequent to additional coordination.

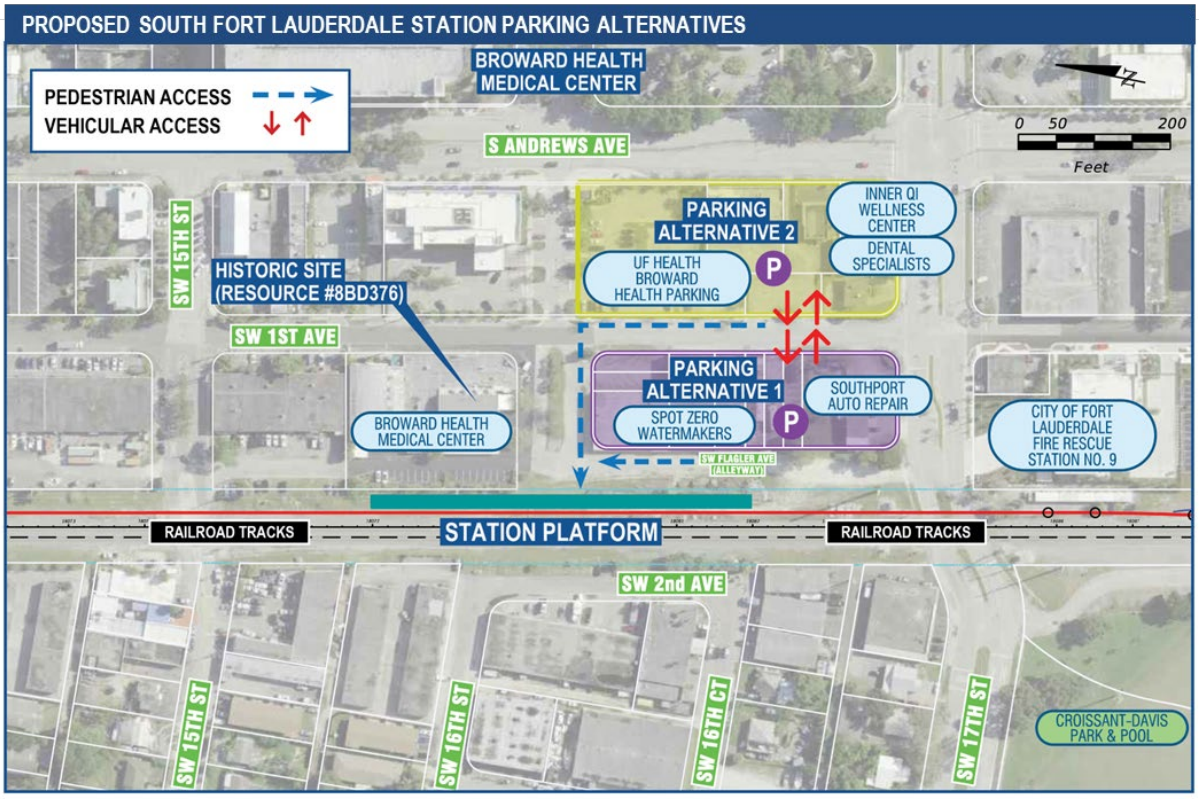


Figure 2.7: SFTL Station Location & Parking Alternatives

2.4.3 Bus Stops/Vehicle Drop-offs

Any new or relocated bus stop for BCR South will meet the same style as the recently constructed Andrews Avenue bus stop project, if practicable. The following is a summary of the bus stops and new vehicle drop-offs near the South Fort Lauderdale Station.

- New northbound and southbound bus stops may be added at SW 1st Avenue on the far side of SW 16th Street (BCT is developing a revised regional transit operation plan).
- New vehicle drop-offs will be accommodated along the reconstructed SW 16th Street as a horseshoe turn around with a pedestrian plaza in the median.
- The existing northbound and southbound bus stops along Andrews Avenue on the far side of SW 16th Street will remain. These sites have a covered waiting area for customers.

2.4.4 Traffic Signals/Crosswalks

The existing traffic signals will remain along Andrews Avenue and SW 17th Street in the project vicinity. The following crosswalks will be included in the project:

- Potential new mid-block pedestrian signal and crosswalk on Andrews Avenue to the north of SW 16th Street to provide pedestrian connectivity between the station and Broward Health complex.
- Potential new pedestrian signal and crosswalk on SW 17th Street at SW 1st Avenue to provide connectivity between the station and Poinciana Crossings affordable housing site.
- Potential modifications or new traffic signal interconnection with railroad active warning device systems, existing fire station emergency signal and new pedestrian signal.

2.4.5 Railroad Crossings

Upgraded highway-rail grade crossings at SW 15th Street and SW 17th Street, including:

- New railroad flashers / gates set outside the new siding track on the east side.
- New or relocated advance warning devices (signs, detectable warning surface, etc)
- New and reconstructed sidewalks for station access
- Additional railroad crossing panels for siding and on mainline FECR tracks
- Other safety features to be determined from Safety Analysis Memorandum and coordination with FECR, Brightline and FRA.

3.0 Existing Conditions

The proposed BCR South project would operate along 11.5 miles of an existing shared-use rail corridor from Aventura in northern Miami-Dade County to Fort Lauderdale in Broward County. The rail corridor traverses a predominantly developed and densely-populated urbanized environment. The project proposes three new passenger stations, one at the City of Hollywood between Tyler Street and Taylor Street, one at the Fort Lauderdale-Hollywood International (FLL) Airport, and one at the City of Fort Lauderdale between SW 15th and 17th Streets (**Figures 3.1** through **3.3**).

Existing environmental conditions are reviewed and detailed below. The term "project corridor" is used in this document to represent the limits of construction for the proposed project. The project corridor is an area that encompasses the footprint of the project at each of the three proposed passenger stations, including the existing FEC right-of-way used by each proposed station and any additional right-of-way or improvements. The term "project area" represents a larger expanse that encompasses the project corridor at each station as well as all land within 500 feet (**Figures 3.1** through **3.3**). The Aventura Station is not considered part of the project corridor in this document because no work is proposed by the BCR South Project at the Aventura Station. A separate project under the Miami-Dade County SMART program will provide a commuter station platform extension in Aventura before the BCR South becomes operational.

3.1 Land Use

Land use cover descriptions for both uplands and wetlands are classified utilizing the *Florida Land Use, Cover, and Forms Classifications System* (FLUCFCS, FLUCCS) designations. Previous and existing land uses in the project area were initially determined utilizing US Geological Survey (USGS) maps, historical images, aerial photographs, and land use mapping from the South Florida Water Management District (SFWMD) (2017-2019). Land use categories in the project area reported by SFWMD were verified in the field. Field reviews generally confirmed the SFWMD land use mapping with very minor adjustments. Land use categories in the project area as mapped by SFWMD are shown in **Figure 3.1** through **3.3** and each land use category in the project area is described below.

<u>Residential Medium Density, Fixed Single Family Units (FLUCCS – 1210)</u>

This category refers to residential areas with a dwelling density of two to five dwellings per acre. This land use type occurs at the Hollywood Station project area west of the project's northern parking area and also at the South Fort Lauderdale Station project area west of the railroad tracks.

Figure 3.1: Land Use in Hollywood Station Project Area

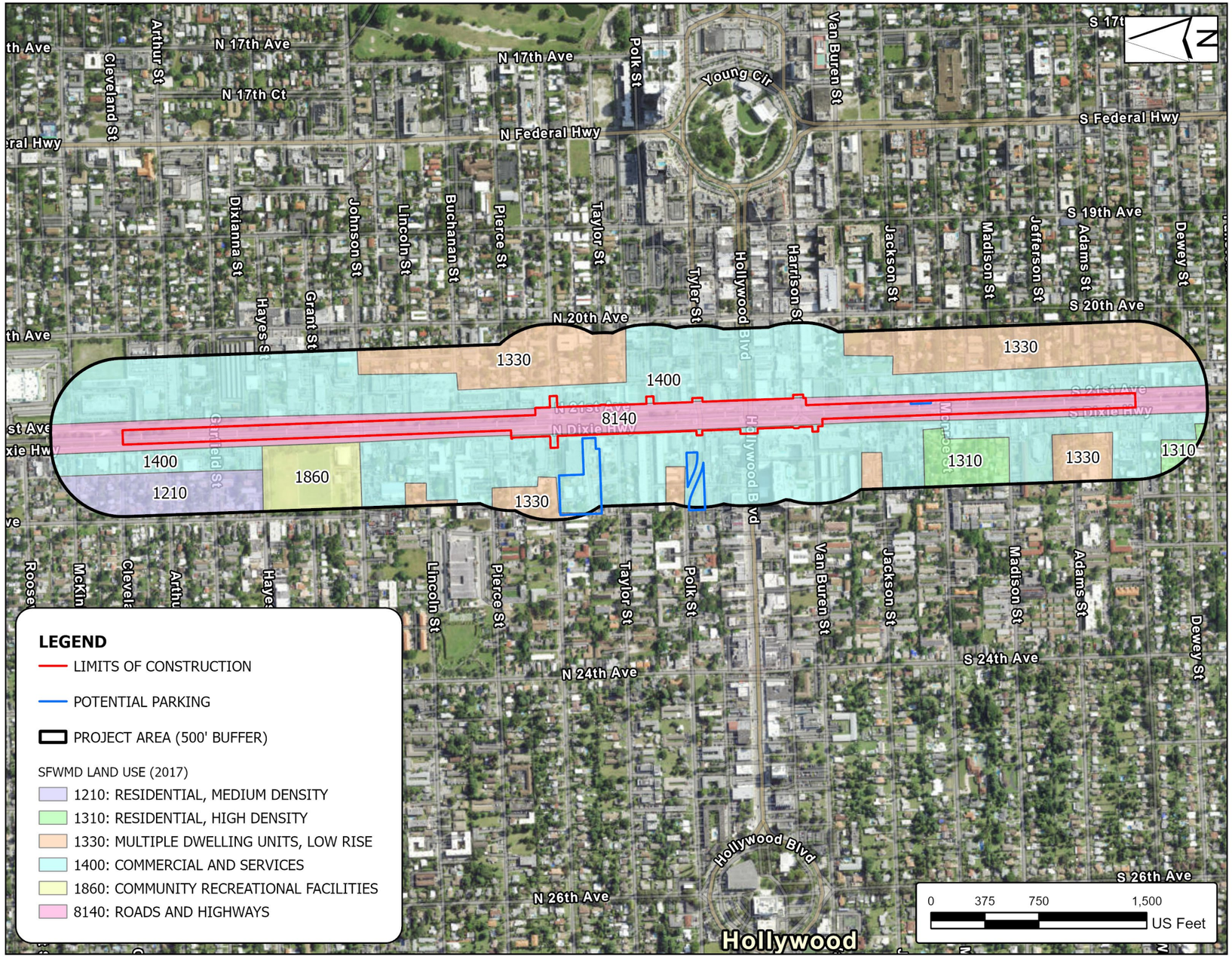


Figure 3.2: Land Use in FLL Airport Station Project Area

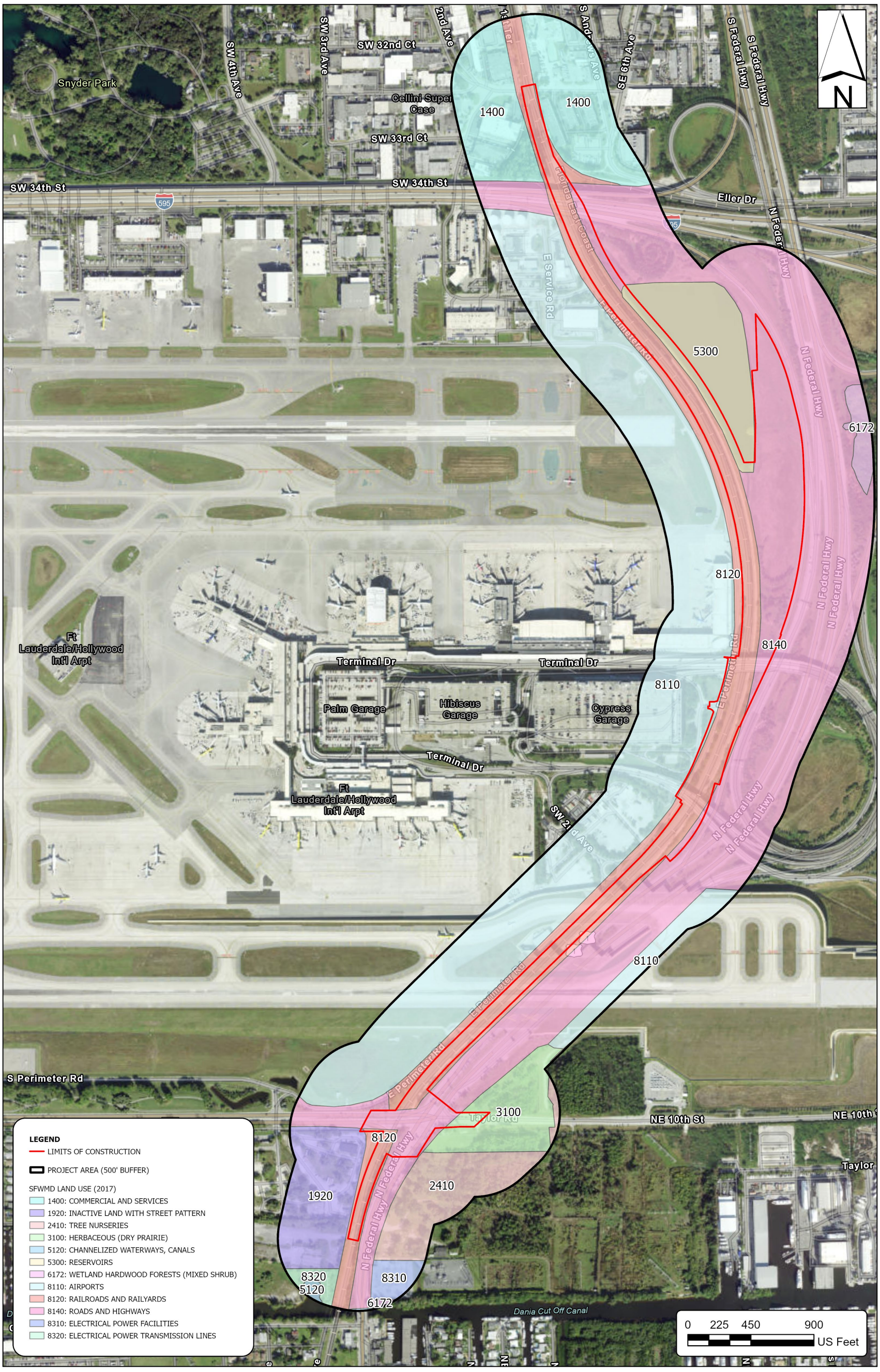
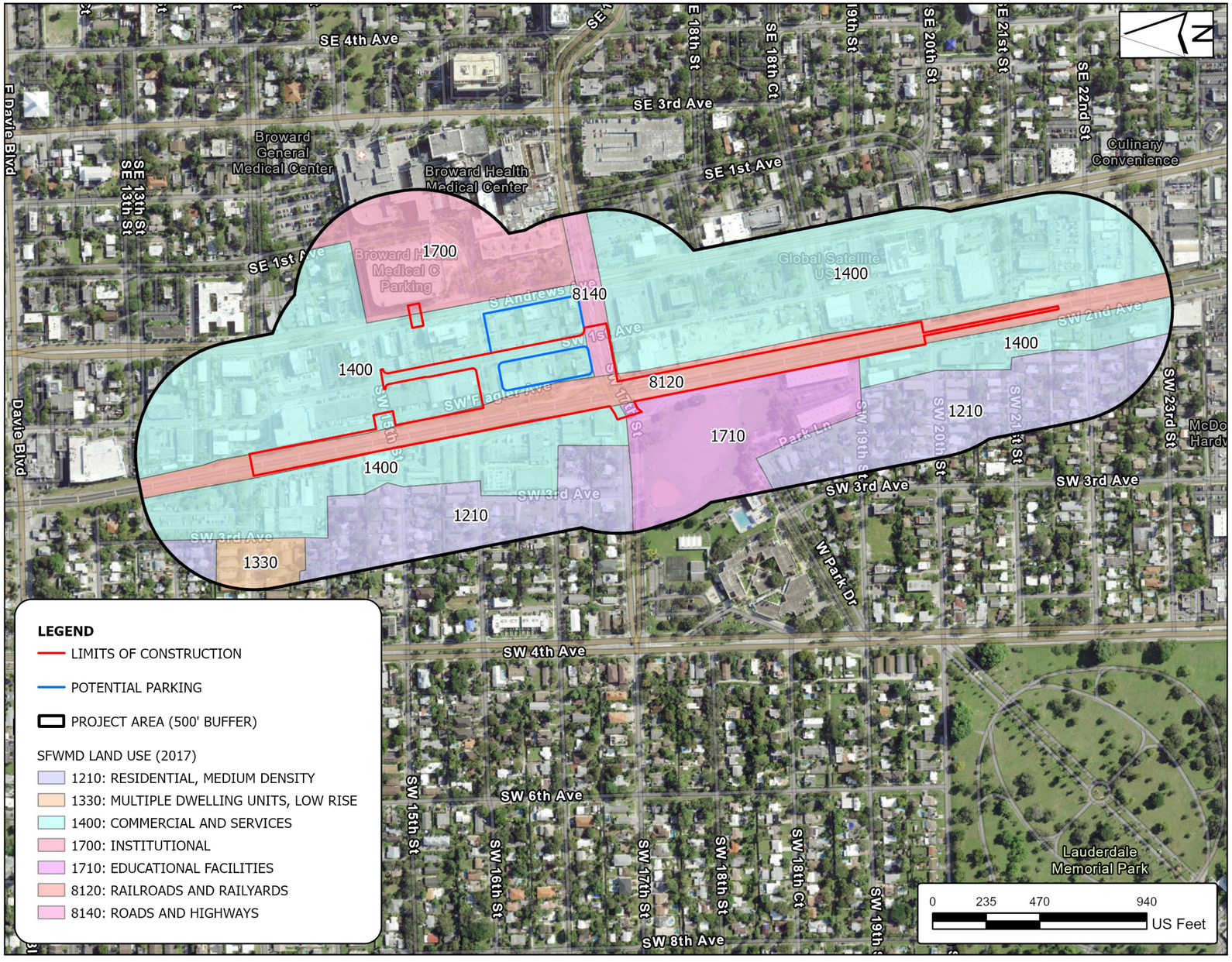


Figure 3.3: Land Use in Fort Lauderdale Station Project Area



Residential High Density, Fixed Single Family Units (FLUCCS – 1310)

This category refers to a density of six or more dwelling units per acre. This land use category includes structures ranging from square, 50' x 50', to rectangular, 25' x 40', or somewhat smaller with a roof area that appears to cover more than half of the lot area. This land use type occurs in the Hollywood Station project area west of the station's southern parking area.

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

This category refers to a density of six or more dwelling units per acre. This land use category includes two-story town homes, duplexes, and other low-rise residential structures. Low-rise residential areas are newer developments which are commonly located on the urban fringe. This land use type occurs throughout the Hollywood station project area on both the east and west sides of S Dixie Highway and in the South Fort Lauderdale Station project area west of the railroad tracks at the northern terminus.

