NATURAL RESOURCES EVALUATION

Florida Department of Transportation

District One

SR 45 (US 41) AT BONITA BEACH ROAD

Lee County, Florida

Financial Management Number: 444321-1-22-01

ETDM Number: 6291

Date: February 2024

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

DRAFT

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Executive Summary

The Florida Department of Transportation (FDOT), District 1, is conducting a Project Development and Environment (PD&E) Study to evaluate proposed improvements to US 41 at its intersection with Bonita Beach Road (CR 865). CR 865 will be referred to as Bonita Beach Road throughout the remainder of this report. The study area limits extend along US 41 from Foley Road to just south of the Imperial River bridge, a distance of approximately 0.9 miles. Additionally, the study area extends along Bonita Beach Road from Windsor Road to Spanish Wells Boulevard, a distance of approximately 0.8 miles.

This Natural Resources Evaluation (NRE) has been prepared as part of the PD&E Study to identify potential impacts to natural resources throughout the study area. The purpose of this NRE is to document protected species and habitat and identify the location of wetlands and surface waters within the project corridor in order to determine potential impacts to these resources, provide rationale to support species effect determinations, identify avoidance and minimization measures, and quantify mitigation necessary for the recommended preferred alternative. This NRE has been prepared in accordance with the *Wetlands and Other Surface Waters* and *Protected Species and Habitat* chapters of FDOT's *PD&E Manual* and the current Natural Resources Evaluation Outline and Guidance.

The Preferred Alternative is located within the US Fish and Wildlife Service (USFWS) Consultation Area (CA) of the American crocodile (*Crocodylus acutus*), Florida bonneted bat (*Eumops floridanus*), Florida scrub-jay (*Aphelocoma coerulescens*), and southwest plants. The Preferred Alternative falls within the Core Foraging Area (CFA) for one wood stork (*Mycertia americana*) colony. The existing habitats in the study area may also support other federally protected species, as well as many state protected species. Effect determinations were based on the results of general wildlife and species-specific surveys, data collection, and USFWS' effect determination keys. **Table ES-1** identifies protected species evaluated in this document, their regulatory status, and the effect determination under the Preferred Alternative.

The proposed project was evaluated for the occurrence of Critical Habitat as defined by the ESA (Endangered Species Act) of 1973, as amended and 50 CFR Part 424. This analysis is consistent with the Protected Species and Habitat chapter of the PD&E Manual. The Imperial River, located at the northern terminus of the project area, is designated Critical Habitat for the West Indian manatee; however, this Critical Habitat will not be impacted by project activities. No other Critical Habitat occurs within the project corridor; therefore, no impacts to Critical Habitat are anticipated as a result of the proposed project.

Table ES-1: Effect Determinations for Protected Species

Scientific Name	Common Name	Status	Effect Determination
Birds			
Aphelocoma coerulescens	Florida scrub-jay	FT	NO EFFECT
Athene cunicularia floridana	Florida burrowing owl	ST	NAEA
Calidris cantus rufa	Rufa red knot	FT	NO EFFECT
Egretta caerulea	Little blue heron	ST	NAEA
Egretta rufescens	Reddish egret	ST	NAEA
Egretta tricolor	Tricolored heron	ST	NAEA
Grus canadensis	Florida sandhill crane	ST	NAEA
Haliaeetus leucocephalus	Bald eagle	BGEPA/MBTA	N/A
Laterallus jamaicensis jamaicensis	Eastern black rail	FT	NO EFFECT
Mycteria americana	Wood stork	FT	MANLAA
Platalea ajaja	Roseate Spoonbill	ST	NAEA
Sternula antillarum	Least tern	ST	NEA
Insects			
Danaus plexippus	Monarch butterfly	C	N/A
Mammals			
Eumops floridanus	Florida bonneted bat	FE	NO EFFECT
Perimyotis subflavus	Tricolored bat	C	N/A
Puma concolor coryi	Florida Panther	FE	NO EFFECT
Sciurus niger avicennia	Big Cypress fox squirrel	ST	NAEA
Trichechus manatus	West Indian manatee	FT	NO EFFECT
Ursus americanus floridanus	Florida black bear	M	N/A
Reptiles			
Crocodylus acutus	American crocodile	FT	NO EFFECT
Drymarchon couperi	Eastern indigo snake	FT	MANLAA
Gopherus polyphemus	Gopher tortoise	ST	NAEA
Pituophis melanoleucus mugitus	Florida pine snake	ST	NAEA
Plants			
Andropogon arctatus	Pinewoods bluestem	ST	NEA
Calopogon multiflorus	Many-flowered grass-pink	ST	NEA
Chamaesyce cumulicola	Sand-dune spurge	SE	NEA
Deeringothamnus pulchellus	Beautiful pawpaw	FE	NO EFFECT
Harrisia aboriginum	Aboriginal prickly-apple	FE	NO EFFECT
Lechea cernua	Nodding pinweed	ST	NEA
Lechea divaricata	Pine pinweed	SE	NEA
Linum carteri var. smallii	Small's flax	SE	NEA
Nemastylis floridana	Celestial lily	SE	NEA
Nolina atopocarpa	Florida beargrass	ST	NEA
Pteroglossaspis ecristata	Giant orchid	ST	NEA
Stylisma abdita	Scrub stylisma	SE	NEA

MANLAA = May Affect, Not Likely to Adversely Affect **NAEA** = No Adverse Effect Anticipated **NEA** = No Effect Anticipated
FE = Federally Endangered **FT** = Federally Threatened
SE = State Endangered **ST** =State Threatened **C** = Candidate **M** = Managed
BGEPA = Bald and Golden Eagle Protection Act **MBTA** = Migratory Bird Treaty Act

Wetlands and other surface waters with potential to be affected by the proposed project were identified within the US 41 and Bonita Beach Road Study Area. A wetland assessment was performed for wetlands and other surface waters in accordance with the Uniform Mitigation Assessment Method (UMAM), pursuant to Chapter 62-345, Florida Administrative Code (F.A.C.),

to determine the functional value provided by the wetlands and other surface waters and determine the amount of mitigation required to offset adverse impacts to these surface waters. Most of the impacted surface waters within the project area are considered upland cut components of the existing manmade drainage system and mitigation will not be required for impacts to these surface waters. The Preferred Alternative, including the preferred pond sites, will directly impact 3.21 acres of wetlands and 0.89 acres of surface waters, of which 0.87 acres of surface waters will not require mitigation. Therefore, 3.21 acres of wetland impacts and 0.02 acres of surface water impacts result in a functional loss of 1.504 UMAM units for state and federal jurisdictional wetlands. Mitigation for unavoidable wetland impacts will be provided to satisfy all mitigation requirements of Part IV, Chapter 373 Florida Statutes (F.S.), and United States Code (U.S.C.) 1344.

In accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Section 7 of the Endangered Species Act (ESA), and the FDOT's PD&E Manual, the proposed project was evaluated for potential Essential Fish Habitat (EFH). No EFH is located within or adjacent to the project. However, the northern terminus of the project lies within 2000 feet of the Imperial River which drains to Little Hickory Bay and Fish Trap Bay. The mouth of the Imperial River, Little Hickory Bay, and Fish Trap Bay contain estuarine habitats used by federally-managed fish species and their prey. According to the Efficient Transportation Decision Making (ETDM) report No. 6291, dated January 18, 2020, NMFS concluded that the project will not directly impact EFH. No involvement with EFH resources is anticipated.

Section 1 Project Overview

1.1 Project Description

The US 41 at Bonita Beach Road PD&E Study evaluated capacity, safety, and multi-modal improvements at the US 41 and Bonita Beach Road intersection, in the City of Bonita Springs, Florida. The study area limits extend along US 41 from Foley Road to just south of the Imperial River bridge, a distance of approximately 0.9 miles. Additionally, the study area extends along Bonita Beach Road from Windsor Road to Spanish Wells Boulevard, a distance of approximately 0.8 miles.

US 41 is a north-south principal arterial roadway running parallel to Interstate 75 (I-75) and facilitates movement of regional and local traffic (including truck traffic) along Florida's west coast. Bonita Beach Road is an east-west minor arterial roadway providing a connection to I-75 and is one of two east-west connections between the Lee County mainland and coastal communities and barrier island tourist destinations and beaches to the west. US 41 is a state roadway maintained by the Florida Department of Transportation (FDOT) District 1, while Bonita Beach Road is maintained by Lee County. Both US 41 and Bonita Beach Road are designated as emergency evacuation routes.

US 41 within the project limits is a six-lane divided roadway with 5' on-street bicycle lanes and 5' sidewalks on both sides of the roadway. Bonita Beach Road is a four-lane divided roadway with 5' sidewalks on both sides but no on-street bicycle facilities.

The US 41 at Bonita Beach Road intersection is currently a signalized intersection with two exclusive left turn lanes and an exclusive right turn lane in each approach. Aside from the main intersection, there is currently one other signalized intersection along US 41 at the Center of Bonita Springs (Tuffy Auto/Advanced Auto Parts). There are three additional signalized intersections along Bonita Beach Road at the Center of Bonita Springs, Arroyal Road, and Spanish Wells Boulevard.

The existing US 41 and Bonita Beach Road intersection has two high volume left turn movements, those being eastbound to northbound and southbound to eastbound. To partially address these heavy movements, the City of Bonita Springs conducted the "Network Enhancement Alignment Study – Quadrant Plan" in May 2017. From this, the City will be designing and building a two-lane quadrant roadway connecting Bonita Beach Road at Windsor Road to US 41 at the Center of Bonita Springs. This Northwest Quadrant Roadway is currently in design by the City and anticipated to be constructed ahead of the US 41 and Bonita Beach Road intersection improvements.