Commercial and Services (FLUCCS – 1400)

This land use category includes a broad range of uses and operations providing diverse products and services which often occur in complex mixtures. Subclasses include retail and wholesale, professional, cultural and entertainment, and tourist services, as well as others. These areas are usually located along main transportation routes or at the intersections of secondary transportation corridors. This land use category can be found throughout the Hollywood Station project area along both sides of S Dixie Highway, at the northern terminus of the FLL Airport Station project area, and throughout the South Fort Lauderdale Station project area on both sides of the railroad tracks.

Institutional (FLUCCS – 1700)

This class includes a broad range of institutional uses which can be difficult to differentiate individually. 1700 includes uses such as educational, religious, medical and health care, governmental, correctional, commercial childcare and others. Included within a particular institutional unit are all buildings, grounds, parking lots, recreational areas, green houses, gardens and other features that are attached to the facility. This land use is found in the westernmost portion of the Hollywood Station project area associated with Beachside Montessori Village and in the eastern portion of the South Fort Lauderdale Station project area associated with Broward Health Medical Center.

Educational Facilities (FLUCCS – 1710)

Educational facilities include all public and private schools, colleges, universities, training centers, etc. This land use is found in the South Fort Lauderdale Station project area west of the rail tracks and south of SE 17th Street, associated with Croissant Park Elementary.

Community Recreation Facilities (FLUCCS – 1860)

This class includes recreational areas primarily used for active outdoor uses such as community sports, including baseball, soccer, football, tennis, and others. These are large, open areas of well-managed turf with fencing, parking, drainage features, and characteristic field designs. They do not include more passive activities such as fairgrounds and open-air performances, although such uses may be attached to the same facility. This land use type is found near the northern terminus of the Hollywood Station project area, associated with Dowdy Field.

Open Land, Inactive Land with Street Pattern (FLUCCS – 1920)

This class includes open areas where development had started but was for some reason halted and appears in an abandoned state at the time of the inventory. It does not include developments that are under construction, incomplete or that are slowly being completed. Lands in this class have street patterns but few if any buildings. This land use type is mapped near the southern terminus of the FLL Airport Station project area, west of the railroad tracks.

Tree Nurseries (FLUCCS – 2410)

This class includes nurseries which grow trees for transfer to other destinations. There may be other products grown at the facility, such as flowers and ornamentals, but they are not the predominant use. Trees may be grown in-ground or in containers. This land use type is mapped near the southern terminus of the FLL Airport Station project area, east of N Federal Highway.

Herbaceous (Dry Prairie) (FLUCCS – 3100)

This category is for upland non-agricultural, non-forested lands which exhibit no evidence of cattle grazing. This class includes prairie grasses which occur on the upland margins of the wetland zone and inundation by water is infrequent. Generally, it is the marginal area between marsh and upland forested areas. This land use type is found near the south end of the FLL Airport Station project area, east of N Federal Highway on both sides of Taylor Road.

Channelized Waterways, Canals (FLUCCS – 5120)

This class is a subdivision of FLUCCS-5100 Streams and Waterways, which includes rivers, creeks, canals, and other linear water bodies that are 10 meters or greater in width. The 5100 class includes both natural and modified waterways, as well as man-made canals and channels. The 5120 class is reserved for these waterways that are in linear channels. This land use type is found at the southern terminus of the FLL Airport Station project area associated with the Dania Cutoff Canal. The Dania Cutoff Canal is tidally influenced and is located outside the limits of construction. No work is proposed in, on, or over the Dania Cutoff Canal.

Reservoirs (FLUCCS – 5300)

This class is for artificial impoundments of water, or water bodies that have been significantly modified from the natural state. They are used for irrigation, flood control, municipal and rural water supplies, stormwater treatment, recreation, and hydro-electric power generation. Reservoirs are found in multiple places throughout the project area. This land use type is found in the FLL Airport Station project area between Perimeter Road and the Airport off-ramp from I-595.

Mixed Wetland Hardwoods, Mixed Shrubs (FLUCCS – 6172)

This class is used for wetland areas that are dominated by woody vegetation less than 20 feet in height. Wetland shrub communities may proliferate when forested communities are regenerating after natural or induced die-offs; or they may form when water tables are lowered in marshes or swamps; or when upland or free flowing areas are flooded or impounded. Many types of disturbance or change can alter vegetation and result in a phase of shrubby growth. This land use type is mapped in the FLL Airport Station project area between N Federal Highway and NE 7th Avenue. That area is outside the limits of construction and separated from the proposed project by N Federal Highway. Another area mapped as Mixed Wetland Hardwoods is located in the southern portion of the FLL Airport Station project area, next to the Dania Cutoff Canal. This area is also outside the limits of construction and no impacts area anticipated.

Airports (FLUCCS – 8110)

This class includes airports and airfields of various sizes, along with their associated facilities. It includes fixed-base commercial, and major airline operations. Heliports and seaplane bases are included if they meet size criteria (5 acres). It does not include single owner private air strips, nor does it include aviation facilities on military bases where the aviation is clearly subsidiary to the other functions of the base. This land use type is found associated with the Fort Lauderdale/Hollywood International Airport.

Railroads and Railyards (FLUCCS – 8120)

This class includes all railroad tracks greater than 100 feet wide and all facilities related to the rail operations. Only multi-track railroads are included. This land use type is mapped associated with the rail tracks through the FLL Airport and South Fort Lauderdale Stations. At the Hollywood station some area of rail is incorrectly mapped as Roads and Highways (FLUCCS- 8140).

Roads and Highways (FLUCCS – 8140)

This class includes those highways exceeding 100 feet in width, with four or more lanes and median strips. The intent of this data layer is to include only the major transportation corridors. This land use type is mapped on I-595 and N Federal Highway and is incorrectly shown at the Hollywood Station at the location of a rail line.

Electrical Power Facilities (FLUCCS – 8310)

Electrical power facility land uses include fossil fuel and nuclear plants. Associated facilities include transformer yards, cooling ponds or towers, and fuel storage. One electrical power facility is found within the project area at the south terminus of the FLL Airport Station east of N Federal Highway.

Electrical Power Transmission Lines (FLUCCS – 8320)

This class includes only high-voltage power transmission lines. The right-of-way is not usually shared with any other utilities and have a distinct appearance due to design considerations. The rights-of-way appear as long, linear strips that transect the landscape. High-voltage lines must be at least 30 feet above the ground or vegetation, so they are carried on high insulated towers above cleared swaths of land. The cleared swaths may be over 500 feet wide and may be used for other purposes, including agricultural and recreational uses. Transmission lines are found at the south terminus of the FLL Airport Station project area, west of N Federal Highway.

3.2 Elevation And Hydrology

The project area is located on relatively flat land with a ground elevation ranging between approximately 0 and 45 feet. **Figure 3.4** shows an elevation map created with data collected by the National Oceanic and Atmospheric Administration and the U.S. Department of Commerce in 2007 using Light Detection and Ranging (LIDAR) in North American Datum 1983 (NAD 83).

The only water crossing along the FEC rail corridor in south Broward County is at the Dania Cutoff Canal, immediately south of the Fort Lauderdale Airport and outside the project corridor. The Dania Cutoff Canal near the project is approximately 1.8 miles upstream from its confluence with the Stranahan River to the east, which flows into the Gulf of Mexico. In general, groundwater flow at the FLL Airport station is southward, towards the Dania Cutoff Canal. The Dania Cutoff Canal is tidally influenced.

The project corridor does not overlap any natural water bodies and an existing stormwater management system is present at each proposed station area. Major hydrologic features and wetlands mapped by the US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) in the project area are shown in **Figures 3.5** through **3.7**. There are no jurisdictional wetlands present within the project corridor at any of the three proposed stations. The project is underlain by the Biscayne Aquifer, which is designated by the USEPA as a Sole Source Aquifer. The Biscayne Aquifer is highly transmissible to water, with documented transmissivity ranges from approximately 75,000 to 300,000 square feet per day. The Biscayne Aquifer forms the top of the surficial aquifer system. The surficial aquifer ranges from approximately 160 feet below the surface in western Broward County to over 350 feet below the surface near the Atlantic Coastal Ridge in eastern Broward County.

Figure 3.4: Elevation Map

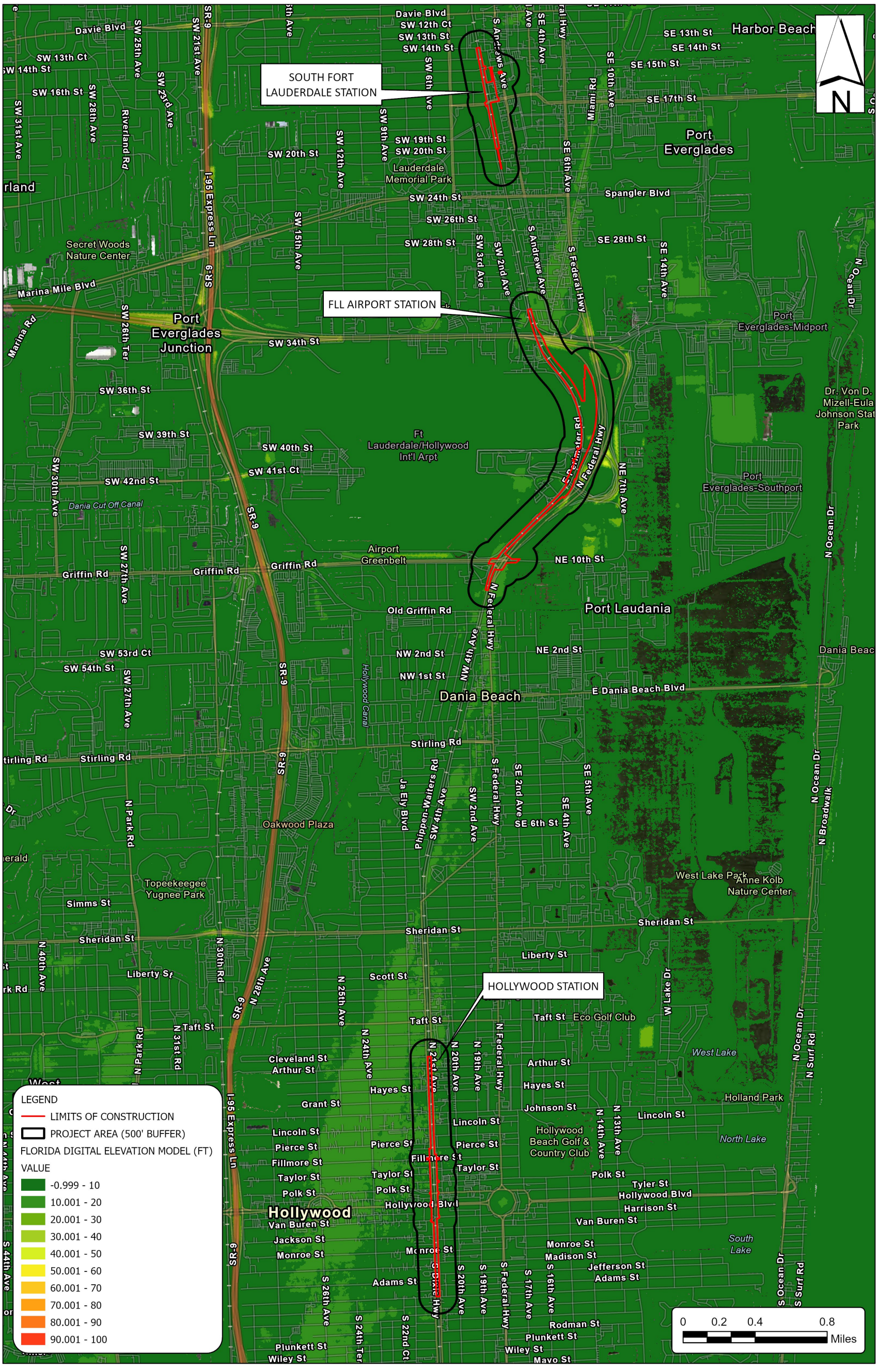


Figure 3.5: Hydrology Map Hollywood Station

Figure 3.6: Hydrology Map FLL Airport Station

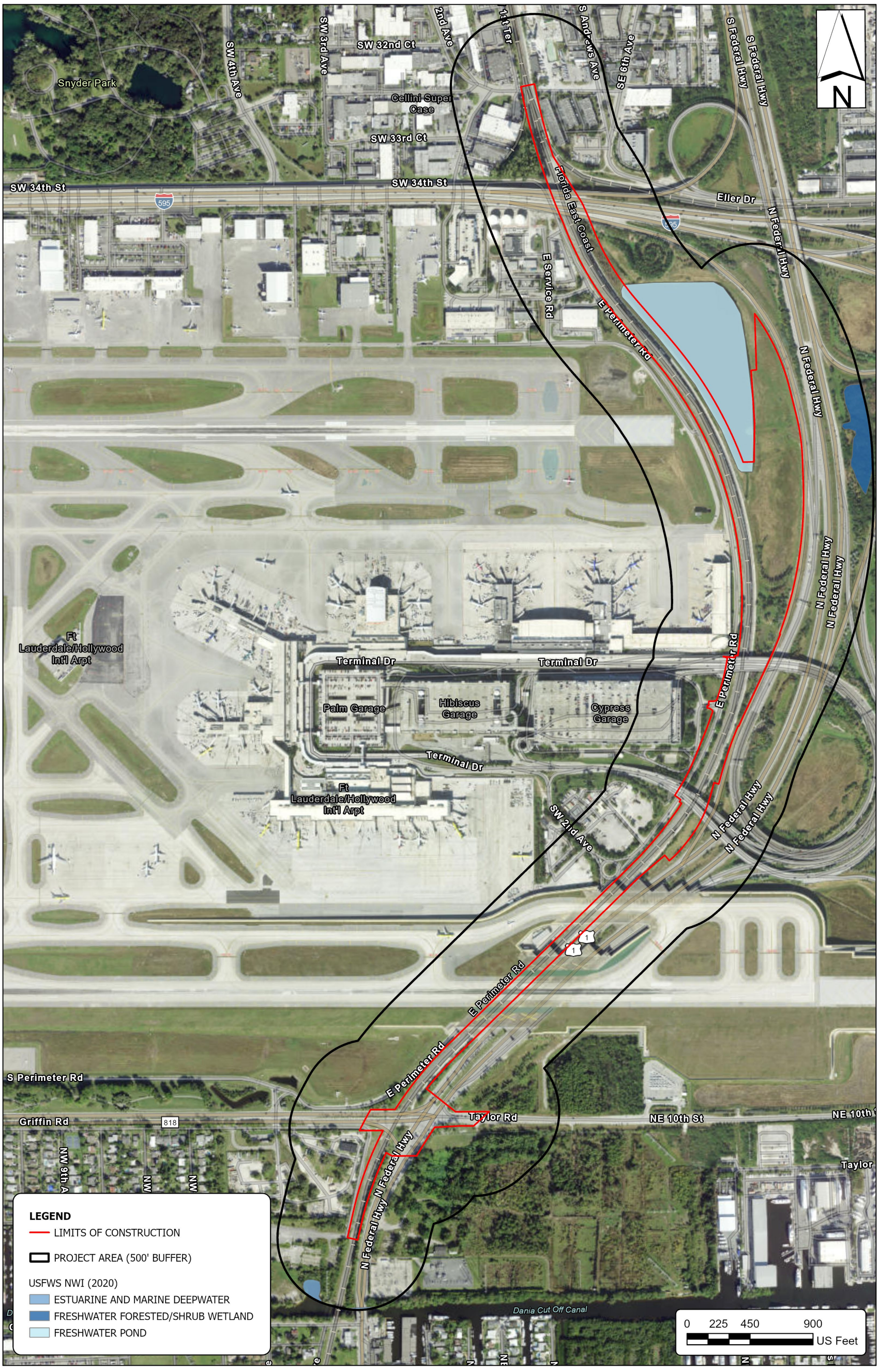
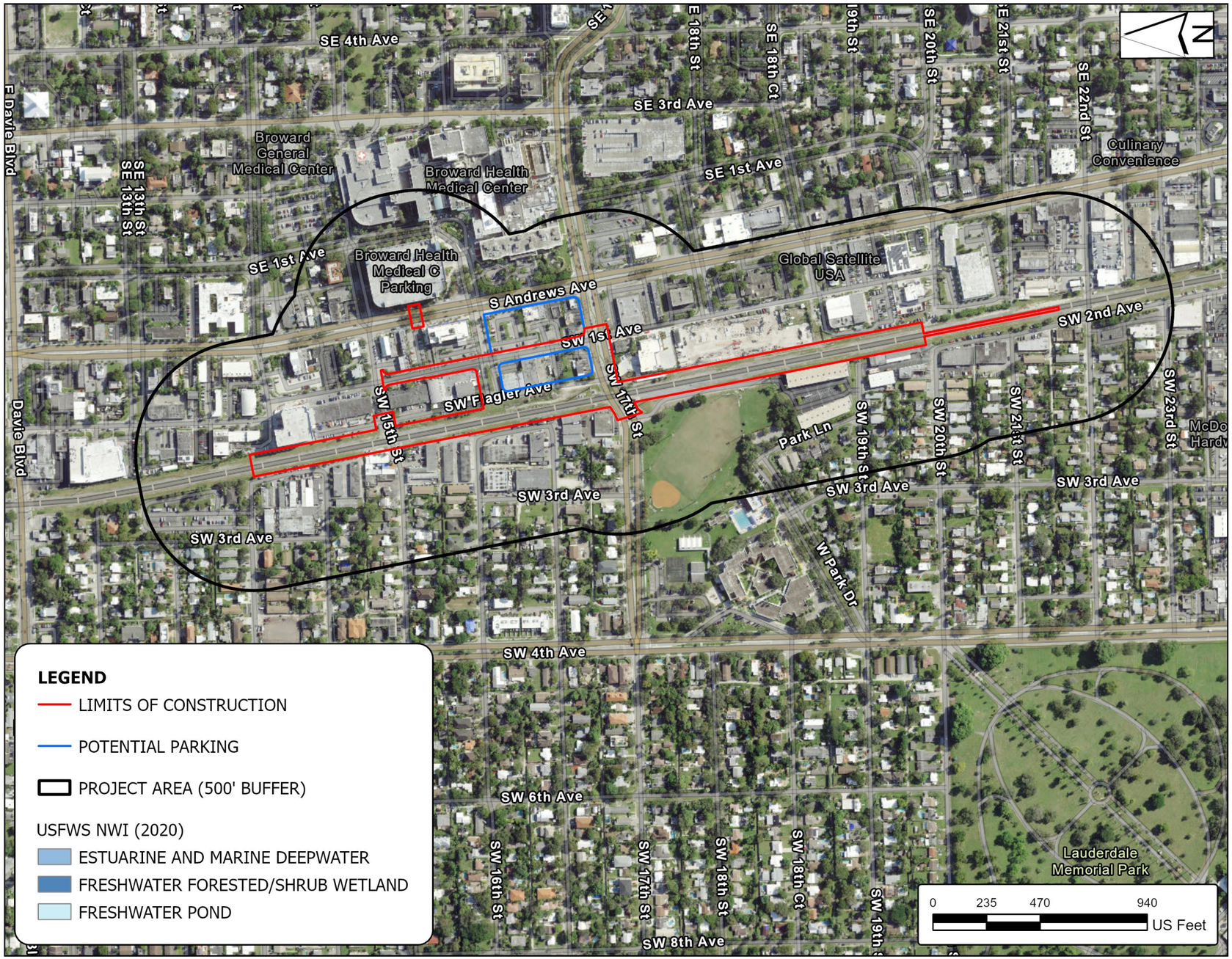


Figure 3.7: Hydrology Map Fort Lauderdale Station



Immediately northeast of the FLL Airport Station is a large stormwater management area that includes a stormwater pond as well as drier detention areas and extensive landscaping plantings. This stormwater management area is between the FEC rail line and the ramp from I-595 eastbound to US 1 southbound. The project corridor overlaps the southern portion of this stormwater management area for additional storage tracks.

3.3 Soils

The Natural Resources Conservation Service (NRCS) (2018) indicates ten soil types occur in the project area (**Table 3.1** and **Figures 3.8** through **3.10**). All of the soil types at the Hollywood and South Fort Lauderdale Stations are considered urban land, which according to the NRCS definition consists of residential, industrial, commercial, and institutional land; construction sites; public administration sites; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures and spillways; other land used for such purposes; small parks within urban and built-up areas; and highways, railroads, and other transportation facilities if they are surrounded by urban areas.

Non-urban land soils occur in the project area around the proposed FLL Airport Station. The second most common soil type behind urban land is Pennsuco, which consists of very poorly drained, moderately slowly permeable soils on lowlands only a few feet above sea level in the Lower Coastal Plain of Florida and tidal areas dominated by salt tolerant vegetation. This soil series is considered a hydric soil. Hydric soils are commonly associated with wetlands and hydric soils are noted in **Table 3.1** and include Pennsuco, Margate, and Perrine Soils. Another common soil type is Duette, which consists of moderately rapidly permeable soils on slightly elevated knolls of ridges in flatwood areas of the lower coast commonly dominated by scrub vegetation. This soil series is not considered a hydric soil.

(This space was left blank intentionally)

Table 3.1: Soil Types in Project Area

NRCS Soil Type	Environmental Association	Approximate Percent of Project Area
Hollywood Station		
Dade-Urban Land Complex	This soil type consists of moderately deep, well drained, very rapidly permeable soils on slightly elevated, sandy coastal prairies. They formed in sandy marine sediments over soft, porous limestone. Most areas of these soils are used for community development. Natural vegetation consists of south Florida slash pine, live oak, laurel oak, scrub live oak, saw palmetto, and other grasses. This is not a hydric soil.	0.28%
Duette-Urban Land Complex	This soil type consists of very deep, moderately well drained, moderately rapidly permeable soils on slightly elevated knolls of ridges in flatwoods areas of the Lower Coastal Plains of Florida. These soils were formed in thick beds of sandy marine sediments. Most areas of this soil type are in scrub vegetation and used for wildlife habitat. Natural vegetation is primarily sand pine, sand live oak, rosemary, saw palmetto, and fetterbush. This is not a hydric soil.	16.65%
Urban Land	This map unit consists of areas that are more than 70 percent covered by airports, shopping centers, parking lots, large buildings, streets and sidewalks, and other structures, so that the natural soil is not readily observable. This is not a hydric soil.	15.05%
FLL Airport Station		
Arents-Urban Land Complex	This soil type consists of soils that have been filled, graded, and shaped for urban development. It is found north of Port Everglades, where the natural soils have been extensively modified by excavation for canals and open water areas and filling in of adjacent areas. There is little natural vegetation. This is not a hydric soil.	1.06%
Dade-Urban Land Complex	See Environmental Association above.	8.25%
Margate Fine Sand	This soil type consists of nearly level, poorly drained, sandy soil that is underlain by limestone. It is on nearly level, low terraces between the Everglades and the low, sandy Atlantic Coastal Ridge. **This is a hydric soil**.	0.15%
Matlacha, Limestone Substratum-Urban Land Complex	This soil type consists of soils that are nearly level, somewhat poorly drained that form as a result of earthmoving operations in areas that are underlain by limestone bedrock. Most natural vegetation has been removed. The existing vegetation consists of South Florida slash pine and various scattered weeds. This is not a hydric soil.	0.17%
Pennsuco Silty Clay Loam	This soil type consists of deep, poorly and very poorly drained, moderately slowly permeable soils on lowlands as a result of finely divided stratified calcareous sediments that were deposited in marine or fresh waters over limestone. Tidal areas are dominated by mangroves, giant leather fern, and salt tolerant grasses. Vegetation in undrained areas consists of sawgrass, reeds, sedges, grasses, and scattered cabbage palm. **This is a hydric soil**.	21.1%
Perrine Silty Clay Loam	This soil type consists of moderately deep, poorly drained, moderately slowly to moderately permeable soils in lowlands along the Atlantic Coast of Peninsular Florida. They formed in calcareous silty and loamy sediments of marine or freshwater origin over limestone. Vegetation includes American and white mangroves, sawgrass, sedges, reeds, and scattered palm trees. **This is a hydric soil**.	1.06%
Perrine Variant Silt Loam	This soil type consists of moderately deep, very poorly drained, very slowly to moderately permeable soils in lowlands along the Atlantic Coast of Peninsular Florida. They formed in calcareous silty and loamy sediments of marine or freshwater origin over limestone. Vegetation includes American and white mangroves, sawgrass, sedges, reeds, and scattered palm trees. **This is a hydric soil**.	5.82%
Urban Land	See Environmental Association above.	10.38%
Water	-	2.13%
South Fort Lauderdale Station		
Dade-Urban Land Complex	See Environmental Association above.	5.53%
Immokalee, Limestone Substratum-Urban Land Complex	This complex consists of Immokalee, limestone substratum, and Urban land. Depth to the water table depends on the established drainage in the area and the amount of fill material that has been added, but the water table is deeper in most areas than is normal for undrained Immokalee soils. This is not a hydric soil.	0.23%
Urban Land	See Environmental Association above.	12.14%

Source: NRCS 2018

Figure 3.8: Soil Types in Hollywood Station Project Area

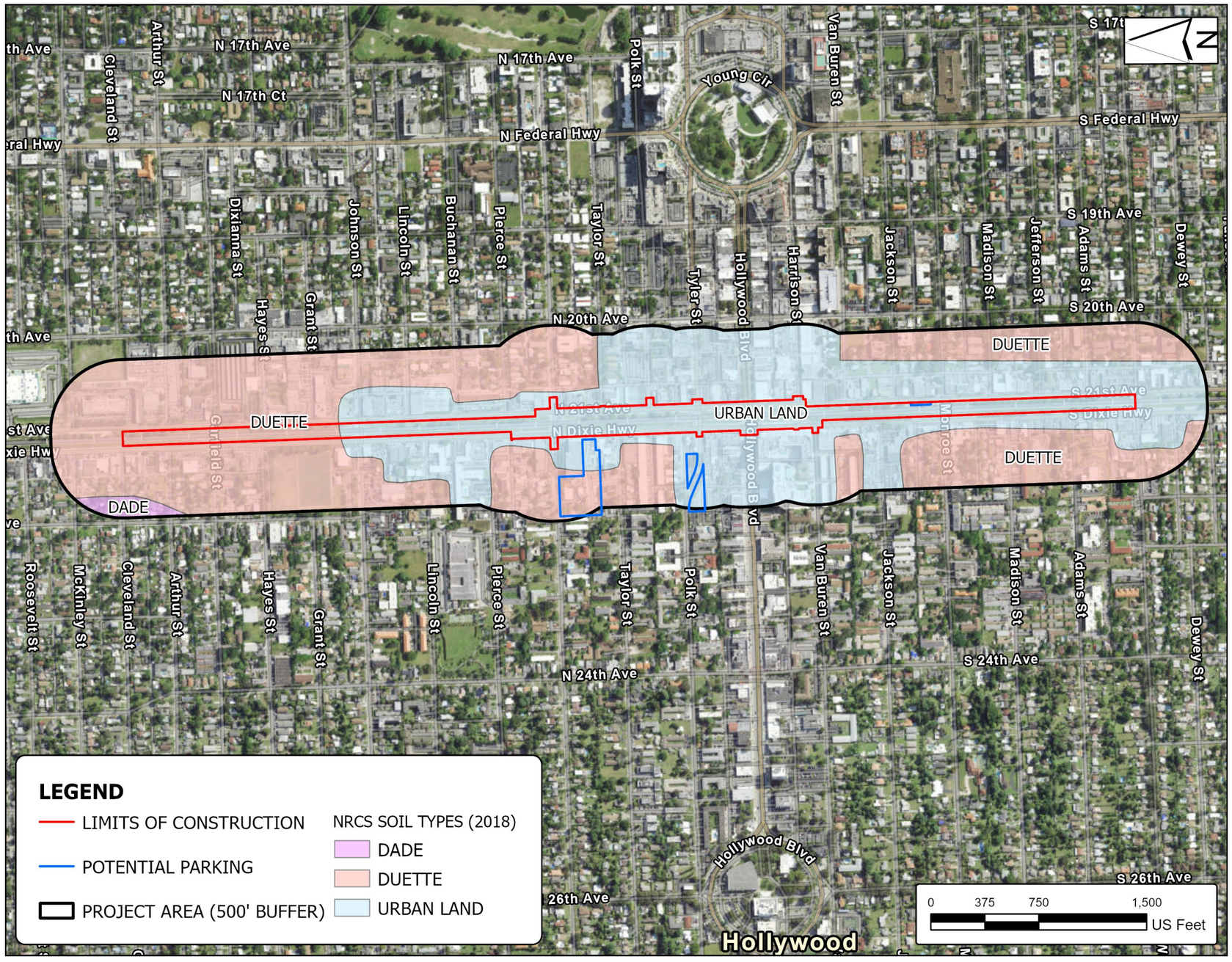


Figure 3.9: Soil Types in FLL Airport Station Project Area

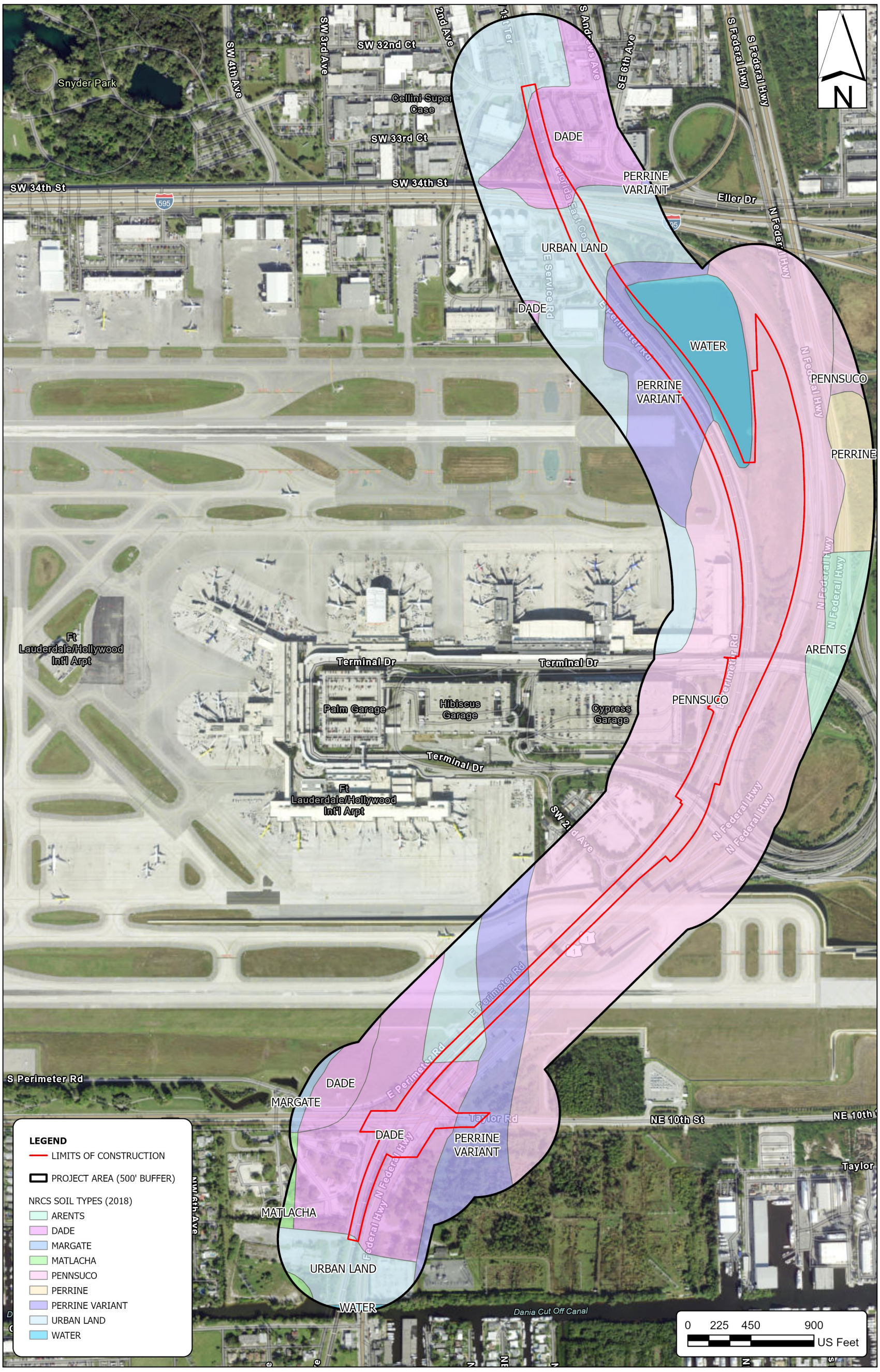
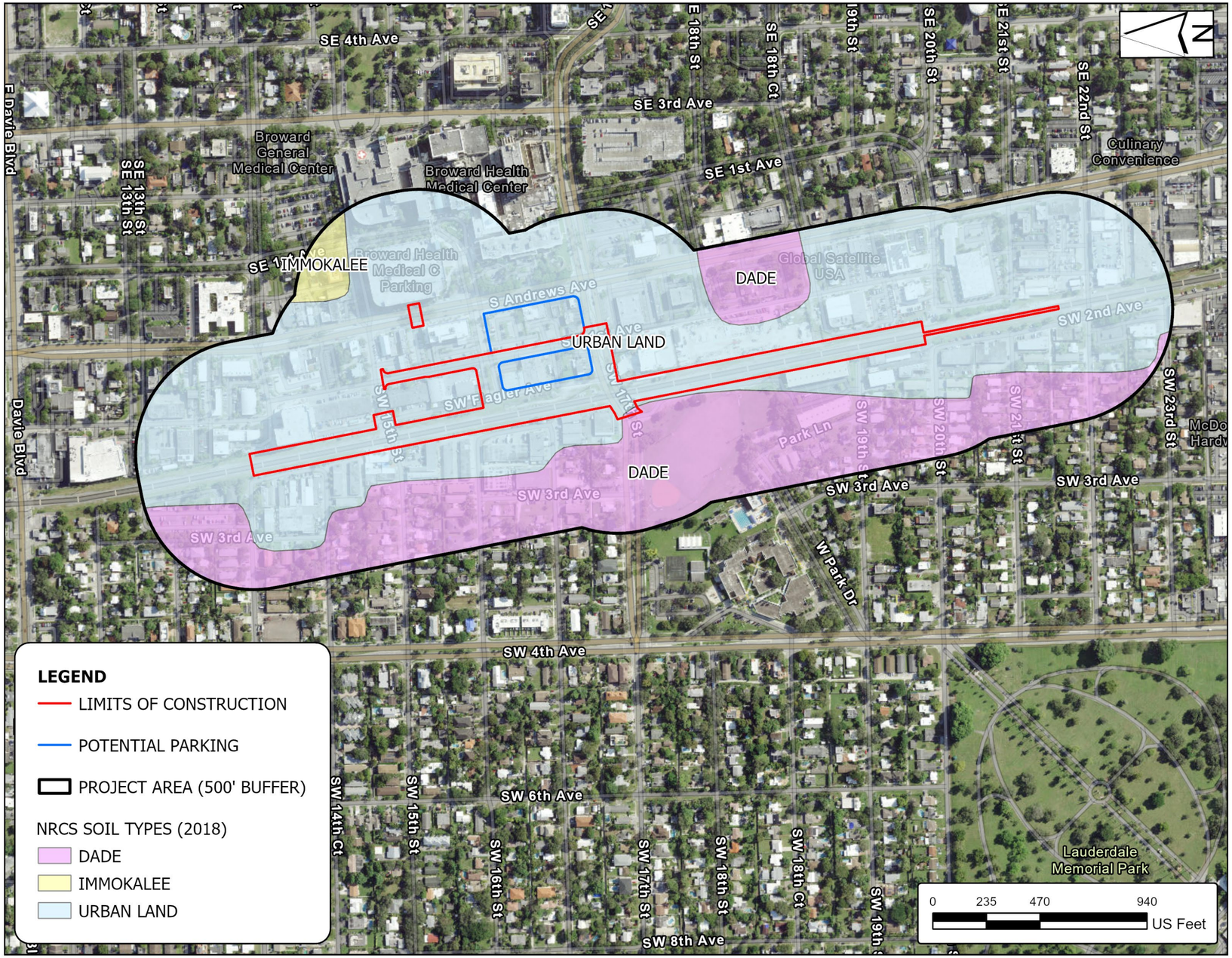


Figure 3.10: Soil Types in Fort Lauderdale Station Project Area



4.0 Methodology

4.1 Approach and Data Gathering

The following data sources and methods were used to establish the baseline conditions and evaluate potential impacts. No notable data gaps were identified and no pertinent comments were received from regulatory agencies through review of the project in the FDOT Efficient Transportation Decision Making (ETDM) System.

4.2 Data Collection

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

- USFWS Environmental Conservation Online System
- USFWS Information for Planning and Consultation (IPaC) online tool
- Florida Fish and Wildlife Conservation Service (FWC) databases
- FWC Integrated Wildlife Habitat Ranking System
- USFWS National Wetland Inventory (NWI) maps
- FWC Water Bird Colony Location Data (http://atoll.floridamarine.org/waterBirds/)
- FWC Bald Eagle Nest Data
- USFWS wood stork (*Mycteria americana*) nesting colonies map tool
- USFWS Species Recovery Plans
- SFWMD Land Use GIS Layers
- National Marine Fisheries Service (NMFS) EFH Data and Guidance documents
- FNAI Land Use GIS Layers
- U.S. Department of Agriculture NRCS Web Soil Survey
- ETDM Summary Report for Broward Commuter Rail (Project # 14474)

4.3 Field Reviews

Multiple field investigations were conducted to evaluate wildlife presence and habitat potential, to identify wetlands, and to generally document existing conditions in the project area. Preliminary field investigations occurred on April 3, 2023, with more detailed inspections on May 4, 2023, that included a limited roost survey for Florida bonneted bats at the proposed Hollywood Station. Limited roost surveys for Florida bonneted bats were conducted at the proposed FLL Airport station on May 10, 2023. Additional inspections of the proposed station project areas were conducted on October 3 and 4, 2023.