The proposed improvements will modify the signalized configuration of the US 41 and Bonita Beach Road intersection to be a partial displaced left turn (PDLT), with the northbound and southbound left turn movements to crossover and be located outside of the opposing traffic flow. This configuration will allow the northbound and southbound left turning movements to operate in the same signal phase or simultaneously as the northbound and southbound through movements. To accommodate the partial displaced left turn configuration and facilitate the relocation of northbound and southbound turning vehicles, two new signalized "crossover"

intersections will be added along US 41 approximately 675' south and 460' north of Bonita Beach Road. The southbound and eastbound left turn movements are proposed to have three lanes each, and the eastbound and westbound right turn movements are proposed to have two lanes each. Figures detailing the proposed improvements are included in Section 1.3 Description of Preferred Alternative.

As noted above, a Northwest Quadrant Roadway is being designed/constructed by the City of Bonita Springs. As part of the PD&E study's proposed improvements, the US 41 and the Center of Bonita Springs intersection is proposed to be changed from a standard signalized intersection to a "thru-cut" intersection. A thru-cut intersection restricts through movements from the minor street typically due to operational and/or geometric conditions. In this case, the west leg is being widened from two lanes to five lanes (four eastbound approach lanes and one westbound receiving lane) and the east leg is being widened from two lanes to four lanes (two westbound approach lanes and two eastbound receiving lanes). This creates skew issues for any east/west through movements and creates operational constraints that are alleviated by the thru-cut intersection configuration. Tying into the new east leg is a Northeast Quadrant Roadway proposed between US 41 and Arroyal Road, northeast of the US 41 and Bonita Beach Road intersection. This will be a new three-lane roadway with two lanes eastbound and one lane westbound.

Along US 41 in the northbound direction, a 6' sidewalk is proposed from Foley Road to Springs Plaza and a 12' shared-use path is proposed from Springs Plaza to just north of the Imperial River Boat Ramp. In the southbound direction, a 12' shared-use path is proposed from just north of the Imperial River Boat Ramp to Bonita Funeral Home and a 6' sidewalk is proposed from Bonita Funeral Home to Foley Road. Along both sides of Bonita Beach Road, the sidewalks will be widened to 12' shared-use paths from the Center of Bonita Springs to Arroyal Road. Signalized marked crosswalks will be maintained on every leg of the PDLT, including the channelized right turn lanes. Signalized marked crosswalks will also be provided on every leg of each signalized intersection along US 41 and Bonita Beach Road within the study area.

The project location is shown in **Figure 1-1** and the study area is shown in **Figure 1-2**.

Figure 1-1: Project Location

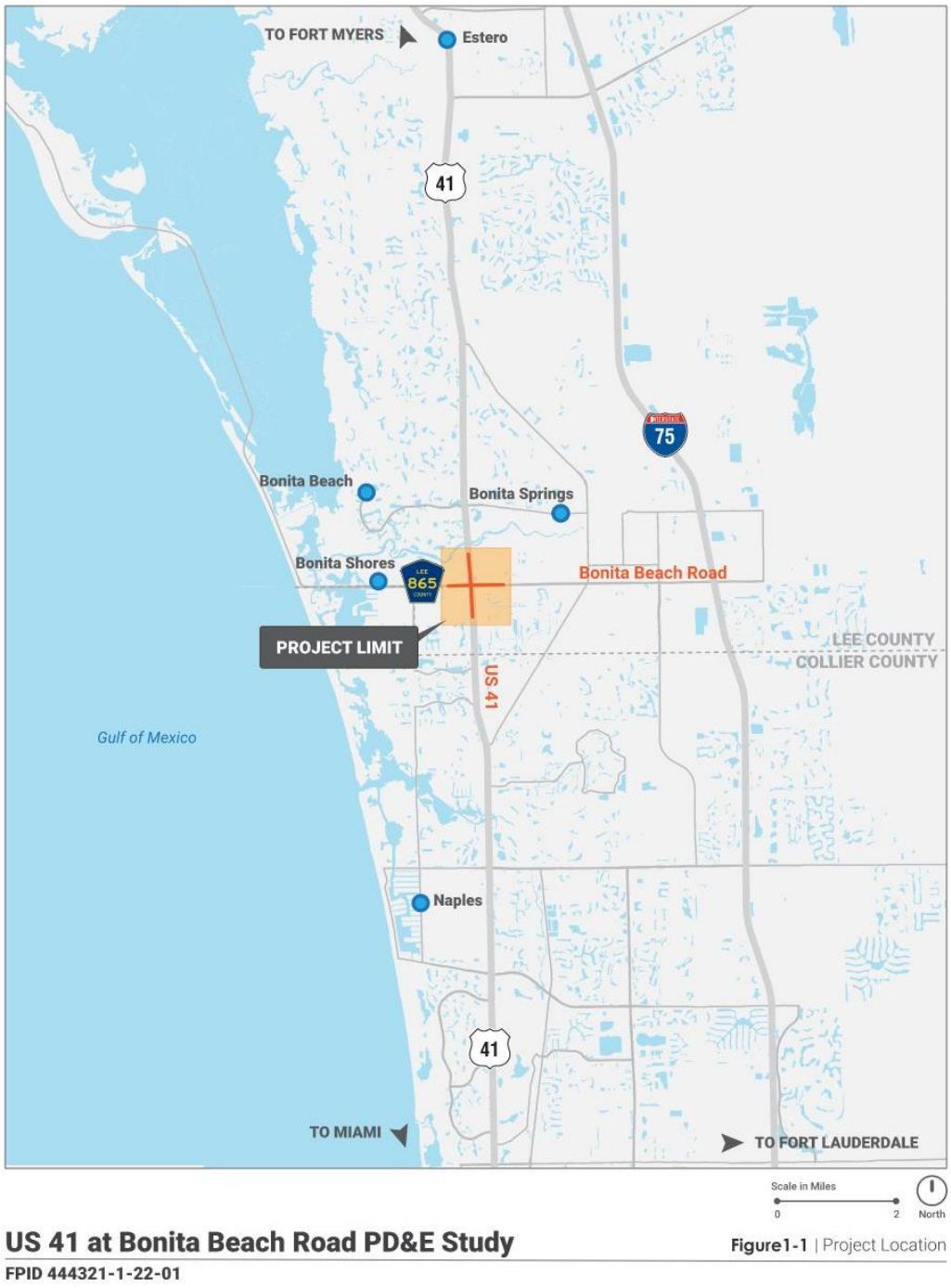
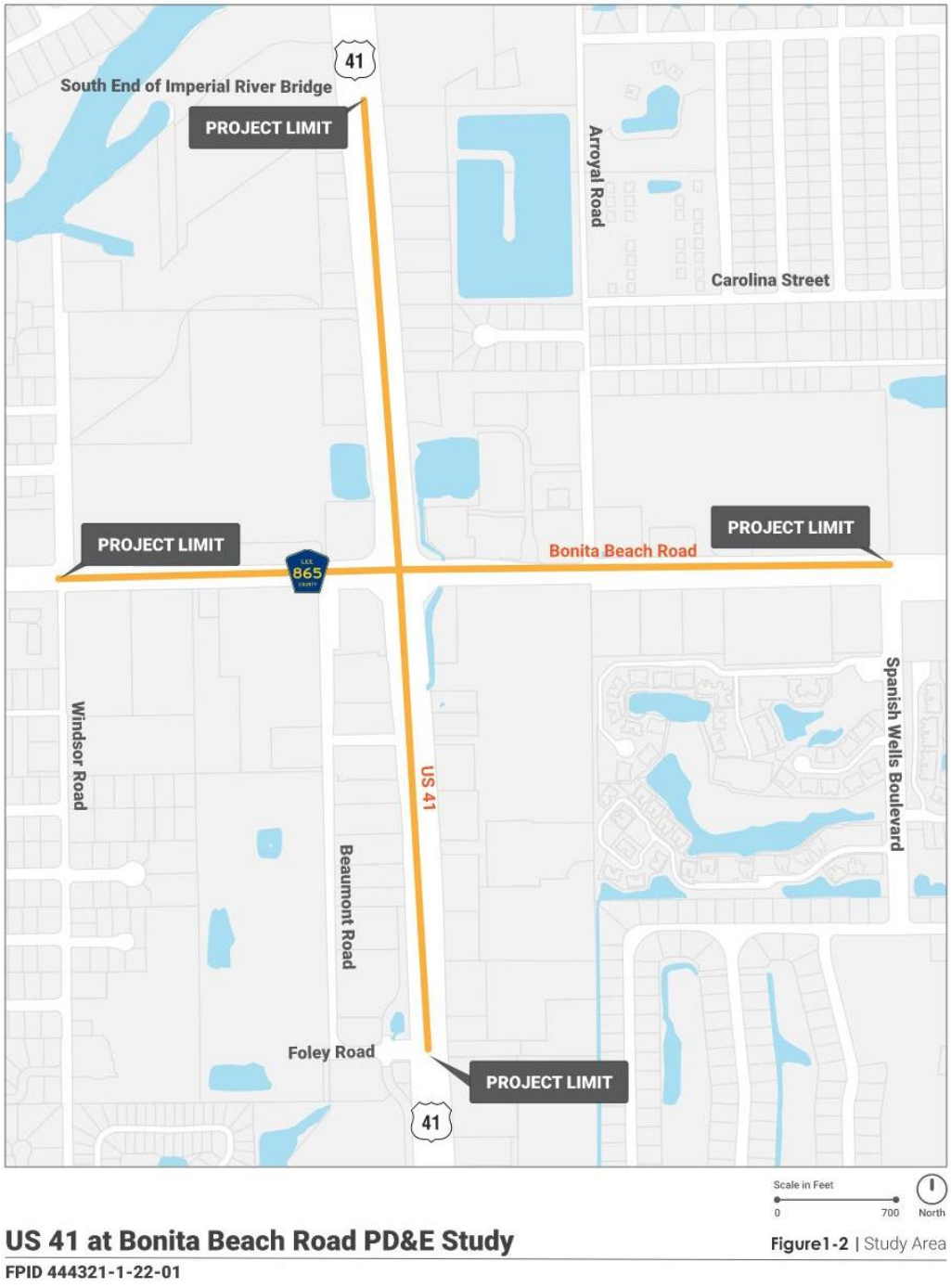


Figure 1-2: Study Area



1.2 Purpose and Need

The purpose of this project is to address the deficient operational capacity of the US 41 and Bonita Beach Road intersection to relieve existing congestion and accommodate projected future traffic demand. The project's secondary goals are to 1) Enhance regional and local mobility; 2) Enhance safety conditions; and 3) Improve multi-modal access. The need for these improvements is described in this section.