During field surveys, maps showing land use by FLUCFCS code and USFWS NWI wetlands maps were verified with existing conditions. Whenever encountered, biologists recorded visual observations of protected plant and animal species and their potential habitats, as well as other indicators of presence such as vocalizations, tracks, scat, staining, and burrows. Natural vegetative communities and any wetlands in the project area were also noted.

5.0 Protected Species and Habitats

The Endangered Species Act of 1973, as amended, and the Florida Endangered and Threatened Species Act, Section 379.2291, Florida Statues, grant the USFWS and FWC, respectively, authority to regulate certain wildlife species. Federal agencies are required to consult with USFWS or NMFS to ensure federal actions are not likely to jeopardize the continued existence of federally endangered or threatened species or result in the destruction or adverse modification of designated critical habitat. The Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act provide additional protections to many bird species. No Essential Fish Habitat occurs in the project area and no involvement with Essential Fish Habitat is anticipated.

The protected species addressed in this document are listed in **Table 5.1** and **5.2**. Federal and state listed species with potential to occur in the project area were identified through coordination with USFWS and FWC, particularly through the ETDM process and online database of land use, habitats, and element occurrences. Field investigations of the project area were conducted on multiple days.

Effect determinations are provided for each species that is Federally or state listed. When available, effect determinations keys were utilized. The standard effect determinations for Federally listed species are No Effect, May Affect, Not Likely to Adversely Affect, and May Affect, Likely to Adversely Affect. For state listed species, the standard effect determinations are No Effect Anticipated, No Adverse Effect Anticipated, and Potential for Adverse Effect. There is no difference in any species effect determinations between the Build Alternative with Parking Alternative 1 or Parking Alternative 2 because parking alternatives are in urban areas that lack wildlife habitats.

The project is within the USFWS consultation areas for American crocodile (*Crocodylus acutus*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*), Florida bonneted bat (*Eumops floridanus*), and Florida manatee (*Trichechus manatus latirostris*) as well as for Atlantic Coastal Plants. Because of a lack of potential habitat in the project corridor and because no work is proposed in wetlands or waterways, American crocodile and Florida manatee were not given further consideration in this document.

Ranges and known localities of protected species were identified using USFWS and FWC databases. The project is within the core foraging areas of two wood stork colonies. The nearest bald eagle (*Haliaeetus leucocephalus*) nest reported by the FWC online bald eagle nest locator tool, Nest DA007, is approximately 4.5 miles southwest of the project. USFWS and FWC generally

do not require any special protective measures or monitoring if a bald eagle nest is further than 660 feet from a project. The nearest known wading bird rookery is approximately 3.6 miles west of the project area. No designated Critical Habitat occurs in or adjacent to the project corridor, so no destruction or adverse modification of Critical Habitat is anticipated. Habitats are mapped by FLUCCS code in **Figures 3.1** through **3.3** and were confirmed in the field with minor revisions. Below is a description of each species in **Tables 5.1** and **5.2** along with pertinent aspects of their ecology, conservation, and potential habitat in the project area. Federally listed species are also considered to be state listed.

Table 5.1: Protected Wildlife Species Potentially Occurring in Project Area

Common Name	Scientific Name	Federal Status	State Status	Indications of Presence During Surveys
Eastern Indigo Snake	*Drymarchon corais couperi*	FT	*	No
Everglade Snail Kite	*Rostrhamus sociabilis plumbeus*	FE	*	No
Florida Bonneted Bat	*Eumops floridanus*	FE	*	No
Florida Scrub-Jay	*Aphelocoma coerulescens*	FT	*	No
Wood Stork	*Mycteria americana*	FT	*	No

Notes: FE = Federally Endangered, FT = Federally Threatened, * = Federally listed species are also considered to be state listed

Table 5.2: Protected Plant Species Potentially Occurring in Project Area

Common Name	Scientific Name	Federal Status	State Status	Occurrence Potential in Project Area
Beach Jacquemontia	*Jacquemontia reclinata*	FE	*	None
Blodgett's Silverbush	*Argythamnia blodgettii*	FT	*	None
Cape Sable Thoroughwort	*Chromolaena frustrata*	FE	*	None
Carter's Mustard	*Warea carteri*	FE	*	None
Carter's Small-flowered Flax	*Linum carteri carteri*	FE	*	None
Crenulate Lead-plant	*Amorpha crenulata*	FE	*	None
Deltoid Spurge	*Chamaesyce deltoidea ssp. deltoidea*	FE	*	None
Everglades Bully	*Sideroxylon reclinatum ssp. austrofloridense*	FT	*	None
Florida Brickell-bush	*Brickellia mosieri*	FE	*	None
Florida Pineland Crabgrass	*Digitaria pauciflora*	FT	*	None
Florida Prairie-clover	*Dalea carthagenensis floridana*	FE	*	None
Florida Semaphore Cactus	*Consolea corallicola*	FE	*	None
Pineland Sandmat	*Chamaesyce deltoidea pinetorum*	FT	*	None
Sand Flax	*Linum arenicola*	FE	*	None
Small's Milkpea	*Galactia smallii*	FE	*	None
Tiny Polygala	*Polygala smallii*	FE	*	None

Notes: FE = Federally Endangered, FT = Federally Threatened, * = Federally listed species are also considered to be state listed

5.1 Federally Protected Species in the Project Area

Eastern indigo snake (Threatened- Endangered)

Eastern indigo snakes are large, black, non-venomous snakes that are often associated with gopher tortoise burrows. Habitat loss is the primary threat to eastern indigo snakes. Eastern indigo snakes inhabit pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of marshes, agricultural fields, coastal dunes and human-altered habitats. The project area lacks agricultural fields and natural habitats. There is an area of human-altered habitat near the FLL Airport station, south of a stormwater pond in a drainage area that contains landscaping. That area is very low quality potential habitat due to its small size, isolation, and former disturbance. There are no direct connections to larger, nearby habitat areas and this patch of landscaping is isolated by major highways. No gopher tortoise burrows or other refugia that are occasionally inhabited by eastern indigo snakes were found in the project area.

The *Eastern Indigo Snake Programmatic Effect Determination Key* (USFWS 2013) was followed in evaluating potential impacts from the proposed project and the *USFWS Standard Protection Measures for the Eastern Indigo Snake* will be implemented during construction to minimize impacts (**Appendix A**). For these reasons, and in accordance with the USFWS effect determination key, a determination of ***May Affect, Not Likely to Adversely Affect*** is made for this species.

Everglade snail kite (Endangered- Federal)

The Everglade snail kite is a medium-sized raptor with a distinguishing slender, curved bill used to prey on apple snails (*Pomacea paludosa*). The range of the species is restricted to the central and southern parts of Florida. The Everglade snail kite's habitat consists of freshwater marshes and shallow edges of natural and manmade lakes. Survival of the species is closely linked to the abundance of apple snails, which are sensitive to water quality. Regulation of water stages in lakes and canals is particularly important to maintain vegetative communities that support their preferred food source.

The project occurs in the USFWS consultation area for this species. The project area lacks potential habitat for Everglade snail kite because it is highly urbanized. There are no areas of wetlands or lakes with emergent vegetation typical of Everglade snail kite habitat. No Everglade snail kites were observed during field surveys and none are known to occur in the project area. Because there are no known occurrences and no suitable habitat present in the project area, a determination of ***No Effect*** is made for this species.

Florida bonneted bat (Endangered- Federal)

The Florida bonneted bat is Florida's largest bat with a wingspan of 19 to 21 inches. Their native habitat consists of upland or wetland shrub/forest, with additional foraging over open freshwater wetlands and water bodies. Populations are restricted to south Florida. The project is within the USFWS consultation area for Florida bonneted bat and is within what USFWS considers the Urban Bat Area.

Florida bonneted bats may roost in bridges and overpasses, abandoned buildings, and large cavity trees with hollows. According to the USFWS Effect Determination Key (USFWS 2013) (**Appendix B**), potential roosts must be at least 15 feet high and include a gap, crevice, hole or other void. Within the project corridor, there are no areas of natural habitats with the potential to support Florida bonneted bat roosting. Trees that would be impacted by the Build Alternative were inspected and were determined to not form suitable nesting habitat due to size and/or a lack of voids at least 15 feet high. There are no snags that would be impacted by the project and trees in the project corridor are planted as part of landscaping and are regularly maintained, including trimming palm fronds.

Potential Florida bonneted bat foraging habitat is comprised of relatively open areas to catch prey and sources of drinking water. In natural landscapes this may include areas above open, fresh water wetlands, and upland or wetland forest. In urban areas, potential foraging habitat may include golf courses, parking lots, and parks in addition to relatively small patches of natural habitat. Open areas in the project area of each proposed station, including parking lots, airport taxiways, existing stormwater ponds and drainage features, and above the existing railroad tracks, are all potential foraging habitat. However, due to a lack of suitable nearby roosting habitat, no indications of use by bats, and no record of bats in the project area, it is unlikely that foraging by Florida bonneted bat occurs in the project corridor. Furthermore, no impacts to potential foraging habitat are anticipated because the project would not introduce substantial obstacles into potential foraging habitat.

Impact Evaluations followed the USFWS Florida Bonneted Bat Effect Determination Key (USFWS 2013) (**Appendix B**). Limited Roost Surveys were conducted to evaluate the potential for roosts and the potential presence of bats. No indications of any bats were found during field surveys and there are no records of Florida bonneted bats occurring in the project area. Because the project is within the USFWS Consultation Area for Florida Bonneted Bat but because no potential roosting habitat is present and there would be no impacts to foraging habitat, a determination of ***No Effect*** is made for this species.

Florida scrub-jay (Threatened- Federal)

Florida scrub-jays generally inhabit sandpine scrub, scrubby flatwoods, oak scrub, and coastal scrub habitats of peninsular Florida where the canopy is less than ten feet tall. These habitat types do not occur in the project area. Florida scrub-jay populations have declined predominantly due to habitat loss from development and habitat degradation through fire suppression. This project occurs in the USFWS consultation area for Florida scrub-jays. However, the project area is urbanized and lacks natural habitats and plant communities known to support Florida scrub-jays. Because there is no potential habitat for Florida scrub-jay in the project area, a determination of ***No Effect*** is made for this species.

Wood stork (Threatened- Federal)

Wood storks are large wading birds with white feathers, black wings, and bald heads. The main threat to wood storks stems from the loss, fragmentation, and modification of habitat, typically through urban encroachment and alterations of hydrology. Wood storks occur in a variety of wetland habitats, including freshwater marshes, stock ponds, shallow, seasonally flooded roadside and agricultural ditches, narrow tidal creeks, managed impoundments, and depressions in cypress heads and swamp sloughs. Because of their foraging method of wading and feeling for prey with their open bill, wood storks forage most effectively in shallow water with highly concentrated prey. High quality foraging conditions include relatively calm water with a depth of 5 to 15 inches lacking dense vegetation. Wood storks form nesting colonies that are typically located in medium to tall trees that are isolated and protected by open water so that human disturbance and exposure to land-based predators is minimized. The project corridor does not contain Suitable Foraging Habitat or potential nesting habitats for wood storks. No wood storks were observed during field surveys and there are no records of wood stork in the project area.

Determinations of potential impacts to wood stork and Suitable Foraging Habitat follow the definitions described in the USFWS *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (USFWS 1990) and the USFWS Wood Stork Effect Determination Key (**Appendix C**). For this region of Florida, the USFWS has defined a wood stork Core Foraging Area (CFA) as being within 18.6 miles of a wood stork nesting colony. The project occurs within the CFA of the Sawgrass Ford and the Emerald Estates 1 and 2 Griffin wood stork nesting colonies. Because no wood stork Suitable Foraging Habitat or potential nesting habitat would be impacted by the project, the effect determination key yields a determination of ***No Effect***.

Federally Listed Plants

The USFWS noted the potential presence of Federally listed plant species through comments made in the FDOT ETDM system. The following federally listed plant species were identified as potentially occurring in the project area through the USFWS IPaC tool: beach jacquemontia,

Blodgett's silverbush, Cape Sable thoroughwort, Carter's mustard, Carter's small-flowered flax, crenulate lead-plant, deltoid spurge, Everglades bully, Florida brickell-bush, Florida pineland crabgrass, Florida prairie-clover, Florida semaphore cactus, pineland sandmat, sand flax, small's milkpea, tiny polygala.

The potential for these species to occur in the project area was evaluated by comparing the existing conditions with descriptions of suitable habitat for each species. Most of the federally listed plant species are restricted to pine rocklands and ecotones with pine rocklands. Pine rocklands and related ecotones do not occur in the project area. Specifically, beach jacquemontia inhabit beach coastal strand and maritime hammock. Blodgett's silverbush inhabit sunny gaps and edges in pine rockland, rockland hammock, and coastal berm. Cape Sable thoroughwort inhabit buttonwood and coastal hardwood hammocks, coastal berm, and rock barrens. Carter's mustard in south Florida inhabit slash pine flatwoods while Carter's small-flowered flax, crenulate lead-plant, deltoid spurge, everglades bully, Florida brickell-bush, Florida pineland crabgrass, and Florida prairie-clover inhabit pine rocklands. Florida semaphore cactus inhabit hardwood hammocks and ecotones between hammocks and mangroves. Pineland sandmat, sand flax, small's milkpea, and tiny polygala inhabit pine rockland. The project corridor is heavily urbanized and does not include any of these habitat types. Due to a lack of suitable habitat, a determination of ***No Effect*** is made for federally listed plant species.

5.2 State Protected Species In The Project Area

The project area is outside of any FWC Strategic Conservation Areas and there are no reported occurrences of state listed species. The FDOT Electronic Screening Tool did not note the presence of any state protected species. FWC commented through the Advanced Notification and FDOT ETDM system that "No significant wildlife resources were identified in the project area" and that "Minimal impacts to fish or wildlife resources are anticipated to result from this project". No records were found of state protected species occurring in the project area and none were detected during field surveys. The project corridor is heavily urbanized and lacks natural habitats that might be suitable for state protected species. Due to a lack of potential habitat, there are ***No Effects Anticipated*** to state listed species.

5.3 Potential Impacts To Protected Species And Habitats

The Build Alternatives described in Section 2.0 can be compared to the existing conditions described in Section 3.0 and a No Build Alternative to expose and evaluate the potential impacts from the project. The No Build Alternative involves taking no action and would have no direct impacts on listed species or habitats; however, the No Build Alternative would not address the needs of the project.

The extent of potential direct impacts from the Build Alternatives were assessed by overlaying habitat types (as mapped by SFWMD and compared with USFWS NWI maps and field investigations) onto the project corridor, which represents the area of direct impacts. Records of species occurrence and habitat associations as well as nearby populations were also used to evaluate potential impacts.

Direct Impacts to Protected Species and Habitats

Effect Determinations for listed species are provided in **Tables 5.3** and **5.4**. The acreages of anticipated direct impacts by FLUCFCS code are shown in **Tables 5.5** and **5.6**. No direct impacts to wetlands or natural aquatic habitats are anticipated as part of the proposed project.

Table 5.3: Effect Determinations for Listed Wildlife Species

Common Name	Scientific Name	Federal Status	State Status	Indications of Presence During Surveys	Effect Determination
Eastern Indigo Snake	*Drymarchon corais couperi*	FT	*	No	May Affect Not Likely to Adversely Affect
Everglade Snail Kite	*Rostrhamus sociabilis plumbeus*	FE	*	No	No Effect
Florida Bonneted Bat	*Eumops floridanus*	FE	*	No	No Effect
Florida Scrub-Jay	*Aphelocoma coerulescens*	FT	*	No	No Effect
Wood Stork	*Mycteria americana*	FT	*	No	No Effect

Notes: FE = Federally Endangered, FT = Federally Threatened, * = Federally listed species are also considered to be state listed

Table 5.4: Effect Determinations for Listed Plant Species

Common Name	Scientific Name	Federal Status	State Status	Effect Determination
Beach Jacquemontia	*Jacquemontia reclinata*	FE	*	No Effect
Blodgett's Silverbush	*Argythamnia blodgettii*	FT	*	No Effect
Cape Sable Thoroughwort	*Chromolaena frustrata*	FE	*	No Effect
Carter's Mustard	*Warea carteri*	FE	*	No Effect
Carter's Small-flowered Flax	*Linum carteri carteri*	FE	*	No Effect
Crenulate Lead-plant	*Amorpha crenulata*	FE	*	No Effect
Deltoid Spurge	*Chamaesyce deltoidea ssp. deltoidea*	FE	*	No Effect
Everglades Bully	*Sideroxylon reclinatum ssp. austrofloridense*	FT	*	No Effect
Florida Brickell-bush	*Brickellia mosieri*	FE	*	No Effect
Florida Pineland Crabgrass	*Digitaria pauciflora*	FT	*	No Effect
Florida Prairie-clover	*Dalea carthagenensis floridana*	FE	*	No Effect
Florida Semaphore Cactus	*Consolea corallicola*	FE	*	No Effect
Pineland Sandmat	*Chamaesyce deltoidea pinetorum*	FT	*	No Effect
Sand Flax	*Linum arenicola*	FE	*	No Effect
Small's Milkpea	*Galactia smallii*	FE	*	No Effect
Tiny Polygala	*Polygala smallii*	FE	*	No Effect

Notes: FE = Federally Endangered, FT = Federally Threatened, * = Federally listed species are also considered to be state listed

Table 5.5: Station Area Direct Impacts by FLUCFCS Code

Land Use Type	Land Use Code	Direct Impacts (acres)	Total acres
Hollywood Station			
Roads and Highways	8140	4.09	5.13
Commercial and Services	1400	1.04	
FLL Airport Station			
Railroads and Railyards	8120	5.23	28.17
Reservoirs	5300	2.24	
Airports	8110	0.43	
Commercial and Services	1400	0.0001	
Roads and Highways	8140	19.78	
Herbaceous (Dry Prairie)*	3100	0.49	
South Fort Lauderdale Station			
Railroads and Railyards	8120	0.49	2.95
Educational Facilities	1710	0.08	
Institutional	1700	0.05	
Commercial and Services	1400	1.82	
Roads and Highways	8140	0.51	

*The area mapped as Herbaceous (Dry Prairie) is predominantly paved portions of Taylor Street, along with some maintained and mowed roadway shoulder. It is not a natural wildlife habitat.

Table 5.6: Parking Area Direct Impacts

Land Use Type	Land Use Code	Direct Impacts (acres)
Hollywood Station		
Multiple Dwelling Units, Low Rise	1330	0.05
Commercial and Services	1400	3.12
FLL Airport Station		
-	-	-
South Fort Lauderdale Station		
Commercial and Services	1400	2.8
Roads and Highways	8140	0.001

Indirect Impacts to Protected Species and Habitats

Indirect impacts are those impacts that are linked and causally related to the proposed project and may be temporary or permanent. For transportation projects, indirect impacts typically include disturbance to areas adjacent to the project area. These impacts include the short-term

impacts associated with road construction activities as well as other long-term impacts due to the proximity of the roadway to wildlife habitat.

Potential short-term indirect impacts to downstream habitats from the Build Alternative either Parking Alternative 1 or Parking Alternative 2 could result from the use of heavy equipment, the staging or stockpiling of equipment and materials, and increased erosion associated with soil disturbance. Standard Best Management Practices will be implemented and maintained throughout all construction activities to minimize indirect impacts from erosion and other sources.

Cumulative Impacts to Protected Species and Habitats

A "cumulative impact", according to the definition in the Council of Environmental Quality Regulations (40 CFR 1508.7), is "the impact on the environment, which results from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions." Because the project area is heavily urbanized, no impacts to habitats are anticipated. No designated Critical Habitats would be affected, and no adverse impacts to any listed species would occur. Standard Best Management Practices will be implemented to reduce potential cumulative impacts from construction, runoff, and sedimentation.

Avoidance, Minimization, and Mitigation

Impacts to protected species and habitats were sequentially avoided and then minimized, first by utilizing an existing transportation corridor and then by reducing the project footprint to minimize the area impacted. The FDOT *Standards Specifications for Road and Bridge Construction* will be implemented to further minimize impacts. USFWS *Standard Protection Measures for The Eastern Indigo Snake* will be implemented during construction.

6.0 Wetlands Evaluation

Wetlands are protected under Section 404 of the Clean Water Act. Guidance is provided in Executive Order 11990, Protection of Wetlands, which establishes a national policy to "avoid to the extent possible the long and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative". The US Army Corps of Engineers (USACE) has the authority to regulate work in Waters of the US under Section 10 of the Rivers and Harbors Act of 1899 and the USFWS acts as a commenting body where permitted actions may affect listed species. In Florida, state authority over activities in state surface waters and wetlands is administered by the Florida Department of Environmental Protection and the five Water Management Districts.

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

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

Wetlands and Other Surface Waters (OSW) were sought in the project area using database research, remote sensing, and field investigations. Wetlands were delineated using three parameters as indicators of wetlands: presence of hydrophytic vegetation, hydric soils, and hydrology, utilizing methodologies consistent with the USACE *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region* (2010), Chapter 62-340, Florida Administrative Code, and the *Florida Wetlands Delineation Manual* (Gilbert et. al. 2011).

6.1 Wetlands in the Project Area

The limits of construction at each proposed passenger station are heavily urbanized and remote sensing and field investigations confirm a lack of any jurisdictional wetlands. The SFWMD does not map any wetlands or surface waters within or adjacent to the limits of construction for the Hollywood or South Fort Lauderdale Stations (**Figures 3.1** and **3.3)**.

Wetlands and surface waters are mapped by the SFWMD in the project area of the FLL Airport Station (see **Figure 3.2**), including Reservoirs (FLUCFCS 5300) (a stormwater pond), Channelized Waterways (FLUCFCS 5120) (the Dania Cutoff Canal), and Wetland Hardwood Forest (FLUCFCS 6172) in two locations. The area mapped as a Reservoir (FLUCFCS 5300) east of the FLL Airport Station would be impacted under the Build Alternative. Those impacts would be to a manmade stormwater feature (pond) and would not impact jurisdictional wetlands. At this location, the Build Alternative requires modification of the existing US 1 pond on the east side of FEC rail. Under the Build Alternative, the pond would be expanded to the south and reconnect to the airport's irrigation facilities to offset storage loss and no permanent impacts to storage capacity would occur.

One area of Wetland Hardwood Forest is mapped by SFWMD east of the proposed FLL Airport station and is separated from the project by North Federal Highway. The other area of Wetland Hardwood Forest is mapped south of the proposed FLL Airport station and is associated with the Dania Cutoff Canal. Both areas mapped as Wetland Hardwood Forest are greater than 300 feet from the limits of construction.

The USFWS NWI does not map any wetlands in the project area at the Hollywood and South Fort Lauderdale Stations (**Figures 3.5** and **3.7**). The USFWS NWI maps three areas of wetlands in the project area for the FLL Airport Station (**Figure 3.6**). One area is a portion of the Dania Cutoff Canal, which USFWS NWI maps as Estuarine/Marine Deep Water. The Dania Cutoff Canal is considered an Other Surface Water and not a wetland. The Dania Cutoff Canal is outside the area of impacts and no work is proposed in, on, or over the Dania Cutoff Canal. The USFWS maps a stormwater pond in the FLL Airport Station project area as a Freshwater Pond, and to the east it maps a Freshwater Forested Shrub Wetland. The Freshwater Pond is considered an OSW and is not a wetland. The area mapped as Freshwater Forested Shrub Wetland east of the FLL Airport Station is outside the limits of construction and separated from the project by North Federal Highway, so no impacts are anticipated.

6.2 Potential to Impact Wetlands

The No Build Alternative would involve taking no action and so would have no impacts to wetlands or OSWs; however, the No Build Alternative would not address the needs of the project. Because the project corridor lacks any wetlands, the Build Alternative would not result in any direct impacts to wetlands, including under Parking Alternative 1 and Parking Alternative 2. Potential indirect impacts during construction will be avoided and minimized through the use of standard Best Management Practices (e.g., erosion control) and implementation of a Stormwater Pollution Prevention Plan. Because of a lack of direct impacts and the above measures to minimize indirect impacts, no cumulative impacts are anticipated.

7.0 Conclusions and Recommendations

The project corridor is heavily urbanized and lacks natural habitats for wildlife. No significant impacts are anticipated to any protected species from the proposed project. Effect determinations are provided in **Tables 7.1** and **7.2**. A commitment is made to implement the Standard Protection Measures for the Eastern Indigo Snake during site preparation and construction.

Impacts are anticipated to an existing stormwater pond which is considered an OSW, but no impacts to wetlands are anticipated from the proposed project. No permits are required from the USACE. An Environmental Resource Permit will be required from SFWMD due to impacts to existing stormwater management systems and for any increases in impermeable cover. No Essential Fish Habitat occurs in the project area and no involvement with Essential Fish Habitat is anticipated.

Table 7.1: Effect Determinations for Listed Wildlife Species

Common Name	Scientific Name	Federal Status	State Status	Indications of Presence During Surveys	Effect Determination
Eastern Indigo Snake	*Drymarchon corais couperi*	FT	*	No	May Affect Not Likely to Adversely Affect
Everglade snail kite	*Rostrhamus sociabilis plumbeus*	FE	*	No	No Effect
Florida bonneted bat	*Eumops floridanus*	FE	*	No	No Effect
Florida scrub-jay	*Aphelocoma coerulescens*	FT	*	No	No Effect
Wood stork	*Mycteria americana*	FT	*	No	No Effect

Notes: FE = Federally Endangered, FT = Federally Threatened, * = Federally listed species are also considered to be state listed

Table 7.2: Effect Determinations for Listed Plant Species

Common Name	Scientific Name	Federal Status	State Status	Effect Determination
Beach Jacquemontia	*Jacquemontia reclinata*	FE	*	No Effect
Blodgett's Silverbush	*Argythamnia blodgettii*	FT	*	No Effect
Cape Sable Thoroughwort	*Chromolaena frustrata*	FE	*	No Effect
Carter's Mustard	*Warea carteri*	FE	*	No Effect
Carter's Small-flowered Flax	*Linum carteri carteri*	FE	*	No Effect
Crenulate Lead-plant	*Amorpha crenulata*	FE	*	No Effect
Deltoid Spurge	*Chamaesyce deltoidea ssp. deltoidea*	FE	*	No Effect
Everglades Bully	*Sideroxylon reclinatum ssp. austrofloridense*	FT	*	No Effect
Florida Brickell-bush	*Brickellia mosieri*	FE	*	No Effect
Florida Pineland Crabgrass	*Digitaria pauciflora*	FT	*	No Effect
Florida Prairie-clover	*Dalea carthagenensis floridana*	FE	*	No Effect
Florida Semaphore Cactus	*Consolea corallicola*	FE	*	No Effect
Pineland Sandmat	*Chamaesyce deltoidea pinetorum*	FT	*	No Effect
Sand Flax	*Linum arenicola*	FE	*	No Effect
Small's Milkpea	*Galactia smallii*	FE	*	No Effect
Tiny Polygala	*Polygala smallii*	FE	*	No Effect

Notes: FE = Federally Endangered, FT = Federally Threatened, * = Federally listed species are also considered to be state listed

8.0 References

Florida Department of Environmental Protection Map Direct. 2023. Map Direct Gallery: Wetlands, Eagle Nests . Available at https: https://ca.dep.state.fl.us/mapdirect/

Florida Geographic Data Library. 2023. Geographic Information System (GIS) Layers. Available at: https://www.fgdl.org/download/index.html.

Google Earth Pro. 2023. Online version available at: https://earth.google.com/web/@0,-0.27619995,0a,22251752.77375655d,35y,0h,0t,0r

Natural Resources Conservation Service. 2023. GIS Soil Data and Series Descriptions from Web Soil
Survey. Available at: https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

Appendix A: Effect Determination Key and Standard Protection Measures for the Eastern Indigo Snake

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

IN REPLY REFER TO:
August 13, 2013

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

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

Dear Colonel Dodd:

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

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

On Page 2

The following replaces the last paragraph above the signatures:

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

On Page 3

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

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

On Page 4

The following replaces the first paragraph under Conservation Measures:

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

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

On Page 4 and Page 5 (Couplet D)

The following replaces D. under Conservation Measures:

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

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

On Page 5

The following replaces footnote #3:

"[3]If excavating potentially occupied burrows, active or inactive, individuals must first obtain state authorization via a FWC Authorized Gopher Tortoise Agent permit. The excavation method selected should also minimize the potential for injury of an indigo snake. Applicants should follow the excavation guidance provided within the most current Gopher Tortoise Permitting Guidelines found at http://myfwc.com/gophertortoise ."

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

Sincerely,

Dawn Jennings
Acting Field Supervisor

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

United States Department of the Interior

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

January 25, 2010

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

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

Dear Mr. Hobbie:

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

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

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

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

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

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

Sincerely,

Paul Souza
Field Supervisor
South Florida Ecological Services Office

David L. Hankla
Field Supervisor
North Florida Ecological Services Office

Enclosure

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

Eastern Indigo Snake Programmatic Effect Determination Key

Scope of the key

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

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

Habitat

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

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

Even though thermal stress may not be a limiting factor throughout the year in south Florida, indigo snakes still seek and use underground refugia. On the sandy central ridge of central Florida, eastern indigos use gopher tortoise burrows more (62 percent) than other underground refugia (Layne and Steiner 1996). Other underground refugia used include armadillo (*Dasypus novemcinctus*) burrows near citrus groves, cotton rat (*Sigmodon hispidus*) burrows, and land crab (*Cardisoma guanhumi*) burrows in coastal areas (Service 2006). Natural ground holes, hollows at the base of trees or shrubs, ground litter, trash piles, and crevices of rock-lined ditch walls are also used (Layne and Steiner 1996). These refugia are used most frequently where tortoise burrows are not available, principally in low-lying areas off the central and coastal ridges. In extreme south Florida (the Everglades and Florida Keys), indigo snakes are found in tropical

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

Conservation Measures

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

In an effort to reduce correspondence in effect determinations and responses, the Service is providing an Eastern Indigo Snake Effect Determination Key, similar in utility to the West Indian Manatee Effect Determination Key and the Wood Stork Effect Determination Keys presently being utilized by the Corps. If the use of this key results in a Corps' determination of "no effect" for a particular project, the Service supports this determination. If the use of this Key results in a determination of NLAA, the Service concurs with this determination and no additional correspondence will be necessary[1]. This key is subject to revisitation as the Corps and Service deem necessary.

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

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

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

Permit will not be conditioned as above for the eastern indigo snake, or it is not known whether an applicant intends to use these measures and consultation with the Service is requested[2] .....*"may affect"*

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

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

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

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

E. Any permit will be conditioned such that all gopher tortoise burrows, active or inactive, will be evacuated prior to site manipulation in the vicinity of the burrow[3]. If an indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Any permit will also be conditioned such that holes, cavities, and snake refugia other than gopher tortoise burrows will be inspected each morning before planned site manipulation of a particular area, and, if occupied by an indigo snake, no work will commence until the snake has vacated the vicinity of proposed work..... *"NLAA"*

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

---

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

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

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

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE
U.S. Fish and Wildlife Service

March 23, 2021

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

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

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

POSTER INFORMATION

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

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat.

These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

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

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida and Georgia. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas and often move seasonally between upland and lowland habitats, particularly in the northern portions of its range (North Florida and Georgia). Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Reliance on xeric sandhill habitats throughout the northern portion of the range in northern Florida and Georgia is due to the dependence on gopher tortoise burrows for shelter during winter. Breeding occurs during October through February. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

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

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

IF YOU SEE A <u>LIVE</u> EASTERN INDIGO SNAKE ON THE SITE:

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

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

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

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

North Florida Field Office: (904) 731-3336
Panama City Field Office: (850) 769-0552
South Florida Field Office: (772) 562-3909
Georgia Field Office: (706) 613-9493

PRE-CONSTRUCTION ACTIVITIES

1. The applicant or designated agent will post educational posters in the construction office and throughout the construction site, including any access roads. The posters must be clearly visible to all construction staff. A sample poster is attached.

2. Prior to the onset of construction activities, the applicant/designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational brochure including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office (a final brochure for Plan compliance, to be printed double-sided on 8.5 x 11in paper and then properly folded, is attached). Â Photos of eastern indigo snakes may be accessed on USFWS and/or FWC or GADNR websites.

3. Construction staff will be informed that in the event that an eastern indigo snake (live or dead) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Field Office. The contact information for the USFWS is provided on the referenced posters and brochures.

DURING CONSTRUCTION ACTIVITIES

1. During initial site clearing activities, an onsite observer may be utilized to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).

2. If an eastern indigo snake is discovered during gopher tortoise relocation activities (i.e. burrow excavation), the USFWS shall be contacted within one business day to obtain further guidance which may result in further project consultation.

3. Periodically during construction activities, the applicants designated agent should visit the project area to observe the condition of the posters and Plan materials, and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.

POST CONSTRUCTION ACTIVITIES

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

Appendix B: Florida Bonneted Bat Effect Determination Key

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

FLORIDA BONNETED BAT CONSULTATION GUIDELINES

October - 2019

The U.S. Fish and Wildlife Service's South Florida Ecological Services Field Office (Service) developed the Florida Bonneted Bat Consultation Guidelines (Guidelines) to assist in avoiding and minimizing potential negative effects to roosting and foraging habitat and assessing effects to the Florida bonneted bat (*Eumops floridanus*) from proposed projects. The Consultation Key within the Guidelines assists applicants in evaluating their proposed projects and identifying the appropriate consultation paths under sections 7 and 10 of the Endangered Species Act of 1973 (Act), as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). These Guidelines are primarily for use in evaluating regulatory projects where development and land conversions are anticipated. These Guidelines focus on conserving roosting structures in natural and semi-natural environments. The following Consultation Area map (Figure 1 and Figure 2, Appendix A), Consultation Flowchart (Figure 3), Consultation Key, Survey Framework (Appendices B-C), and **Best Management Practices (BMPs)** (Appendix D) are based upon the best available scientific information. As more information is obtained, these Guidelines will be revised as appropriate. If you have comments, or suggestions on these Guidelines or the Survey Protocols (Appendix B and C), please email your comments to FBBguidelines@fws.gov. These comments will be reviewed and incorporated in an annual review.

Terms in **bold** are further defined in the Glossary.

Wherever possible, proposed development projects within the Consultation Area should be designed to avoid and minimize take of Florida bonneted bats and to retain their habitat. Applicants are encouraged to enter into early technical assistance/consultation with the Service so we may provide recommendations for avoiding and minimizing adverse effects. Although these Guidelines focus on the effects of a proposed action (*e.g.*, development) on natural habitat, (*i.e.*, non-urban), Appendix E also provides Best Management Practices for Land Management Projects.

If you are renovating an existing artificial structure (*e.g.*, building) within the urban environment with or without additional ground disturbing activities, these Guidelines do not apply. The Service is developing separate guidelines for consultation in these situations. Until the urban guidelines are complete, please contact the Service for additional guidance.

The final listing rule for the Florida bonneted bat (Service 2013) describes threats identified for the species. Habitat loss and degradation, as well as habitat modification, have historically affected the species. Florida bonneted bats are different from most other Florida bat species because they are reproductively active through most of the year, and their large size makes them capable of foraging long distances from their roost (Ober *et al.* 2016). Consequently, this species is vulnerable to disturbances around the roost during a greater portion of the year and considerations about foraging habitat extend further than the localized roost.

Use of Consultation Area, Flowchart, and Key

Figure 1 shows the Consultation Area for the Florida bonneted bat where this consultation guidance applies. For information on how the Consultation Area was delineated see Appendix A. The Consultation Flowchart (Figure 3) and Consultation Key direct project proponents through a series of couplets that will provide a conclusion or determination for potential effects to the Florida bonneted bat. *Please Note: If additional listed species, or candidate or proposed species, or designated or proposed critical habitat may be affected, a separate evaluation will be needed for these species/critical habitats.*

Currently, the Consultation Flowchart (Figure 3) and Consultation Key cannot be used for actions proposed within the urban development boundary in Miami-Dade and Broward County. The urban development boundary is part of the Consultation Area, but it is excluded from these Guidelines because Florida bonneted bats use this area differently (roosting largely in artificial structures), and small natural foraging areas are expected to be important. Applicants with projects in this area should contact the Service for further guidance and individual consultation.

Determinations may be either "no effect," "may affect, but is not likely to adversely affect" (**MANLAA**), or "may affect, and is likely to adversely affect" (**LAA**). An applicant's willingness and ability to alter project designs could sufficiently minimize effects to Florida bonneted bats and allow for a **MANLAA** determination for this species (informal consultation). The Service is available for early technical assistance/consultation to offer recommendations to assist in project design that will minimize effects. When take cannot be avoided, applicants and action agencies are encouraged to incorporate compensation to offset adverse effects. The Service can assist with identifying compensation options (*e.g.,* conservation on site, conservation off-site, contributions to the Service's Florida bonneted bat conservation fund, *etc*.).

Using the Key and Consultation Flowchart

- "No effect" determinations do not need Service concurrence.
- "May affect, but is not likely to adversely affect" **MANLAA**. Applicants will be expected to incorporate the appropriate BMPs to reach a **MANLAA** determination.
    - **MANLAA-P** (in blue in Consultation Flowchart) have programmatic concurrence through the transmittal letter of these Guidelines, and therefore no further consultation with the Service is necessary unless assistance is needed in interpreting survey results.
    - **MANLAA-C** (in black in Consultation Flowchart) determinations require further consultation with the Service.
- "May affect, and is likely to adversely affect" (**LAA**) determinations require consultation with the Service. Project modifications could change the **LAA** determinations in numbers 5, 8, 9, 11, 12, and 17 to **MANLAA**. When take cannot be avoided, **LAA** determinations will require a biological opinion.
- The Service requests copies of surveys used to support all determinations. If a survey is required by the Consultation Key and the final determination is "no effect" or "MANLAA-P", send the survey to FBBsurveyreport@fws.gov , or mail electronic file to U.S. Fish and Wildlife Service, Attention Florida bonneted bat surveys, 1339 20th Street, Vero Beach, Florida 32960. If a survey is required by the Consultation Key and the determination is "MANLAA-C" or "LAA", submit the survey in the consultation request.

For the purpose of making a decision at Couplet 2: If any potential roosting structure is present, then the habitat is classified as **potential roosting habitat**, and the left half of the flowchart should be followed (see Figure 3). We recognize that roosting habitat may also be used by Florida bonneted bats for foraging. If the project site only consists of **foraging habitat** (*i.e.*, no suitable roosting structures), then the right side of the flowchart should be followed beginning at step 13.