1.2.1 Transportation Demand/Capacity

The US 41 at Bonita Beach Road intersection experiences chronic congestion. As population and employment growth are expected to continue within this area of Lee County, the intersection's congestion is anticipated to increase. Based on 2019 traffic counts taken, the existing Annual Average Daily Traffic (AADT) ranges from 39,000 to 53,000 along US 41 and was 30,000 along Bonita Beach Road. New traffic counts were taken at the study intersections in 2022 to inform the opening and design year turning movement counts. Based on future growth projections to a 2050 design year, the AADTs are forecast to range from 60,000 to 78,000 along US 41. The future 2050 AADT forecast along Bonita Beach Road is 39,000.

The US 41 at Bonita Beach Road intersection's existing (2019) mid-day traffic analysis shows that six of the 12 movements operate at Level of Service (LOS) of F, with one of those being overcapacity (volume-to-capacity >1.0). The intersection's existing (2019) PM traffic analysis shows that seven of the 12 movements operate at Level of Service (LOS) of F, with two of those being overcapacity. In the future 2050 condition, the no-build intersection operates at LOS F with an overall average vehicle delay just shy of 90 seconds. While there are a similar number of LOS F movements between the existing and future no-build, latent demand is expected to increase by nearly 30 percent. The future no-build intersection is serving approximately the same amount of traffic volume as the existing condition but with the increased volumes, there are more vehicles in the overall network not being served.

1.2.2 Safety

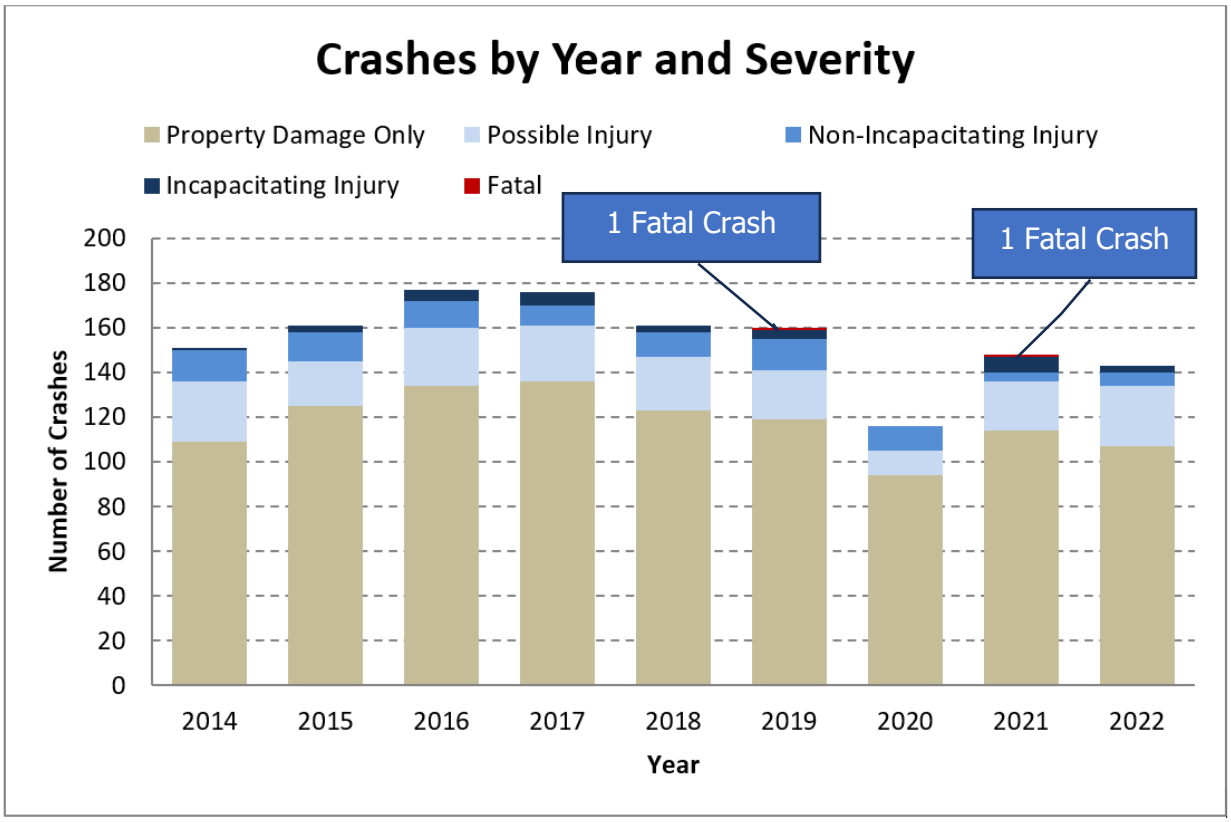
Crash records were obtained for both US 41 and Bonita Beach Road within the study area, as described below:

- US 41 from Foley Road (MP 0.540) to the Imperial River bridge (MP 1.482);
- Bonita Beach Road from 400' west of Windsor Road to 450' east of Spanish Wells Boulevard; and
- Bonita Beach Road at Vanderbilt Drive.

Crash data was obtained for the most recent five-year period on record (2018 through 2022). The crash data was obtained from the University of Florida's Signal Four (S4) Analytics crash database for US 41 and Bonita Beach Road. The safety analysis was performed for the most recent five years of crash data (January 1, 2018 – December 31, 2022). Supplemental crash data from previous years (2014 to 2017) and January 1, 2023 to June 30, 2023 were also analyzed to verify crash trends and patterns.

Figure 1-3 displays a summary of crash frequency by year along with the respective severities from 2014 to 2022. There was an increase in crashes between 2014 and 2017, but there has been a decrease in crashes between 2017 and 2019 before an approximate 30 percent drop in crashes due to the COVID-19 pandemic in 2020. The number of crashes have stayed relatively constant in 2021 and 2022. There were 166 crashes per year on average between 2014 to 2017. However, there were 146 crashes per year on average in the study area between 2018 to 2022, not including 2020 (a 12 percent decrease). The fatal crash in 2019 involved a vehicle striking a pedestrian on US 41 just south of Bonita Beach Road, and the fatal crash in 2021 involved an angle crash at the intersection of US 41 at Foley Road/Shanna Lane.

Figure 1-3: Crashes per Year (Entire Study Area)



Forty one percent of the total study area crashes were located within the intersection influence area of US 41 and Bonita Beach Road. **Figure 1-4** displays a summary of crash frequency by year along with the respective severities from 2018 to 2022. There was a total of 298 reported crashes during this period, 65 injury crashes (22 percent), and one fatal crash (in 2019). As displayed in **Figure 1-4**, there were an average of 60 crashes per year at the intersection.

Figure 1-5 displays the crashes at the intersection by type and severity for the five-year study period. The highest crash type observed was rear end, comprising 59 percent of the total crashes. Sideswipe crashes (13 percent) and left turn (8 percent) were the second and third highest crash types. These trends are consistent with the overall study area. The fatal crash in 2019 occurred when a vehicle struck a pedestrian crossing US 41.

Figure 1-4: Crashes per Year (US 41 and Bonita Beach Road Intersection)