For couplets 11 and 12: **Potential roosting habitat** is considered **Florida bonneted bat foraging habitat** when a determination is made that roosting is not likely.

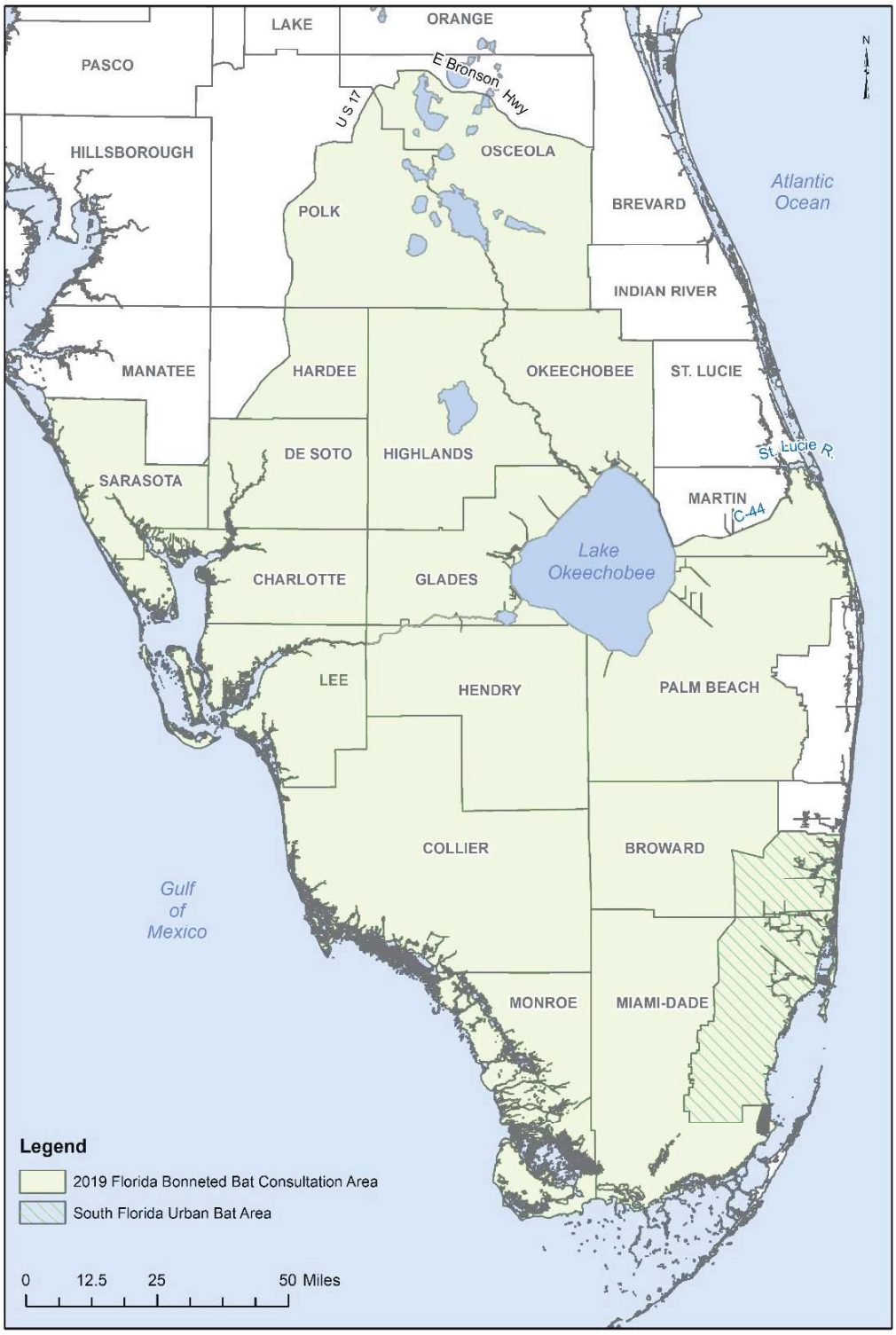


Figure 1. Florida Bonneted Bat Consultation Area. Hatched area (Figure 2) identifies the urban development boundary in Miami-Dade and Broward County. Applicants with projects in this area should contact the Service for specific guidance addressing this area and individual consultation. The Consultation Key should not be used for projects in this area.

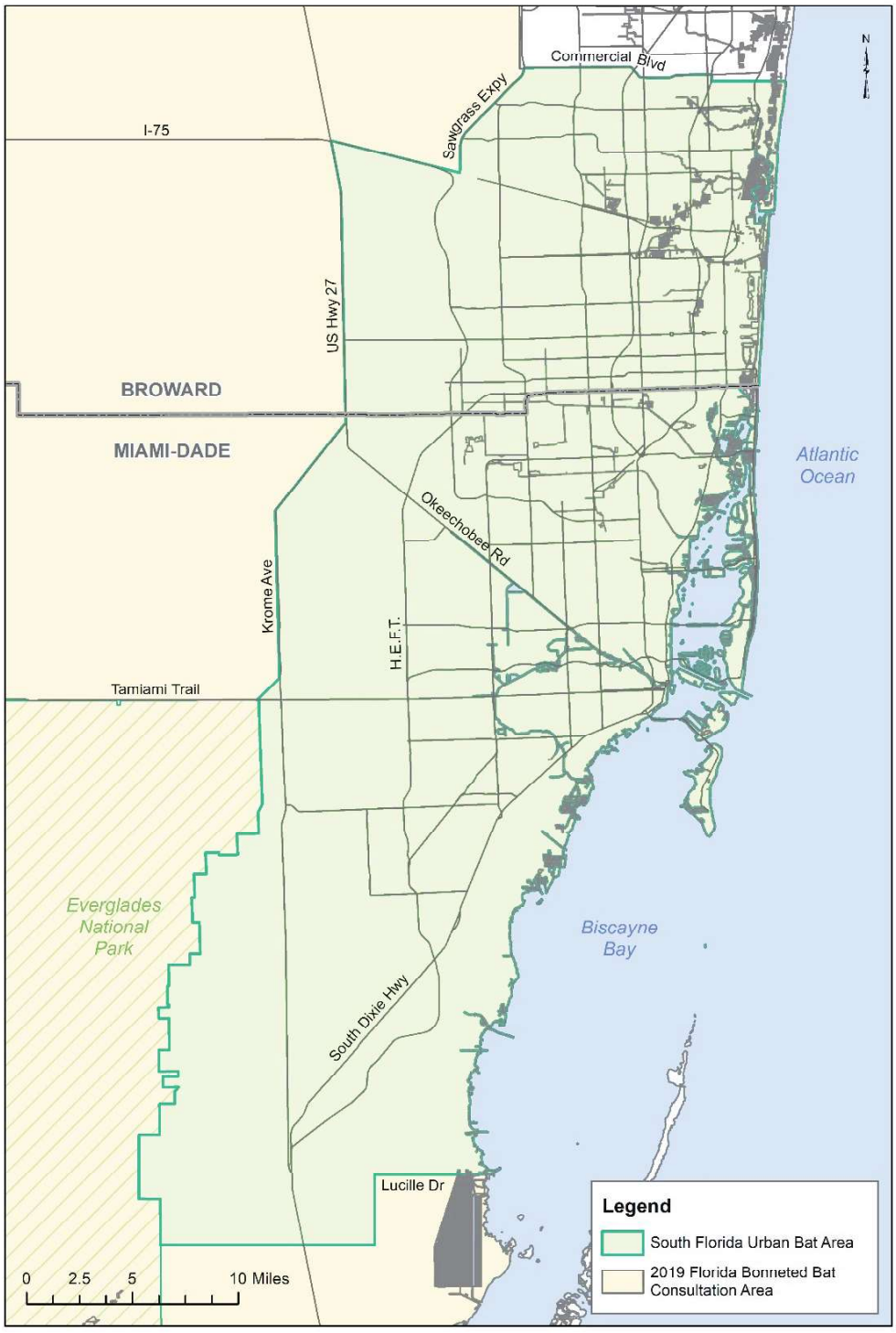


Figure 2. Urban development boundary in Miami-Dade and Broward County. The Consultation Key should not be used for projects in this area. Applicants with projects in this South Florida Urban Bat Area should contact the Service for specific guidance addressing this area and individual consultation.

Florida Bonneted Bat Consultation Key[#]

Use the following key to evaluate potential effects to the Florida bonneted bat (FBB) from the proposed project. Refer to the Glossary as needed.

1a. Proposed project or land use change is partially or wholly within the Consultation Area (Figure 1).....**Go to 2**
1b. Proposed project or land use change is wholly outside of the Consultation Area (Figure 1).....**No Effect**

2a. Potential FBB roosting habitat exists within the project area.....**Go to 3**
2b. No potential FBB roosting habitat exists within the project area.....**Go to 13**

3a. Project size/footprint* ≤ 5 acres (2 hectares)..... **Conduct Limited Roost Survey (Appendix C)** then **Go to 4**
3b. Project size/footprint* > 5 acres (2 hectares).....**Conduct Full Acoustic/Roost Surveys (Appendix B)** then **Go to 6**

4a. Results show FBB roosting is likely .....**Go to 5**
4b. Results do not show FBB roosting is likely.....**MANLAA-P if BMPs (Appendix D) used and survey reports are submitted. Programmatic concurrence.**

5a. Project will affect roosting habitat.....**LAA[+] Further consultation with the Service required.**
5b. Project will not affect roosting habitat..... **MANLAA-C with required BMPs (Appendix D). Further consultation with the Service required.**

6a. Results show some FBB activity.....**Go to 7**
6b. Results show no FBB activity.....**No Effect**

7a. Results show FBB roosting is likely.....**Go to 8**
7b. Results do not show FBB roosting is likely.....**Go to 10**

8a. Project will not affect roosting habitat.....**Go to 9**
8b. Project will affect roosting habitat.....**LAA[+] Further consultation with the Service required.**

9a. Project will affect* > 50 acres (20 hectares) (wetlands and uplands) of foraging habitat.....**LAA[+] Further consultation with the Service required.**
9b. Project will affect* ≤ 50 acres (20 hectares) (wetlands and uplands) of foraging habitat..... **MANLAA-C with required BMPs (Appendix D). Further consultation with the Service required.**

10a. Results show high FBB activity/use.....**Go to 11**
10b. Results do not show high FBB activity/use.....**Go to 12**

11a. Project will affect* > 50 acres (20 hectares) (wetlands and uplands) of FBB habitat (roosting and/or foraging)..... **LAA[+] Further consultation with the Service required.**
11b. Project will affect* ≤ 50 acres (20 hectares) (wetlands and uplands) of FBB habitat (roosting and/or foraging)..... **MANLAA-C with required BMPs (Appendix D). Further consultation with the Service required.**

12a. Project will affect* > 50 acres (20 hectares) (wetlands and uplands) of FBB habitat..... **LAA[+] Further consultation with the Service required.**
12b. Project will affect* ≤ 50 acres (20 hectares) (wetlands and uplands) of FBB habitat..... **MANLAA-P if BMPs (Appendix D) used and survey reports are submitted. Programmatic concurrence.**

13a. FBB foraging habitat exists within the project area and foraging habitat will be affected…..……..**Go to 14**

13b. FBB foraging habitat exists within the project area and foraging habitat will not be affected **OR** no FBB foraging habitat exists within the project area….……..**No Effect**

14a. Project size* > 50 acres (20 hectares) (wetlands and uplands) ……..…….....**Go to 15**

14b. Project size* ≤ 50 acres (20 hectares) (wetlands and uplands) ……...….. **MANLAA-P if BMPs (Appendix D) used. Programmatic concurrence.**

15a. Project is within 8 miles (12.9 kilometers) of high quality potential roosting areas^……..……**Conduct Full Acoustic Survey (Appendix B) and Go to 16**

15b. Project is not within 8 miles (12.9 kilometers) of high quality potential roosting area^……....….**MANLAA-P if BMPs (Appendix D) used. Programmatic concurrence.**

16a. Results show some FBB activity……...…….…....**Go to 17**

16b. Results show no FBB activity……..…….…....**No Effect**

17a. Results show high FBB activity/use……...…...…....**LAA[+] Further consultation with the Service required.**

17b. Results do not show high FBB activity/use……..... **MANLAA-P if BMPs (Appendix D) used and survey reports submitted. Programmatic concurrence.**

[#] If you are within the urban environment and you are renovating an existing artificial structure (with or without additional ground disturbing activities), these Guidelines do not apply. The Service is developing separate guidelines for consultation in these situations. Until the urban guidelines are complete, please contact the Service for additional guidance

*Includes wetlands and uplands that are going to be altered along with a 250- foot (76.2- meter) buffer around these areas if the parcel is larger than the altered area.

[+]Project modifications could change the **LAA** determinations in numbers 5, 8, 9, 11, 12, and 17 to **MANLAA** determinations.

^Determining if **high quality potential roosting areas** are within 8 mi (12.9 km) of a project is intended to be a desk-top exercise looking at most recent aerial imagery, not a field exercise.

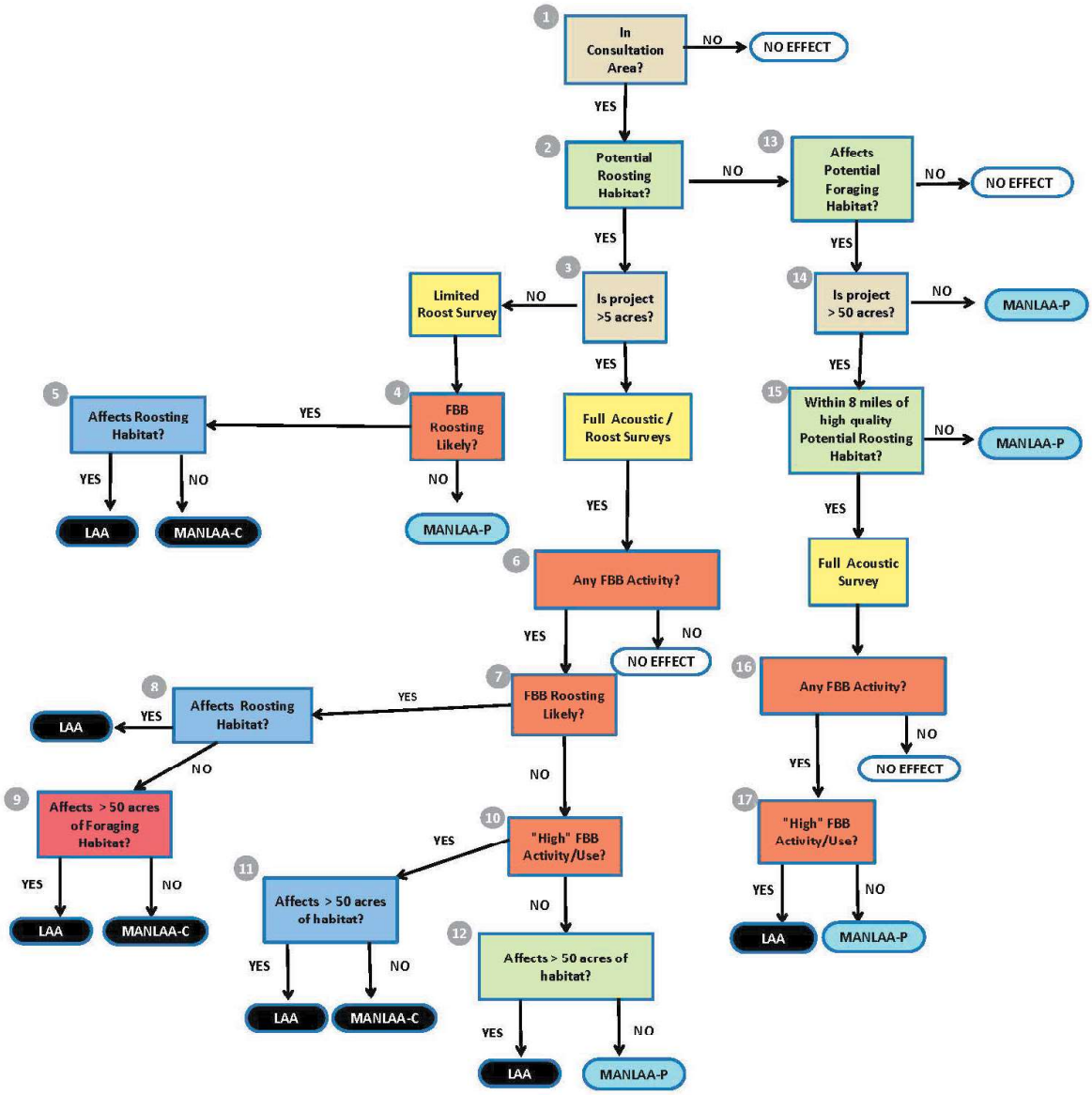


Figure 3. Florida bonneted bat Consultation Flowchart. "**No effect**" determinations do not need Service concurrence. "May affect, but not likely to adversely affect", **MANLAA-P,** in blue have programmatic concurrence through the transmittal letter of these Guidelines, and therefore no further consultation with the Service is necessary unless assistance is needed in interpreting survey results. **MANLAA-C** determinations in black require further consultation with the Service. Applicants are expected to incorporate the appropriate **BMPs** to reach a **MANLAA** determination. "May affect, and is likely to adversely affect", **LAA, (**also in black) determinations require consultation with the Service. Further consultation with the Service may identify project modifications that could change the **LAA** determinations in numbers 5, 8, 9, 11, 12, and 17 to **MANLAA** determinations. The Service requests Florida bonneted bat survey reports for all determinations.

GLOSSARY

BMPs – Best Management Practices. Recommendations for actions to conserve roosting and foraging habitat to be implemented before, during, and after proposed development, land use changes, and land management activities.

FBB Activity – Florida bonneted bat (FBB) activity is when any Florida bonneted bat calls are recorded during an acoustic survey or human observers see or hear Florida bonneted bats on a site.

FORAGING HABITAT - Comprised of relatively open (*i.e.,* uncluttered or reduced numbers of obstacles, such as fewer tree branches and leaves, in the flight environment) areas to find and catch prey, and sources of drinking water. In order to find and catch prey, Florida bonneted bats forage in areas with a reduced number of obstacles. This includes: open fresh water, permanent or seasonal freshwater wetlands, within and above wetland and upland forests, wetland and upland shrub, and agricultural lands (Bailey *et al.* 2017). In urban and residential areas drinking water, prey base, and suitable foraging can be found at golf courses, parking lots, and parks in addition to relatively small patches of natural habitat.

FULL ACOUSTIC/ROOST SURVEY - This is a comprehensive survey that will involve systematic acoustic surveys (*i.e.,* surveys conducted 30 minutes prior to sunset to 30 minutes after sunrise, over multiple consecutive nights). Depending upon acoustic results and habitat type, targeted roost searches through thorough visual inspection using a tree-top camera system or observations at emergence (*e.g.,* looking and listening for bats to come out of tree cavities around sunset) or more acoustic surveys may be necessary. See Appendix B for a full description.