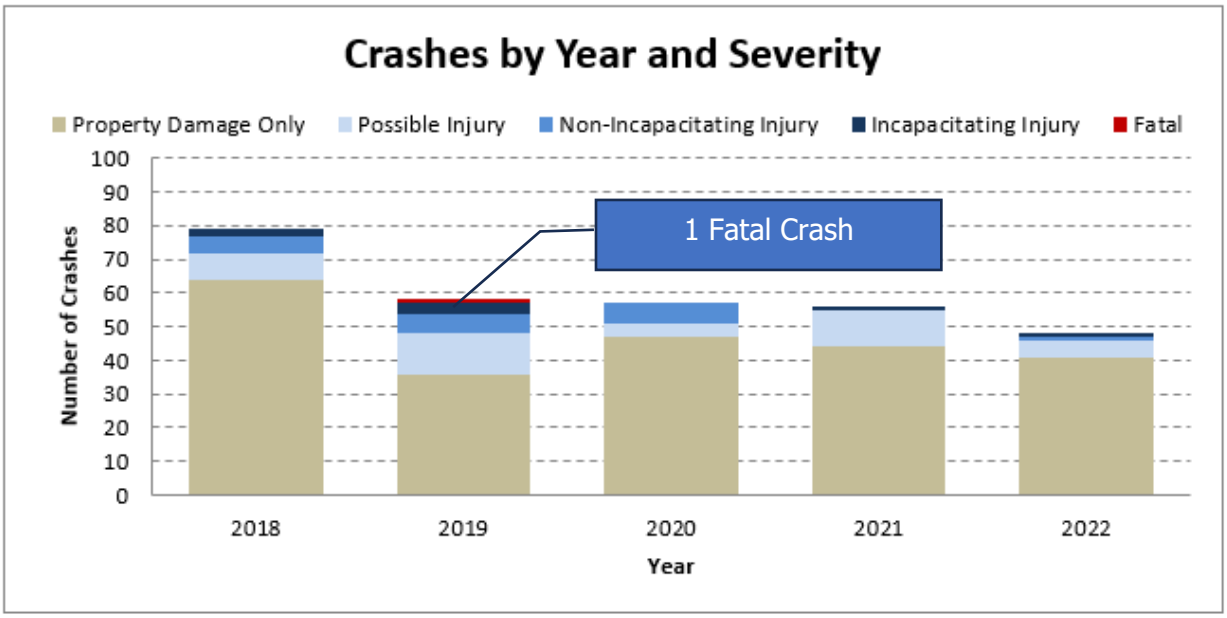
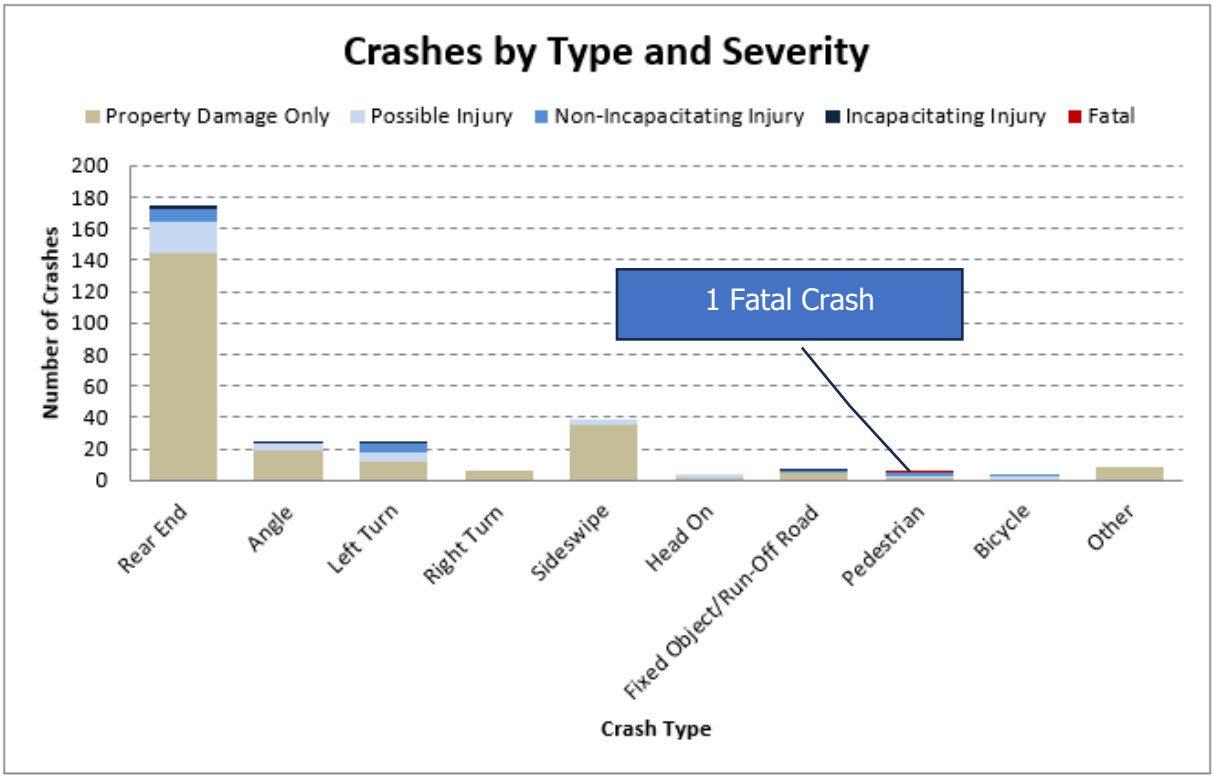


Figure 1-5: Crashes by Type and Severity (US 41 and Bonita Beach Road Intersection: 2018 to 2022)



A crash rate analysis was performed for the US 41 at Bonita Beach Road intersection. Note that as 2020-2022 average crash rates are not yet available, crash rate analyses were limited to 2018 and 2019 data. Based on the analysis, the study intersection experienced higher than average crash rates in both 2018 and 2019 when compared to both Statewide and Districtwide average crash rates.

US 41 and Bonita Beach Road are designated emergency evacuation routes for both the Florida Division of Emergency Management and Lee County. Providing parallel service to I-75, US 41 plays an important role in facilitating north-south traffic during incidences and emergency evacuation periods (particularly within southwest Florida). Bonita Beach Road also serves a critical role during emergency evacuation periods as it connects US 41 and I-75 (facilities of the state evacuation route network) and provides one of two connections for residents and tourists between the barrier islands/tourist destinations to the west and mainland of Lee County.

1.2.3 Modal Interrelationships

While sidewalks are present on both sides of US 41 and Bonita Beach Road, the only bicycle facilities present in the study area are 5' marked bicycle lanes along both sides of US 41. Two LeeTran bus routes (Routes 150 and 600) operate along US 41 and Bonita Beach Road. In addition to the two bus routes, LeeTran has partnered with Uber to provide ULTRA On-Demand Transit service in the Bonita Springs area. With LeeTran's ULTRA On-Demand Transit service is a deluxe mini-bus available seven days a week from 7:00 AM to 6:00 PM. ULTRA On-Demand Transit allows riders to request a ride as needed, with curb to curb service.

Due to the presence of these facilities/services and the surrounding urban environment, heavy pedestrian and bicycle traffic exists in the area (as observed during field reviews conducted for the project).

The Office of Greenways and Trails (OGT) and the Lee County Metropolitan Planning Organization (MPO) have identified trail opportunities in the vicinity of the US 41 and Bonita Beach Road study intersection. The Coastal Loop Trail is a spur loop from the Southwest Coastal Regional Trail, which is part of the larger FDOT Shared-Use Nonmotorized (SUN) Trail Program. This is a planned loop trail that begins at the Southwest Coastal Regional Trail in Bonita Springs, travels along Bonita Beach Road to the barrier islands, then travels through Fort Myers Beach and southern Fort Myers before connecting back to the Southwest Coastal Regional Trail east of US 41 in Fort Myers. Through discussions with Lee County MPO, no future funding has been dedicated for Coastal Loop Trail improvements in the vicinity of the US 41 and Bonita Beach Road intersection as per the date of this report.

1.2.4 System Linkage

US 41 serves as a critical arterial in facilitating the north-south movement of regional and local traffic (including truck traffic) as it runs parallel to I-75 along Florida's west coast. Similarly, Bonita Beach Road serves as a major east-west local roadway within Lee County, linking US 41 and I-75 and providing access (as one of two connections) between the mainland of Lee County and coastal communities/tourist destinations to the west (i.e., barrier islands and beaches).

The City of Bonita Springs performed the Network Enhancement Alignment Study, also known as the "Quadrant Plan", in May 2017. The purpose of the Quadrant Plan is to develop an expanded roadway network between Bonita Beach Road with US 41 that improves the area's mobility, maintains a high-quality environment for the community, and minimizes impacts to the natural environment. The City is moving forward with design and construction for a northwest quadrant roadway.

1.3 Description of Preferred Alternative

1.3.1 Preferred Intersection Control Alternative

The project's purpose is to address the deficient operational capacity of the US 41 and Bonita Beach Road intersection to relieve existing congestion and accommodate projected future traffic demand. The project's secondary goals are to 1) Enhance regional and local mobility; 2) Enhance safety conditions; and 3) Improve multi-modal access.

Alternatives A (Enhanced Traffic Signal) and B (Partial Displaced Left Turn (PDLT)) were presented at the Alternatives Public Workshop conducted virtually on Monday April 3 and in-person on Tuesday April 4, 2023. Following the workshop, feedback was gathered from members of the public for both alternatives. The majority of public comments received expressed support for Alternative B, PDLT. Alternative B was favored as it does not add through lanes along US 41, was viewed as being more operationally efficient, and provided better pedestrian and bicyclist safety. These alternatives were also presented to the Lee County MPO on June 16, 2023 and the public support for the PDLT alternative was documented with the MPO Board.

Discussions were held with FDOT District 1 after the Alternatives Public Workshop and it was determined Alternative B – PDLT best aligns with the project's purpose and need and was selected as the preferred alternative. The following bullets summarize how the PDLT recommendation meets the primary and secondary purpose and need goals noted above:

- Transportation Demand/Capacity
    - In the 2050 future build condition, the average network delay for vehicles traveling through the PDLT would be approximately 50 percent less than the No-Build Alternative.
    - The estimated number of vehicles served by the PDLT in 2050 would be approximately 20 percent higher than the No-Build Alternative.
    - The PDLT is anticipated to improve average vehicle delay by over 45 seconds in both the 2050 mid-day and PM peak hours when compared to the No-Build Alternative at the main US 41 at Bonita Beach Road intersection only.
- Safety
    - Using the predictive safety analysis methods provided in the FDOT Safety Performance for Intersection Control Evaluation (SPICE) Tool, the PDLT intersection is predicted to decrease total and fatal/injury crashes by over 10 percent vs the No-Build Alternative over the 20-year life cycle from 2030 to 2050.