HIGH FBB ACTIVITY/USE - High Florida bonneted bat (FBB) activity/use or importance of an area can be defined using several parameters (*e.g*., types of calls, numbers of calls). An area will be considered to have high FBB activity/use if **ANY** of the following are found: (a) multiple FBB feeding buzzes are detected; (b) FBB social calls are recorded; (c) large numbers of Florida bonneted bat calls (9 or more) are recorded throughout one night. Each of these parameters is considered to indicate that an area is actively used and important to FBBs, however, the Service will further evaluate the activity/use of the area within the context of the site (*i.e.,* spatial distribution of calls, site acreage, habitat on site, as well as adjacent habitat) and provide additional guidance.

HIGH QUALITY POTENTIAL ROOSTING AREAS - Sizable areas (>50 acres) [20 hectares] that contain large amounts of high-quality, natural roosting structure – (*e.g.,* predominantly native, mature trees; especially pine flatwoods or other areas with a large number of cavity trees, tree hollows, or high woodpecker activity).

LAA - May Affect, and is Likely to Adversely Affect. The appropriate conclusion 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 "may affect, but is not likely to adversely affect" (**MANLAA**)]. In

the event the overall effect of the proposed action is beneficial to the listed species, but also is likely to cause some adverse effects, then the proposed action is "likely to adversely affect" the listed species. If incidental take is anticipated to occur as a result of the proposed action, an "is likely to adversely affect" (**LAA**) determination should be made. An "is likely to adversely affect" determination requires the initiation of formal section 7 consultation.

LIMITED ROOST SURVEY - This is a reduced survey that may include the following methods: acoustics, observations at emergence (*e.g.,* looking and listening for bats to come out of tree cavities around sunset), and visual inspection of trees with cavities or loose bark using tree-top cameras (or 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 structures on site. See also Appendix C for a full description.

MANLAA - May Affect, but is Not Likely to Adversely Affect. The appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. 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. To use these Guidelines and Consultation Key applicants must incorporate the appropriate **BMPs** (Appendix D) to reach a **MANLAA** determination.

In this Consultation Key we have identified two ways that consultation can conclude informally, **MANLAA-P and MANLAA-C**:

> **MANLAA-P**: programmatic concurrence is provided through the transmittal letter of these Guidelines, no additional consultation is required with the Service for Florida bonneted bats. All survey results must be submitted to Service.
>
> **MANLAA-C:** further consultation with the Service is required to confirm that the Consultation Key has been used properly, and the Service concurs with the evaluation of the survey results. Request for consultation must include survey results.

NO EFFECT - The appropriate conclusion when the action agency determines its proposed action will not affect listed species or designated critical habitat.

POTENTIAL ROOSTING HABITAT - Includes forest and other areas with tall, mature trees or other areas with suitable roost structures (*e.g.,* utility poles, artificial structures). Forest is defined as all types including: pine flatwoods, scrubby flatwoods, pine rocklands, royal palm hammocks, mixed or hardwood hammocks, cypress, sand pine scrub, or other forest types. (Forrest types currently include exotic forests such as melaleuca, please contact the Service for additional guidance as needed). More specifically, this includes habitat in which suitable structural features for breeding and sheltering are present. In general, roosting habitat contains one or more of the following structures: tree snags, and trees with cavities, hollows, deformities, decay, crevices, or loose bark. Structural characteristics are of primary importance.

Florida bonneted bats have been found roosting in habitat with the following structural features, but may also occur outside of these parameters:

- trees greater than 33 feet (10 meters) in height, greater than 8 inches (20 centimeters) in diameter at breast height (DBH), with cavity elevations higher than 16 feet (5 meters) above ground level (Braun de Torrez 2019);
- areas with a high incidence of large or mature live trees with various deformities (*e.g.,* large cavities, hollows, broken tops, loose bark, and other evidence of decay) (*e.g.,* pine flatwoods);
- rock crevices (*e.g.,* limestone in Miami-Dade County); and/or
- artificial structures, mimicking natural roosting conditions (*e.g.,* bat houses, utility poles, buildings), situated in natural or semi-natural habitats.

In order for a building to be considered a roosting structure, it should be a minimum of 15 feet high and contain one or more of the following features: chimneys, gaps in soffits, gaps along gutters, or other structural gaps or crevices (outward entrance approximately 1 inch (2.5 centimeters) in size or greater. Structures similar to the above (*e.g.,* bridges, culverts, minimum of 15 feet high) are expected to also provide roosting habitat, based upon the species' morphology and behavior (Keeley and Tuttle 1999). Florida bonneted bat roosts will be situated in areas with sufficient open space for these bats to fly (*e.g.,* open or semi-open canopy, canopy gaps, above the canopy, and edges which provide relatively uncluttered conditions [*i.e.,* reduced numbers of obstacles, such as fewer tree branches and leaves, in the flight environment]).

For the purpose of this Consultation Key*: Roosting habitat refers to habitat with structures that can be used for daytime and maternity roosting. Roosting at night between periods of foraging can occur in a broader range of structure types. For the purposes of this guidance we are focusing on day roosting habitat.*

ROOSTING IS LIKELY– Determining likelihood of roosting is challenging. The Service has provided the following definition for the express purpose of these Guidelines. Researchers use additional cues to assist in locating roosts. As additional indicators are identified and described we expect our Guidelines will be improved.

In this Consultation Key the Service will consider the following evidence indicative that roosting is likely nearby (*i.e.,* reasonably certain to occur) if **ANY** of the following are documented: (a) Florida bonneted bat calls are recorded within 30 minutes before sunset to 1½ hours following sunset or within 1½ hours before sunrise; (b) emergence calls are recorded; (c) human observers see (or hear) Florida bonneted bats flying from or to potential roosts; (d) human observers see and identify Florida bonneted bats within a natural roost or artificial roost; and/or (e) other bat sign (*e.g.*, guano, staining, etc.) is found that is identified to be Florida bonneted bat through additional follow-up.

In addition to the aforementioned events, researchers consider roosting likely in an area when (1) large numbers of Florida bonneted bat calls are recorded throughout the night (*e.g.,* ≥ 25 files per night at a single acoustic station when 5 second file lengths are recorded); (2) large numbers of FBB calls are recorded over multiple nights (*e.g.,* an average of ≥ 20 files per night from a single detector when 5 second file lengths are recorded); or (3) social calls are recorded. Because social calls and large numbers of calls recorded over one or more nights can be indicative of high FBB activity/use or when roosting is likely, the Service is choosing not to use these as indicators to make the determination that roosting is likely. Instead we are relying on the indicators that are only expected to occur at or very close to a roost location [(a)-(e) above].

TAKE - to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct. [ESA §3(19)] Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. [50 CFR §17.3].

Literature Cited

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.

Braun de Torrez, E. 2019. Email from biologist E. Braun de Torrez, Florida Fish and Wildlife Conservation Commission to biologist, S. Sneckenberger, U.S. Fish and Wildlife Service. July 24, 2019. Gainesville, Florida.

Keeley, B.W., and M.D. Tuttle. 1999. Bats in American bridges. Bat Conservation International, Inc. Austin, Texas.

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.

U.S. Fish and Wildlife Service. 2013. Endangered and threatened wildlife and plants; endangered species status for the Florida bonneted bat. Federal Register 78:61004-61043.

Appendix A. Delineation and Justification for Consultation Area

The Consultation Area (Figure 1) represents the general range of the species. The Consultation Area represents the area within which consideration should be given to potential effects to Florida bonneted bats from proposed projects or actions. Coordination and consultation with the Service helps to determine whether proposed actions and activities may affect listed species. This Consultation Area defines the area where proposed actions and activities may affect the Florida bonneted bat.

This area was delineated using confirmed presence data, key habitat features, reasonable flight distances and home range sizes. Where data were lacking, we used available occupancy models that predict probability of occurrence (Bailey *et al.* 2017). Below we describe how each one of these data sources was used to determine the overall Consultation Area.

Presence data: Presence data included locations for: (1) confirmed Florida bonneted bat acoustic detections; (2) known roost sites (occupied or formerly occupied; includes natural roosts, bat houses, and utility poles); (3) live Florida bonneted bats observed or found injured; (4) live Florida bonneted bats captured during research activities; and (5) Florida bonneted bats reported as dead. The Geographic Information Systems (GIS) dataset incorporates information from January 2003 to May 2019.

The vast majority of the presence data came from acoustic surveys. The species' audible, low frequency, distinct, echolocation calls are conducive for acoustic surveys. However, there are limitations in the range of detection from ultrasonic devices, and the fast, high-flying habits of this species can confound this. Overall, detection probabilities for Florida bonneted bats are generally considered to be low. For example, in one study designed to investigate the distribution and environmental associations of Florida bonneted bat, Bailey *et al.* 2017 found overall nightly detection probability was 0.29. Based on the estimated detection probabilities in that study, it would take 9 survey nights (1 detector per night) to determine with 95% certainty whether Florida bonneted bat are present at a sampling point. Positive acoustic detection data are extremely valuable. However, it is important to recognize that there are issues with false negatives due to limitations of equipment, low detection probabilities, difference in detection due to prey availability and seasonal movement over the landscape, and in some circumstances improperly conducted surveys (*i.e.,* short duration or in unsuitable weather conditions).

Key habitat features: We considered important physical and biological features with a focus on potential roosting habitat and applied key concepts of bat conservation (*i.e*., need to conserve roosting habitat, foraging habitat, and prey base). To date, all known natural Florida bonneted bat roosts (n=19 have been found in live trees and snags of the following types: slash pine, longleaf pine, royal palm, and cypress (Braun de Torrez 2018). Several of the recent roost discoveries are located in fire-maintained vegetation communities, and it appears that Florida bonneted bats are fire-adapted and can benefit from prescribed burn regimes that closely mimic historical fire patterns (Ober *et al.* 2018).

From a landscape and roosting perspective, we consider key habitat features to include forested areas and other areas with mature trees, wetlands, areas used by red-cockaded woodpeckers

(*Picoides borealis*; RCW), and fire-managed and other conservation areas. However, recent work suggests that Florida bonneted bats do not use pinelands more than other land cover types (Bailey *et al.* 2017). In fact, Bailey *et al.* 2017 detected Florida bonneted bats in all land cover types investigated in their study (e.g., agricultural, developed, upland, and wetland). For the purposes of these consultation guidelines, we are focusing on the conservation of potential roosting habitats across the species' range. However, we also recognize the need for comprehensive consideration of foraging habitats, habitat connectivity, and long-term suitability.

Flight distances and home range sizes: Like most bats, Florida bonneted bats are colonial central-place foragers that exploit distant and scattered resources (Rainho and Palmeirim 2011). Morphological characteristics (narrow wings, high wing-aspect ratio) make *Eumops* spp. well-adapted for efficient, low-cost, swift, and prolonged flight in open areas (Findley *et al*. 1972, Norberg and Rayner 1987). Other Eumops including Underwood's mastiff bat (*Eumops underwoodi*), and Greater mastiff bat or Western mastiff bat (*Eumops perotis*) are known to forage and/or travel distances ranging from 6.2 miles to 62 miles from the roost with multiple studies documenting flight distances approximately 15- 18 miles from the roost (Tibbitts *et al* 2002, Vaugh 1959 as cited in Best *et al*. 1996, Siders *et al.* 1999, Siders 2005, Vaughan 1959 as cited in Siders 2005.)

Like other *Eumops,* Florida bonneted bats are strong fliers, capable of travelling long distances (Belwood 1992). Recent Global Positioning System (GPS) and radio-telemetry data for Florida bonneted bats documents that they also move large distances and likely have large home ranges. Data from recovered GPS satellite tags on Florida bonneted bats tagged at Babcock-Webb Wildlife Management Area (WMA), found the maximum distance detected from a capture site was 24.2 mi (38.9 km); the greatest path length travelled in a single night was 56.3 mi (90.6 km) (Ober 2016; Webb 2018a-b). Additional data collected during the month of December documented the mean maximum distance of Florida bonneted bats (n=8) with tags traveled from the roost was 9.5 mi (Webb 2018b). The Service recognizes that the movement information comes from only one site (Babcock-Webb WMA and vicinity), and data are from small numbers (n=20) of tagged individuals for only short periods of time (Webb 2018a-b). We expect that across the Florida bonneted bat's range differences in habitat quality, prey availability, and other factors will result in variable habitat use and home range sizes between locations. Foraging distances and home range sizes in high quality habitats are expected to be smaller while foraging distances and home range sizes in low quality habitat would be expected to be larger. Consequently, because Babcock-Webb WMA provides high quality roosting habitat, this movement data could represent the low end of individual flight distances from a roost.

Given the species' morphology and habits (*e.g*., central-place forager) and considering available movement data from other *Eumops* and Florida bonneted bats discussed above, we opted to use 15 miles (24 km) as a reasonable estimate of the distance Florida bonneted bats would be expected to travel from a roost on any given night. For the purposes of delineating a majority of the Consultation Area, we used available confirmed presence point location data and extended out 15 miles (24 km), with modifications for habitat features (as described above). As more movement data are obtained and made available, this distance estimate may change in the future.

Occupancy model – Research by Bailey *et al.* (2017) indicates the species' range is larger than previously known. Their model performed well across a large portion of the previously known

range when considering confirmed Florid bonneted bat locations; thus it is anticipated to be useful where limited information is available for the species.

We used the model output from Bailey *et al.* (2017) to more closely examine areas where we are data-deficient (*i.e.,* areas where survey information is particularly lacking). We considered 0.27 probability of occurrence a filter for high likelihood of occurrence because 0.27 was the model output for Babcock-Webb WMA, an area where Florida bonneted bats are known to occupy and heavily use. Large portions of Sarasota, Martin, and Palm Beach counties were identified as having probability of occurrence of 0.27. The consultation area should include areas where the species has a high likelihood of occurring. Based on this reasoned approach, all of Sarasota County, portions of Martin County, and greater parts of Palm Beach County were included in the Consultation Area.

We recognize that there are areas in the northern portion of the range where the model is less successful predicting occurrence based on the known Florida bonneted bat locations (*i.e*., the model predicts low likelihood of occurrence on Avon Park Air Force range, where the species is known to roost). Consequently, the Service is proactively working with partners to conduct surveys in the areas added based on the model to confirm that inclusion of these portions of the aforementioned counties is appropriate. The Consultation Area may be adjusted based on changes in this information.

Literature Cited -Appendix A

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.

Belwood, J.J. 1992. Florida mastiff bat Eumops glaucinus floridanus. Pages 216-223 in S.R. Humphrey (ed.), Rare and Endangered Biota of Florida. Vol. I. Mammals. University Press of Florida. Gainesville, Florida.Best, T.L., Kiser, W.M., and P.W. Freeman. 1996. Eumops perotis. Mammalogy Papers: University of Nebraska State Museum. Lincoln.

Braun de Torrez, E.C. 2018c. Presentation given at Florida bonneted bat working group meeting at The Conservancy of Southwest Florida. Florida Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission. Gainesville, Florida. May 23, 2016.

Findley, J.S., E.H. Studier, and D.E. Wilson. 1972. Morphologic properties of bat wings. Journal of Mammalogy 53(3): 429-444.

Norberg, U.M. and J.M.V. Rayner. 1987. Ecological morphology and flight in bats (Mammalia; Chiroptera): wing adaptations, flight performance, foraging strategy and echolocation. Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences 316(1179):335-427.

Ober, H. 2016. Annual report to USFWS for calendar year 2016. Permit number TE23583B-1. University of Florida, Department of Wildlife Ecology and Conservation, North Florida Research and Education Center. Quincy, Florida.

Ober, H.K., R.A. McCleery, and E.C. Braun de Torrez. 2018. Managing with fire to promote the recently listed Florida bonneted bat, *Eumops floridanus*. Final report. JFSP Project ID: 14-1-05-7. University of Florida, Department of Wildlife Ecology and Conservation. Gainesville, Florida.

Rainho, A., and J.M. Palmeirim. 2011. The importance of distance to resources in the spatial modelling of bat foraging habitat. PLoS ONE 6(4): e19227.

Siders, M. 2005. *Eumops perotis*, Western mastiff bat. Western Bat Working Group. Species Accounts. Updated at the 2005 Portland Biennial Meeting. http://www.wbwg.org/species_accounts

Siders, M. S., Rabe, M. J., Snow, T. K., and K. Yasuda. 1999. Long foraging distances in two uncommon bat species (Euderma maculatum and Eumops perotis) in northern Arizona. In Proceedings of the Fourth Biennial Conference of Research on the Colorado Plateau. US Geological Survey, Flagstaff, AZ, Vol. 4.

Tibbitts, T., A. Pate, Y. Petryszyn, and B. Barns. 2002. Determining foraging and roosting areas

for Underwood's mastiff bat (*Eumops underwoodi*) using radiotelemetry, at Organ Pipe Cactus National Monument, Arizona. Final summary report, year two – December 2002. Organ Pipe Cactus National Monument. Ajo, Arizona.

Webb, E.N. 2018a. Email to Paula Halupa *et al*. University of Florida, Department of Wildlife Ecology and Conservation. Gainesville, Florida. April 1, 2018.

Webb, E.N. 2018b. Presentation given at Florida bonneted bat working group meeting at The Conservancy of Southwest Florida. University of Florida, Department of Wildlife Ecology and Conservation. Gainesville, Florida. May 24, 2016.

Appendix C: Wood Stork Effect Determination Key

United States Department of the Interior

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

May 18, 2010

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

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

Dear Mr. Kinard:

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

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

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

Wood stork

Habitat

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

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

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

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

Conservation Measures

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

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

In an effort to reduce correspondence in effect determinations and responses, the Service is providing the Wood Stork Effect Determination Key below. If the use of this key results in a Corps determination of "no effect" for a particular project, the Service supports this determination. If the use of this Key results in a determination of NLAA, the Service concurs with this determination[1]. This Key is subject to revisitation as the Corps and Service deem necessary.

The Key is as follows:

A. Project within 0.76 km (0.47 mile)[2] of an active colony site[3] ..... "*may affect*[4]"

Project impacts Suitable Foraging Habitat (SFH)[5] at a location greater than 0.76 km (0.47 mile) from a colony site..... ....."*go to* B"

---

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

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

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

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

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

Project does not affect SFH……..…..*"no effect*[1]*"*.

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

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

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

Project impacts to SFH within the CFA of a colony site …….…...…….*go to* E

D. Project impacts to SFH have been avoided and minimized to the extent practicable; compensation (Service approved mitigation bank or as provided in accordance with Mitigation Rule 33 CFR Part 332) for unavoidable impacts is proposed in accordance with the CWA section 404(b)(1) guidelines; and habitat compensation replaces the foraging value matching the hydroperiod[7] of the wetlands affected and provides foraging value similar to, or higher than, that of impacted wetlands. See Enclosure 3 for a detailed discussion of the hydroperiod foraging values, an example, and further guidance[8]…….. *NLAA*[1]"

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

E. Project provides SFH compensation in accordance with the CWA section 404(b)(1) guidelines and is not contrary to the HMG; habitat compensation is within the appropriate CFA or within the service area of a Service-approved mitigation bank; and habitat compensation replaces foraging value, consisting of wetland enhancement or restoration matching the hydroperiod[7] of the wetlands affected, and provides foraging value similar

---

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

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

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

to, or higher than, that of impacted wetlands. See Enclosure 3 for a detailed discussion of the hydroperiod foraging values, an example, and further guidance[8]..... *"NLAA[1]"*

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

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

Monitoring and Reporting Effects

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

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

Sincerely yours,

Paul Souza
Field Supervisor
South Florida Ecological Services Office

Enclosures

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

LITERATURE CITED

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

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

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

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

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

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

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

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

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

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

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Prepared by

John C. Ogden
Acting Program Manager
Wildlife Research
Everglades National Park

for the

Southeast Region
U.S. Fish and Wildlife Service

Cover design by
Florida Power & Light Company
Miami, Florida

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Introduction

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

General

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

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

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

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

I. Feeding habitat.

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

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

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

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

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

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

II. Nesting habitat.

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

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

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

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

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

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

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

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

III. Roosting habitat.

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

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

IV. Management zones and guidelines for feeding sites.

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

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

B. Feeding sites should not be subjected to water management practices that alter traditional water levels or the seasonally normal drying patterns and rates. Sharp rises in water levels are especially disruptive to feeding storks.

C. The introduction of contaminants, fertilizers, or herbicides into wetlands that contain stork feeding sites should be avoided, especially those compounds that could adversely alter the diversity and numbers of native fishes, or that could substantially change the characteristics of aquatic vegetation. Increase in the density and height of emergent vegetation can degrade or destroy sites as feeding habitat.

D. Construction of tall towers (especially with guy wires) within three miles, or high power lines (especially across long stretches of open country) within one mile of major feeding sites should be avoided.

V. Management zones and guidelines for nesting colonies.

A. Primary zone: This is the most critical area, and must be managed according to recommended guidelines to insure that a colony site survives.

1. Size: The primary zone must extend between 1000 and 1500 feet in all directions from the actual colony boundaries when there are no visual or broad aquatic barriers, and never less than 500 feet even when there are strong visual or aquatic barriers. The exact width of the primary zone in each direction from the colony can vary within this range, depending on the amount of visual screen (tall trees) surrounding the colony, the amount of relatively deep, open water between the colony and the nearest human activity, and the nature of the nearest human activity. In general, storks forming new colonies are more tolerant of existing human activity, than they will be of new human activity that begins after the colony has formed.

2. Recommended Restrictions:

a. Any of the following activities within the primary zone, at any time of the year, are likely to be detrimental to the colony:

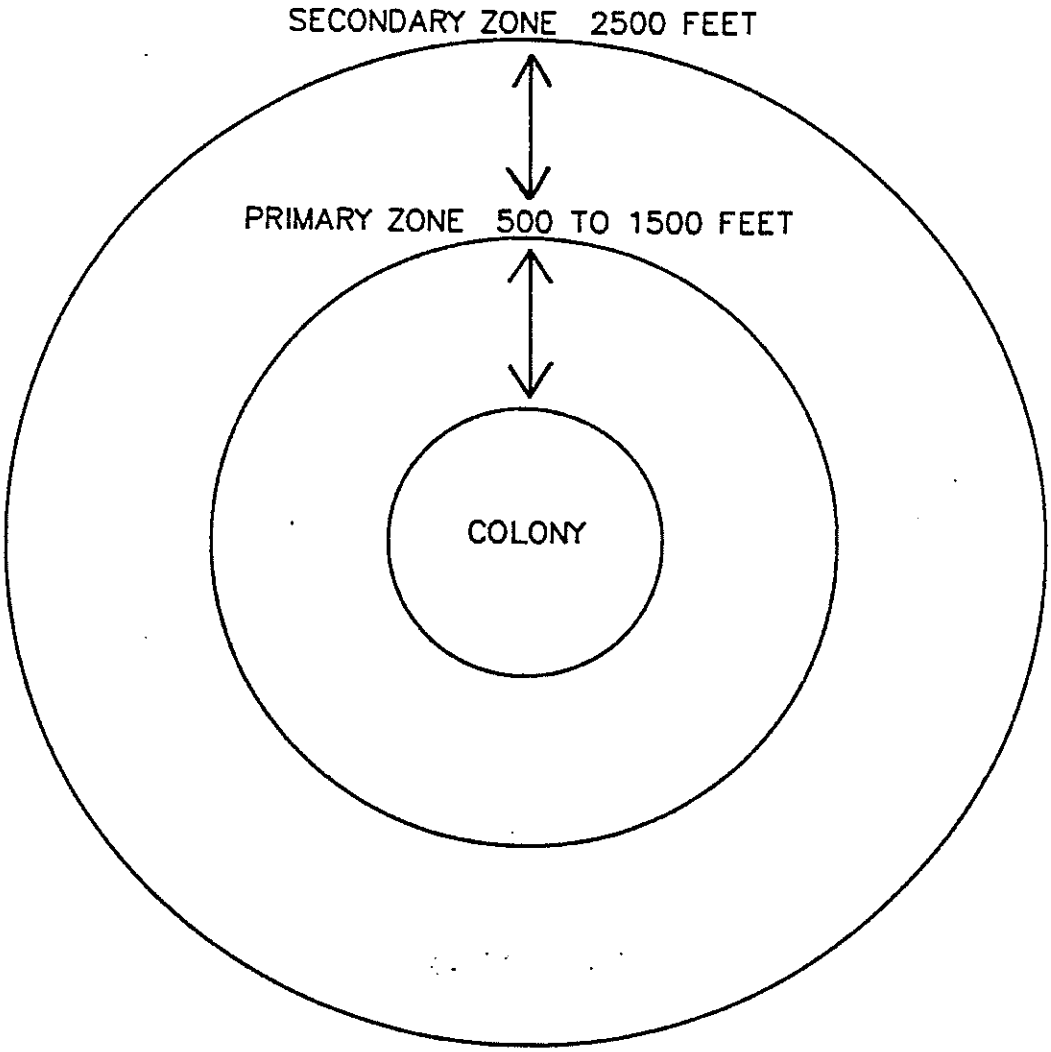
(1) Any lumbering or other removal of vegetation, and

(2) Any activity that reduces the area, depth, or length of flooding in wetlands under and surrounding the colony, except where periodic (less than annual) water control may be required to maintain the health of the aquatic, woody vegetation, and

(3) The construction of any building, roadway, tower, power line, canal, etc.

b. The following activities within the primary zone are likely to be detrimental to a colony if they occur when the colony is active:

(1) Any unauthorized human entry closer than 300 feet of the colony, and


SECONDARY ZONE 2500 FEET
PRIMARY ZONE 500 TO 1500 FEET
COLONY

(2) Any increase or irregular pattern in human activity anywhere in the primary zone, and

(3) Any increase or irregular pattern in activity by animals, including livestock or pets, in the colony, and

(4) Any aircraft operation closer than 500 feet of the colony.

B. Secondary Zone: Restrictions in this zone are needed to minimize disturbances that might impact the primary zone, and to protect essential areas outside of the primary zone. The secondary zone may be used by storks for collecting nesting material, for roosting, loafing, and feeding (especially important to newly fledged young), and may be important as a screen between the colony and areas of relatively intense human activities.

1. Size: The secondary zone should range outward from the primary zone 1000-2000 feet, or to a radius of 2500 feet of the outer edge of the colony.

2. Recommended Restrictions:

a. Activities in the secondary zone which may be detrimental to nesting wood storks include:

(1) Any increase in human activities above the level that existed in the year when the colony first formed, especially when visual screens are lacking, and

(2) Any alteration in the area's hydrology that might cause changes in the primary zone, and

(3) Any substantial (>20 percent) decrease in the area of wetlands and woods of potential value to storks for roosting and feeding.

b. In addition, the probability that low flying storks, or inexperienced, newly-fledged young will strike tall obstructions, requires that high-tension power lines be no closer than one mile (especially across open country or in wetlands) and tall trans-mission towers no closer than 3 miles from active colonies. Other activities, including busy highways and commercial and residential buildings may be present in limited portions of the secondary zone at the time that a new colony first forms. Although storks may tolerate existing levels of human activities, it is important that these human activities not expand substantially.

VI. Roosting site guidelines.

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

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

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

VII. Legal Considerations.

A. Federal Statutes

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

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

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

B. State Statutes

1. State of Alabama

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

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

2. State of Florida

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

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

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

3. State of Georgia

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

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

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

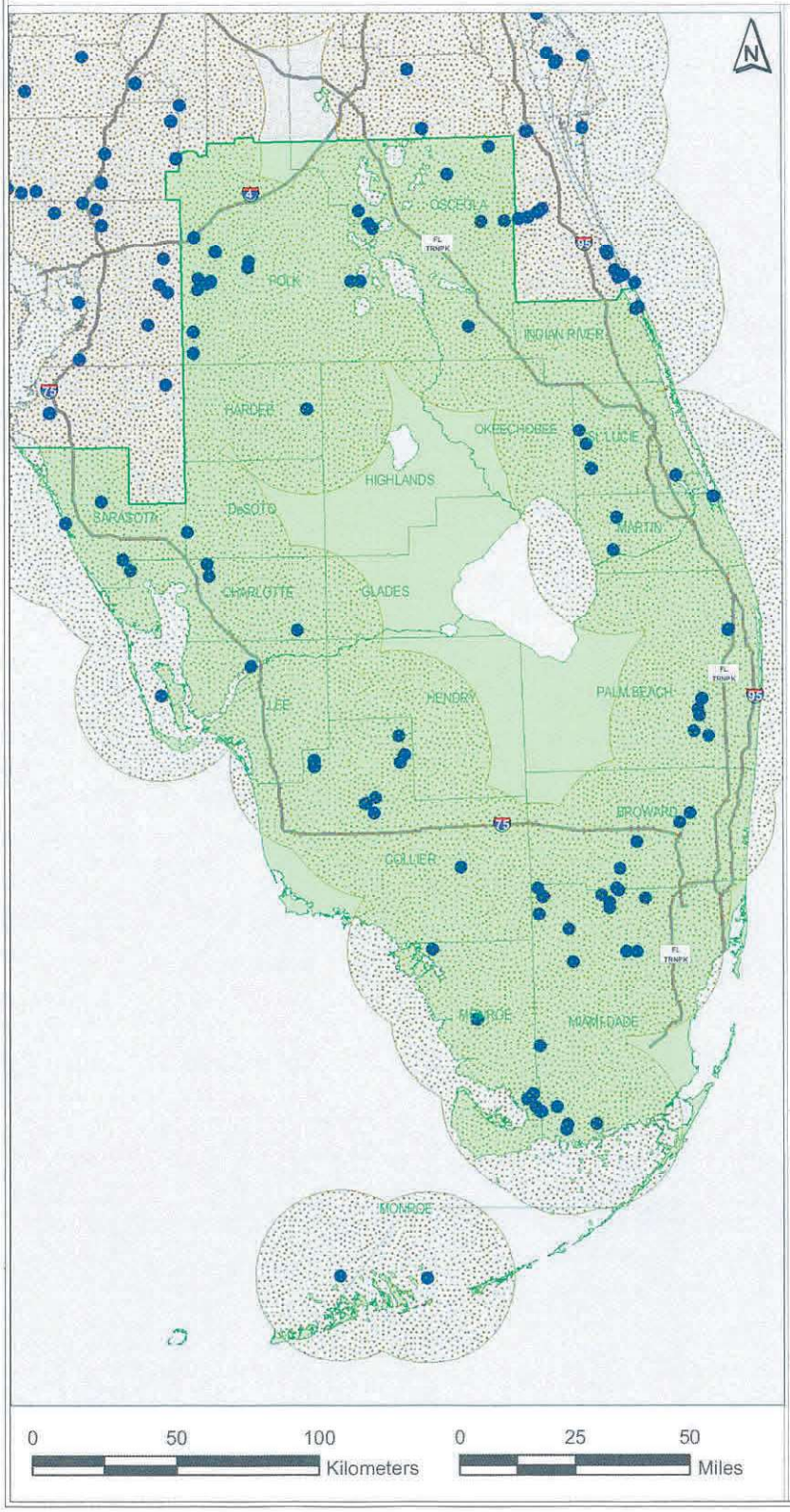
The wood stork is listed as endangered pursuant to the Endangered Wildlife Act of 1973 (Section 27-3-130 of the Code). Section 391-4-13-.06 of the Rules and Regulations of the Georgia Department of Natural Resources prohibits harassment, capture, sale, killing, or other actions which directly cause the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

4. State of South Carolina

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

5/21/2010

Wood Stock



Nesting Colonies
Core Foraging Areas

1999 to 2005

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

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

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

5/21/2010

Enclosure 3

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

Foraging Habitat

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

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

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

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

Table 1: Vegetation classes

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

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

Table 2: Habitat Foraging Suitability

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

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

Table 3. Foraging Suitability Percentages

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

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

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

Hydroperiod: The hydroperiod of a wetland can affect the prey densities in a wetland. For instance, research on Everglades fish populations using a variety of quantitative sampling techniques (pull traps, throw traps, block nets) have shown that the density of small forage fish increases with hydroperiod. Marshes inundated for less than120 days of the year average ± 4 fish/m^2; whereas, those flooded for more than 340 days of the year average ± 25 fish/m^2 (Loftus and Eklund 1994, Trexler et al. 2002).

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

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

Table 4. SFWMD Hydroperiod Classes – Everglades Protection Area

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

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

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

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

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

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

In consideration of this assessment, the Service used the data presented in Trexler et al.'s (2002) study on the number of fish per square-meter per hydroperiod for fish 8 cm or less to be applicable for estimating the total biomass per square-meter per hydroperiod for all fish. In determining the biomass of fish per square-meter per hydroperiod, the Service relied on the summary data provided by Turner et al. (1999), which provides an estimated fish biomass of 6.5 g/m^2 for a Class 7 hydroperiod for all fish and used the number of fish per square-meter per hydroperiod from Trexler et al.'s data to extrapolate biomass values per individual hydroperiods.

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

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

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

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

Table 6. Extrapolated Fish Densities for SFWMD Hydroperiods

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

Fish Biomass per Hydroperiod: A more important parameter than fish per square-meter in defining fish densities is the biomass these fish provide. In the ENP and WCA-3, based on studies by Turner et al. (1999), Turner and Trexler (1997), and Carlson and Duever (1979), the standing stock (biomass) of large and small fishes combined in unenriched Class 5 and 6 hydroperiod wetlands averaged between 5.5 to 6.5 grams-wet-mass/m^2. In these studies, the data was provided in g/m^2 dry-weight and was converted to g/m^2 wet-weight following the procedures referenced in Kushlan et al. (1986) and also referenced in Turner et al. (1999). The fish density data provided in Turner et al. (1999) included both data from samples representing fish 8 cm or smaller and fish larger than 8 cm and included summaries of Turner and Trexler (1997) data, Carlson and Duever (1979) data, and Loftus and Eklund (1994) data. These data sets also reflected a 0.6 g/m^2 dry-weight correction estimate for fish greater than 8 cm based on Turner et al.'s (1999) block-net rotenone samples.

Relating this information to the hydroperiod classes developed by the SFWMD, we estimated the mean annual biomass densities per hydroperiod. For our assessment, we considered Class 7 hydroperiod wetlands based on Turner et al. (1999) and Trexler et al. (2002) studies to have a mean annual biomass of 6.5 grams-wet-mass/m^2 and to be composed of 25 fish/m^2. The remaining biomass weights per hydroperiod were determined as a direct proportion of the number of fish per total weight of fish for a Class 7 hydroperiod (6.5 grams divided by 25 fish equals 0.26 grams per fish).

For example, given that a Class 3 hydroperiod has a mean annual fish density of 9 fish/m^2, with an average weight of 0.26 grams per fish, the biomass of a Class 3 hydroperiod would be 2.3 grams/m^2 (9*0.26 = 2.3). Based on the above discussion, the biomass per hydroperiod class is:

Table 7. Extrapolated Mean Annual Fish Biomass for SFWMD Hydroperiods

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

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

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

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

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

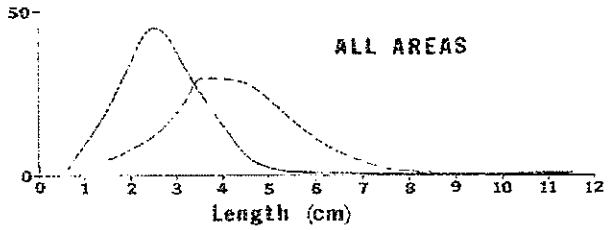


FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

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

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

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

To estimate the fraction of the fish biomass that might be consumed by wood storks, the Service, using Trexler et al.'s (2002) throw-trap data set, determined the mean biomass of each fish species that fell within the wood stork prey size limits of 1.5 to 9.0 cm. The mean biomass of each fish species was estimated from the length and wet mass relationships for Everglades' icthyofauna developed by Kushlan et al. (1986). The proportion of each species that was outside of this prey length and biomass range was estimated using the species mean and variance provided in Table 1 in Kushlan et al. (1986). These biomass estimates assumed the length and mass distributions of each species was normally distributed and the fish biomass could be estimated by eliminating that portion of each species outside of this size range. These biomass estimates of available fish prey were then standardized to a sum of 6.5 g/m^2 for Class 7 hydroperiod wetlands (Service 2009).

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

Standardizing these data to a sample size of 6.5 g/m^2, the warmouth biomass for long hydroperiod wetlands would be about 0.427 g (Service 2009). However, the size frequency distribution (assumed normal) for warmouth (Kushlan et al. 1986) indicate 48 percent are too large for wood storks and 0.6 percent are too small (outside the 1.5 cm to 9 cm size range most likely consumed), so the warmouth biomass within the wood stork's most likely consumed size range is only 0.208 g (0.427*(0.48+0.006)=0.2075) in a 6.5 g/m^2 sample. Using this approach summed over all species in long hydroperiod wetlands, only 3.685 g/m^2 of the 6.5 g/m^2 sample consists of fish within the size range likely consumed by wood storks or about 57 percent (3.685/6.5*100=56.7) of the total biomass available.

An alternative approach to estimate the available biomass is based on Ogden et al. (1976). In their study (Table 8), the sunfishes and four other species that accounted for 84 percent of the biomass eaten by wood storks totaled 2.522 g of the 6.5 g/m^2 sample (Service 2009). Adding the remaining 16 percent from other species in the sample, the total biomass would suggest that 2.97 g of a 6.5 g/m^2 sample are most likely to be consumed by wood storks or about 45.7 percent (2.97/6.5=0.4569)

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

As an example, a Class 3 SFWMD model hydroperiod wetland with a biomass of 2.3 grams/m^2, adjusted by 51 percent for appropriate size and species composition, provides an available biomass of 1.196 grams/m^2. Following this approach, the biomass per hydroperiod potentially available to predation by wood storks based on size and species composition is:

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

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

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

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

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

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

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

Table 10 Actual Biomass Consumed by Wood Storks

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

Sample Project of Biomass Calculations and Corresponding Concurrence Determination

Example 1:

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

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

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

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

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

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

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

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

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

Project Site Balance 2.98 kg- 2.92 kg = 0.07kg

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

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

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

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

Example 2:

In the above example, if the onsite preserve wetlands were a class 4 hydroperiod, which has a value of 0.71. grams/m^2 instead of a class 3 hydroperiod with a 0.39 grams/m^2 [Table 10]), there would be a loss of 2.92 kg of short hydroperiod wetlands (as above) and a net gain of 8.62 kg of long-hydroperiod wetlands.

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

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

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

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

Net increase: 8.62 kg-3.19 kg = 5.43 kg

Project Site Balance 5.43 kg- 2.92 kg = 2.51 kg

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

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

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

LITERATURE CITED

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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