    - Increase the volume of residents and tourists from coastal communities that can be evacuated during an emergency event by improving operations at the intersection of two major evacuation routes.
    - Enhance access to facilities of the state evacuation route network.
    - Improve response times (due to enhanced access) to emergency events and incidences.
- Modal Interrelationships
    - Sidewalks in the study area are proposed to be widened to 12' shared-use paths along both sides of US 41 and Bonita Beach Road.
    - These shared-use paths will improve pedestrian/bicycle access and circulation by modifying/limiting opportunities for conflicts between automobiles and pedestrians/bicyclists.
    - The 12' shared-use path improvements proposed as part of the PDLT would help further enhance the future vision of the Coastal Loop Trail in the study area.
    - Additional median and concrete traffic separators are included in the PDLT concept to provide pedestrian refuge areas and better facilitate non-motorist crossings.
    - The PDLT will also enhance the performance and reliability of transit service operating along US 41 and Bonita Beach Road by reducing delays at the intersection.
- System Linkage
    - Improve the viability of US 41 as a regional alternative facility to I-75 by reducing travel delay.
    - Enhance east-west access between two primary north-south transportation corridors (US 41 and I-75) as well as between the mainland of Lee County and coastal communities/tourist destinations to the west.
    - Enhance freight mobility and access within the area as US 41 is designated as regional freight mobility corridor (Tier 1 Regional Freight Corridor) in the Lee County 2045 Long Range Transportation Plan.
    - The proposed PDLT improvements will support local system linkage planning efforts by providing a Northeast Quadrant Roadway connecting US 41 to Arroyal Road. It will also widen the US 41 and Northeast Quadrant Roadway intersection's west approach to meet the intersection's future traffic demands.

The preferred alternative concept plans can be found in Appendix G of the US 41 and Bonita Beach Road PD&E Preliminary Engineering Report (PER).

1.3.2 Preferred Alternative Features

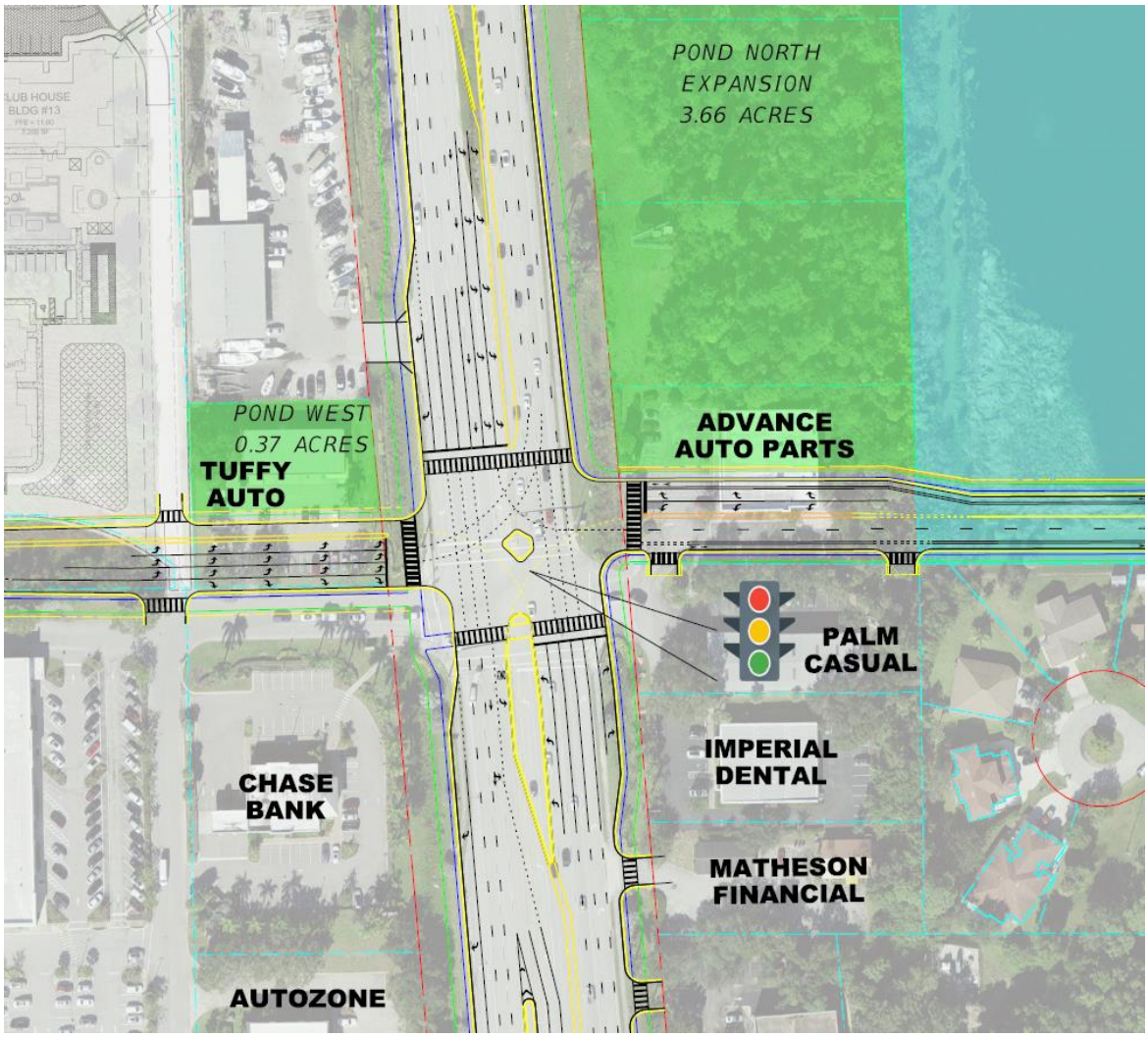
The following highlights the key improvement elements within the US 41 at Bonita Beach Road intersection area for Alternative B:

1.3.2.1 US41

- Signalization and turn lane improvements at the intersection of US 41 and Foley Road (Sta. 222+75).

- Modified "thru-cut" signalized intersection at US 41 and Center of Bonita Springs (Sta. 260+00) as shown in **Figure 1-6**:
    - A thru-cut intersection restricts through movements from the minor street typically due to operational and/or geometric conditions. In this case, the west leg is being widened from two lanes to five lanes (four eastbound approach lanes and one westbound receiving lane) and the east leg is being widened from two lanes to four lanes (two westbound approach lanes and two eastbound receiving lanes).
    - Dual southbound left turn lanes are also proposed in the new thru-cut configuration.

Figure 1-6: US 41/Center of Bonita Springs "Thru-Cut" Intersection



1.3.2.2 Bonita Beach Road

The following roadway improvements are proposed along Bonita Beach Road as part of the preferred alternative:

- Three 11’ travel lanes in each direction from the Center of Bonita Springs (Sta. 266+50) to Arroyal Road (Sta. 286+25). The third eastbound through lane drops at the Spanish Wells Boulevard signal.
- Widening the sidewalk to be a 12’ shared-use path on both sides from the Center of Bonita Springs (Sta. 266+50) to Arroyal Road (Sta. 286+25).

At intersections along Bonita Beach Road, the following features are included are part of the preferred alternative:

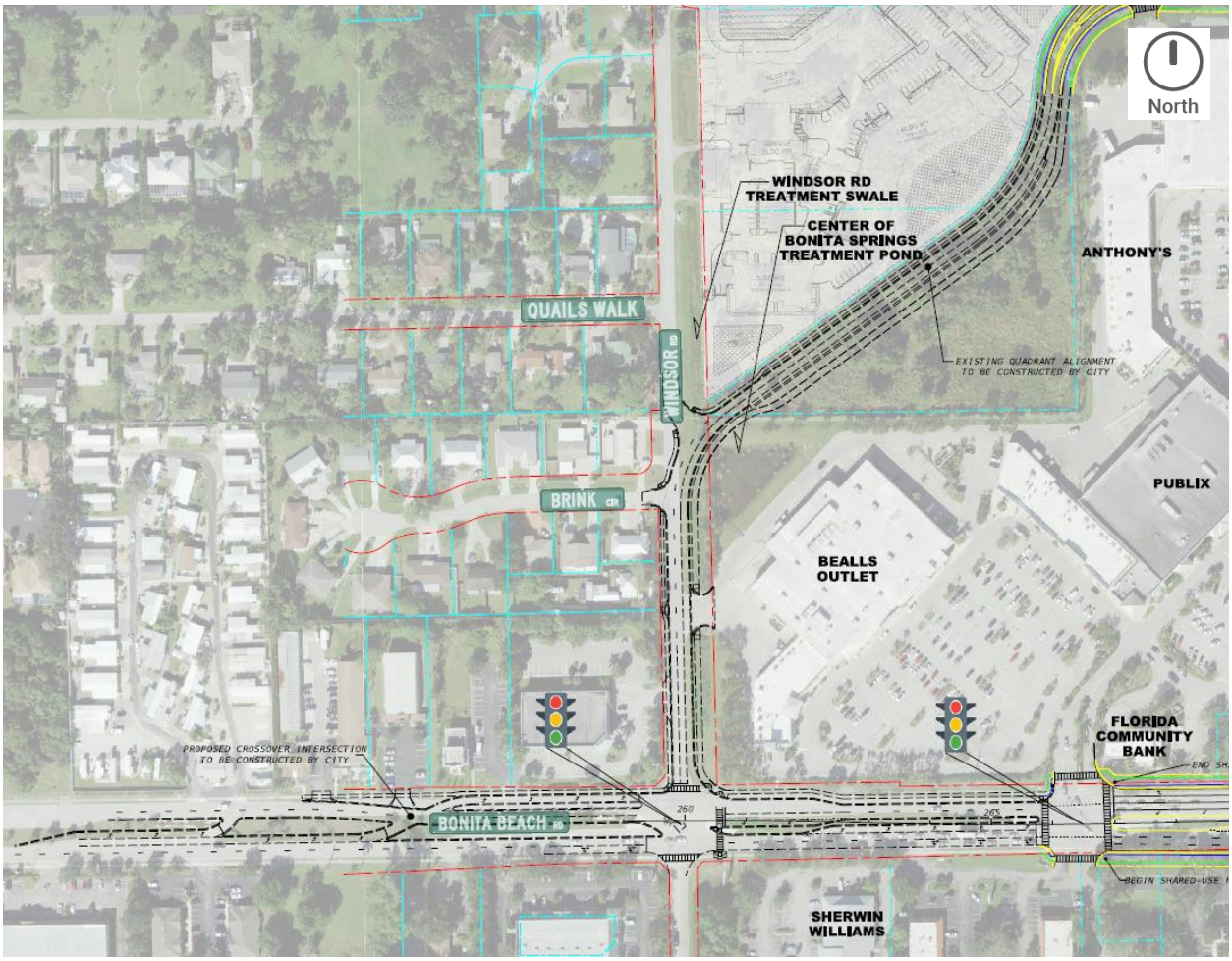
- Bonita Beach Road at Center of Bonita Springs (Sta. 266+50):
  - Develop a third 11’ eastbound travel lane departing intersection.
- Bonita Beach Road at Arroyal Road (Sta. 286+25):
  - One additional 11’ eastbound through lane (will be a shared through/right configuration).
  - Develop a third 11’ westbound travel lane departing intersection.
  - The southbound approach will be modified to include two southbound left turn lanes and one southbound shared through/right turn lane.

1.3.2.3 Quadrant Roadway System

A new Northwest Quadrant Roadway from Bonita Beach Road at Windsor Road (Bonita Beach Road Sta. 260+00) to US 41 at the Center of Bonita Springs (US 41 Sta. 260+00) will be constructed by the City of Bonita Springs before the preferred alternative is planned to be constructed at the US 41 and Bonita Beach Road intersection. The following features describe the Northwest Quadrant Roadway improvements as shown in **Figure 1-7**.

- Intersection of Bonita Beach Road and Windsor Road (Bonita Beach Road Sta. 260+00):
  - An eastbound displaced left turn to the Northwest Quadrant Roadway with a new crossover intersection just west of Windsor Road.
  - The southbound approach from Windsor Road will be widened to two lanes.
  - An exclusive westbound right turn lane will be added.
- Along Windsor Road:
  - Two southbound lanes and one northbound lane.
  - 6’ sidewalk on the west side and 12’ shared-use path on the east side of the roadway.
- Along New Roadway between Windsor Road and the Northwest Corner of the Center of Bonita Springs Shopping Plaza:
  - One 11’ travel lane in each direction.
  - 4’ paved shoulders in each direction.
  - 6’ sidewalk on the west side and 12’ shared-use path on the east side of the roadway.

Figure 1-7: Northwest Quadrant Roadway – Proposed City Alignment

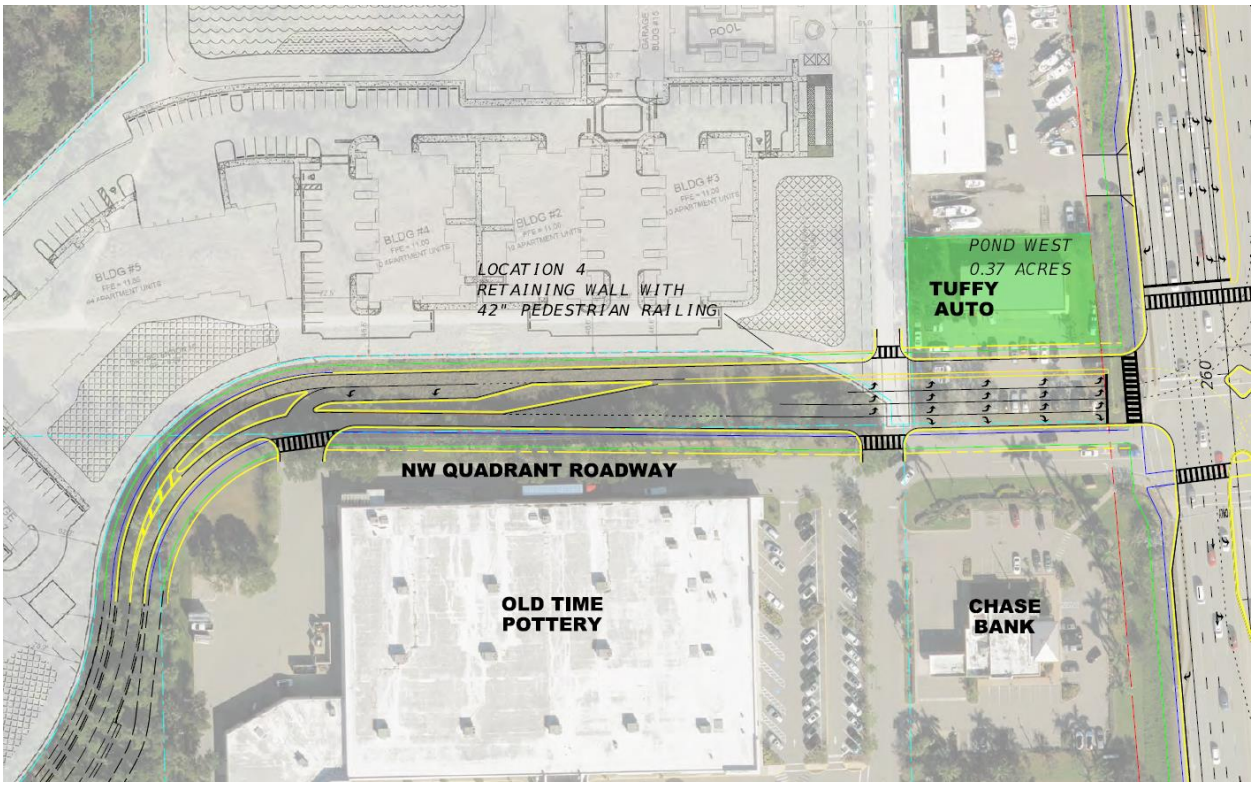


The City's Northwest Quadrant Roadway design concept ties in at the existing US 41/Center of Bonita Springs intersection and is not making any improvements to this intersection. In the future condition, this intersection will not have enough capacity to accommodate the forecasted traffic demand, necessitating additional turn lane improvements on the intersection's west leg. As part of the preferred alternative, the Northwest Quadrant Roadway is being modified from the northwest corner of the Center of Bonita Springs Shopping Plaza to US 41. These changes are described below and shown in **Figure 1-8**:

- Northwest Corner of the Center of Bonita Springs Shopping Plaza to US 41:
  - Roadway is widened to develop a center median with varying width.
  - One 11' travel lane in each direction.
  - 6' sidewalk on the north side of the roadway.
  - 12' shared-use path on the south side of the roadway.
  - New 11' westbound left turn lane into Center of Bonita Springs behind the Old Time Pottery building.

- West Leg at US 41 Intersection:
    - One 11’ eastbound right turn lane.
    - Three 11’ eastbound left turn lanes.
    - One 11’ westbound receiving lane.

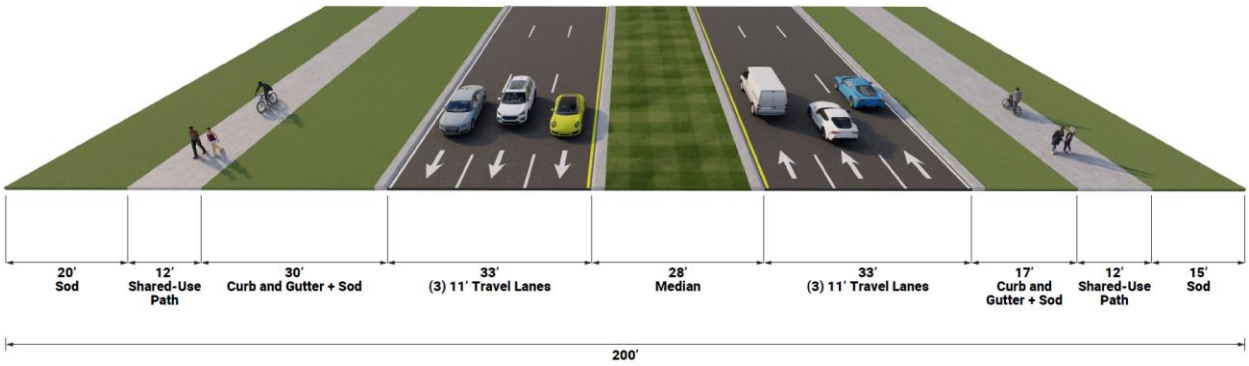
Figure 1-8: Northwest Quadrant Roadway – West Leg at US 41



Tying into the US 41 intersection’s east leg is the Northeast Quadrant Roadway proposed between US 41 and Arroyal Road, intersecting at Arroyal Road and Carolina Street. This will be a new three-lane roadway with two lanes eastbound and one lane westbound, as shown in **Figure 9**. The lane configuration at the US 41 intersection is discussed below:

- One 11’ westbound left turn lane.
- One 11’ westbound right turn lane.
- Two 11’ eastbound receiving lanes.

Figure 1-9: Northeast Quadrant Rodway – East Leg at US 41



1.5 Proposed Drainage

The study is located in the Estero Bay Watershed within the jurisdiction of the South Florida Water Management District (SFWMD). It is just south of the Imperial River, Waterbody ID (WBID) 3258EB – Imperial River (Marine Segment), which is an Outstanding Florida Water (OFW) and the ultimate outfall for the project. There is a Total Maximum Daily Load (TMDL) for Dissolved Oxygen (DO) and Total Nitrogen (TN) for the Imperial River meaning nutrient loading analysis will be required. Bonita Beach Road and US 41 both collect stormwater runoff in curb and gutter along the roadways before conveying the runoff via closed storm sewer systems to permitted stormwater treatment facilities within the study limits. The surrounding commercial developments at the US 41 and Bonita Beach Road intersection also have their own stormwater treatment facilities that treat onsite runoff before discharging offsite.

There are three existing drainage crossings within the study limits. There is a double 8' x 4' concrete box culvert (CBC) underneath US 41 south of the US 41 and Bonita Beach Road intersection which conveys a large drainage ditch from the west side of US 41 to the canal along the east side of US 41. There is a single 10' x 7' CBC underneath Bonita Beach Road east of the US 41 and Bonita Beach Road intersection, conveying the canal north to the Arroyal Mall Pond. There is a 24" outfall pipe crossing underneath US 41 from the Center of Bonita Springs treatment pond into the Arroyal Mall Pond.

The Federal Emergency Management Agency (FEMA) flood insurance rate map (FIRM) for Lee County (Map No. 12071C0658F) dated August 28th, 2008 indicates that portions of the study area are within Zone AE floodplains (Flood El. 10.0 feet NAVD). The floodplain area within the study limits is tidally influenced and will not require compensation for impacts anticipated from the proposed study. The Imperial River is considered a regulatory FEMA floodway; however, the proposed improvements considered for this study will not impact the roadway or bridge at the river.

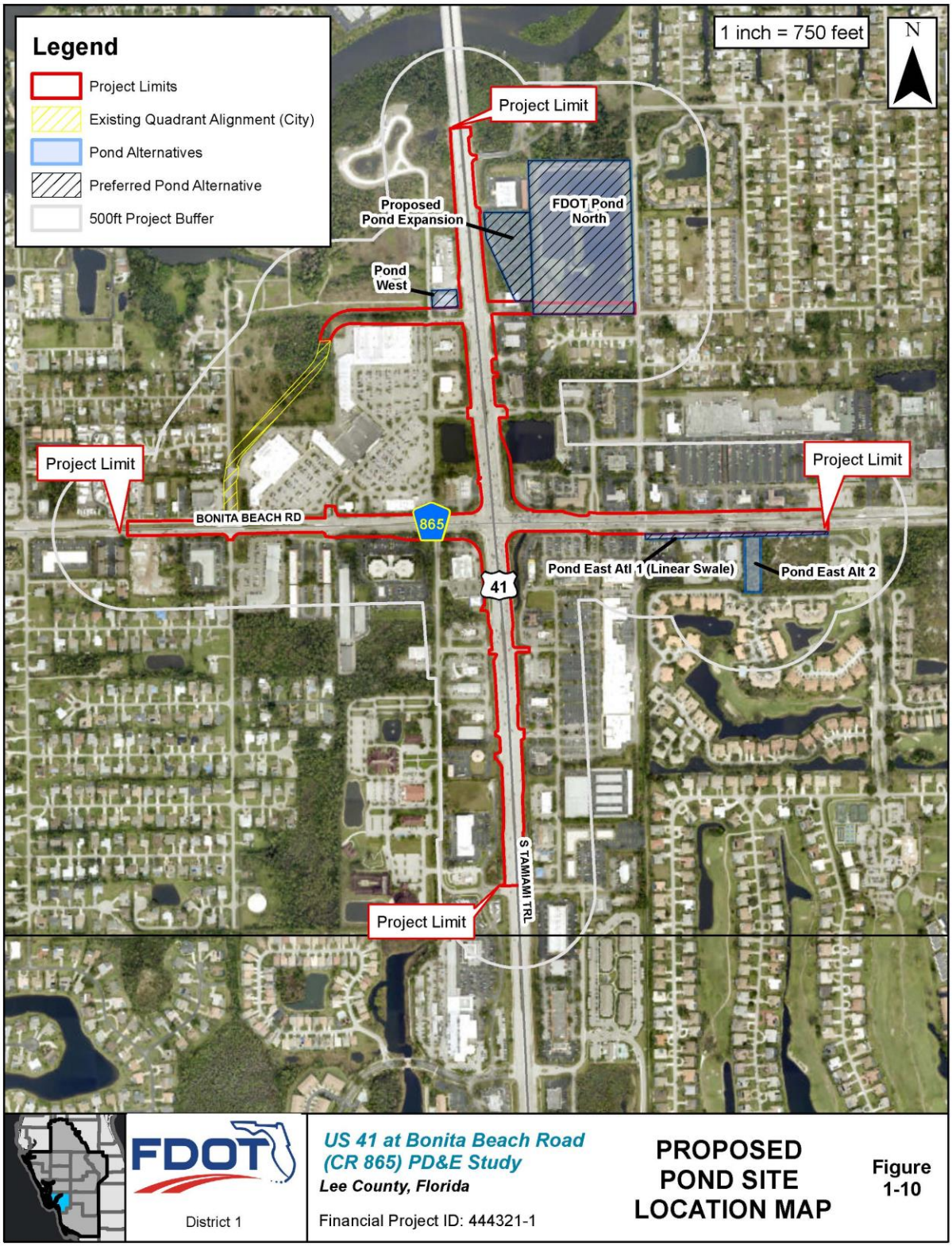
The proposed stormwater approach will maintain the existing drainage patterns. Stormwater runoff from the study limits will be collected and conveyed via curb and gutter to the

recommended stormwater treatment facility for each basin. The Preferred Alternative consists of dry retention ponds, wet detention ponds, dry linear swales, and modifications to existing permitted ponds (**Figure 1-10**). The proposed treatment facilities have been sized to achieve water quality treatment and water quantity attenuation requirements.

The proposed improvements at the Bonita Beach Road and US 41 intersection will impact the existing adjacent canal and Arroyal Mall Pond. To offset these impacts the canal will be enclosed within a concrete box culvert to maintain conveyance, and the pond will be expanded to account for volumetric impacts from the improvements. The outfall ditch from the existing pond will also be bisected by the northeast quadrant roadway. A cross drain underneath the proposed roadway and a proposed outfall ditch to the Imperial River will be provided to maintain conveyance for the pond outfall.

The Drainage Report can be found in the project file and provides detailed information about the proposed drainage.

Figure 1-10: Proposed Pond Site Location Map



Section 2 Existing Environmental Conditions

Prior to field surveys, staff ecologists reviewed the most currently available information to determine location and extent of habitats and land uses within the vicinity of the project area. This information included land use maps provided by the SFWMD. The land use descriptions were based on the Florida Land Use, Cover and Forms Classification System (FLUCFCS) (FDOT 1999). Other information included but was not limited to:

U.S. Geographic Survey (USGS) Topographic Maps

(https://viewer.nationalmap.gov/launch/)

Natural Resources Conservation Service (NRCS) Soil Maps

(https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm)

Florida Natural Areas Inventory (FNAI) Cooperative Land Cover Maps

(http://www.fnai.org/landcover.cfm)

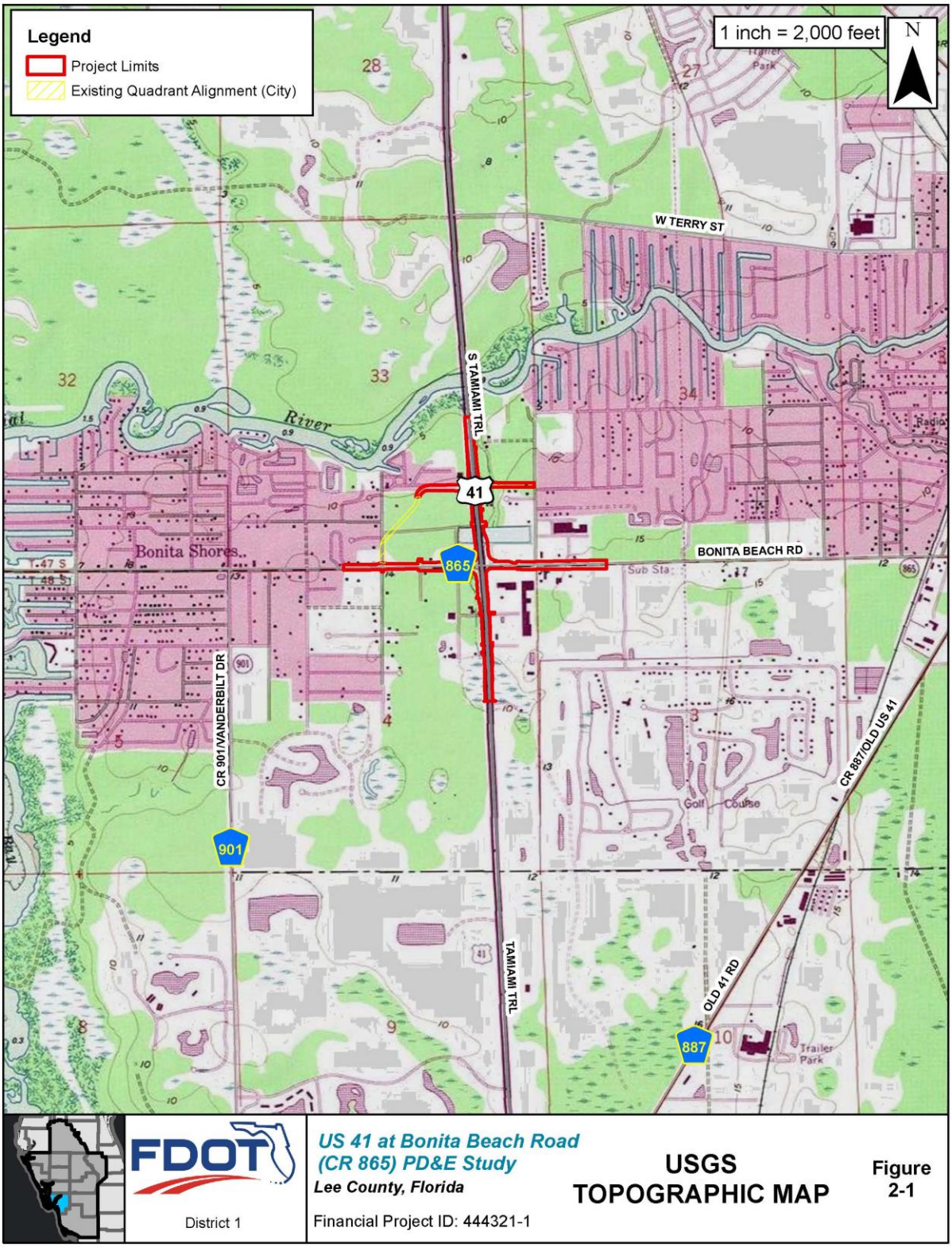
ETDM Summary Report #6291

(https://etdmpub.fla-etat.org/est/#)

2.1 Topography

The US 41 and Bonita Beach Road Study Area lies within the Southwestern Florida Flatwoods ecoregion of Florida (Griffith et al. 1994). According to the USGS, elevations within the US 41 and Bonita Beach Road Study Area vary from approximately 5 feet above sea level to approximately 15 feet above sea level (**Figure 2-1**).

Figure 2-1: USGS Topographic Map



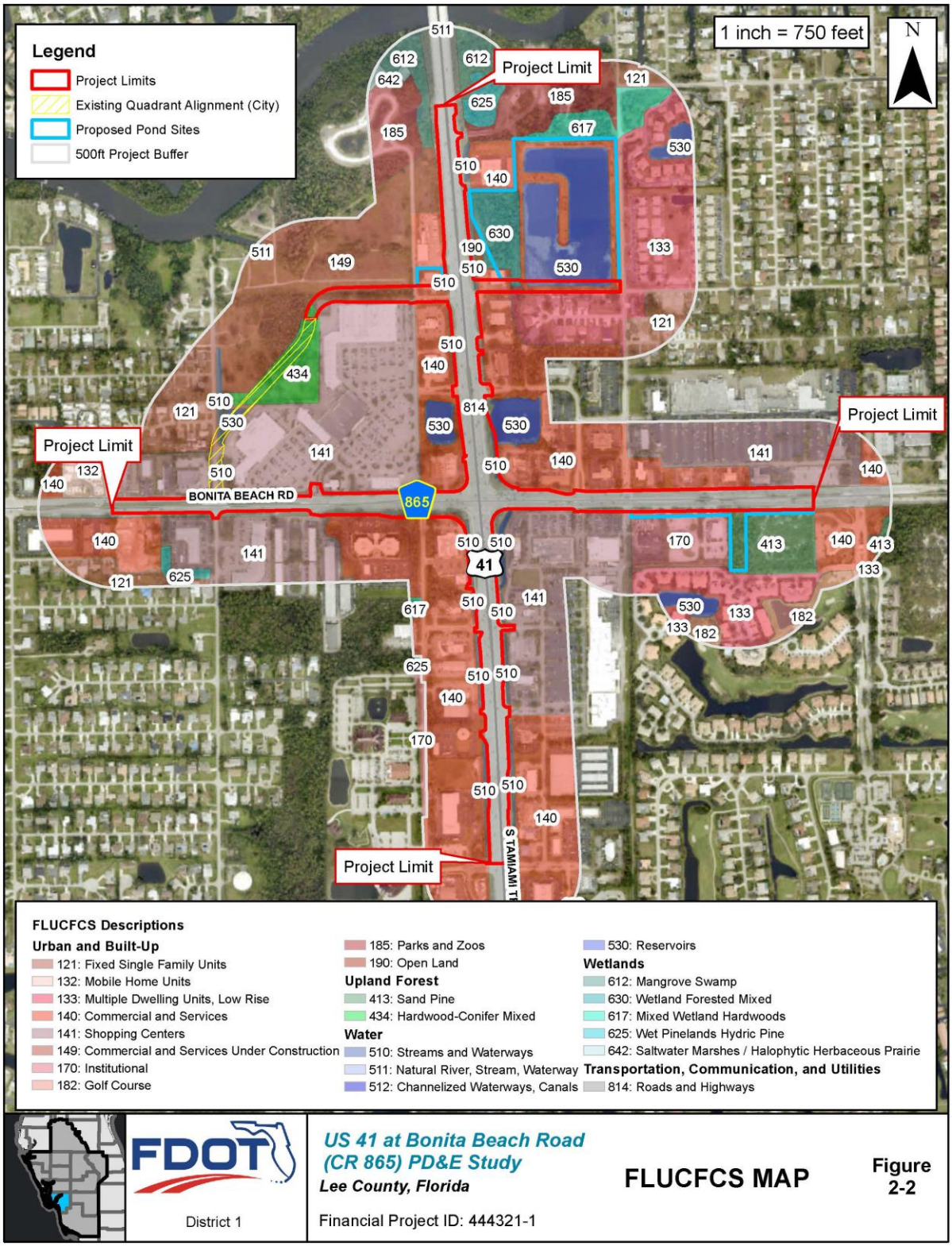
2.2 Land Use

The land uses within the US 41 and Bonita Beach Road Study Area were characterized by SFWMD online resources and later modified by ecologists to reflect field observations made at the time of the study. The US 41 and Bonita Beach Road Study Area contains a mixture of several FLUCFCS types including urban and built-up, upland forest, water, wetlands, and transportation or other linear utilities (**Figure 2-2**). A detailed list of the land uses within the study area is provided in **Table 2-1** along with additional descriptions of the land uses in **Appendix A**. Photographs of representative habitats in the study area are provided in **Appendix B**.

Table 2-1: FLUCFCS within the US 41 and Bonita Beach Road Project Limits

FLUCFCS Code	FLUCFCS Description
121	Fixed Single-Family Units
133	Multiple Dwelling Units, Low Rise
140	Commercial and Services
141	Shopping Centers
149	Commercial and Services Under Construction
170	Institutional
413	Sand Pine
434	Hardwood-Conifer Mixed
510	Streams and Waterways
530	Reservoirs
630	Wetland Forested Mixed
814	Roads and Highways

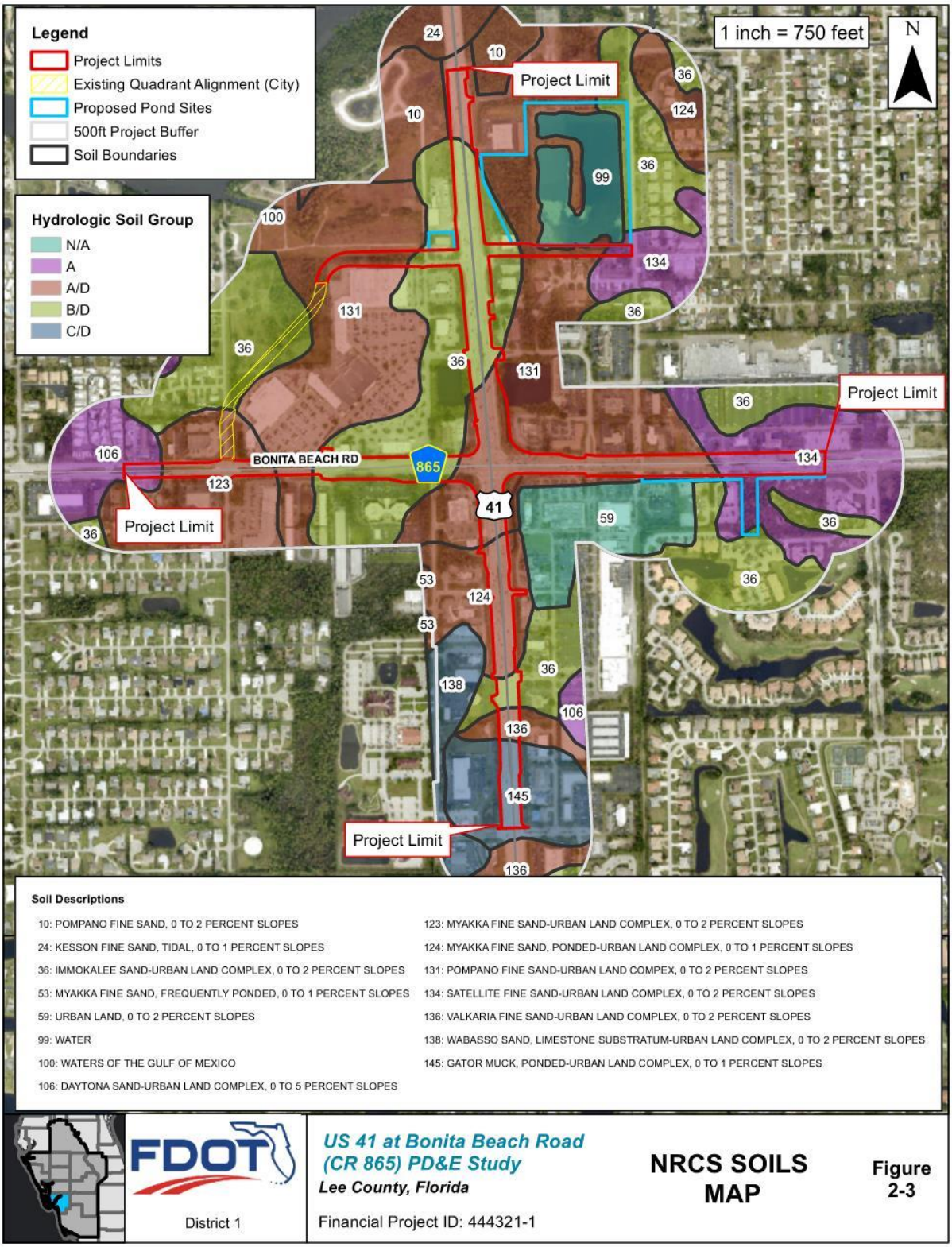
Figure 2-2: FLUCFCS Map



2.3 Soils

The soil survey of Lee County, Florida (NRCS 1984) and GIS data provided by NRCS were reviewed to determine the soil types and characteristics within the US 41 and Bonita Beach Road Study Area (**Appendix C**). The soils encountered along the project limits include Hydrologic Soil Group (HSG) A, A/D, B/D, C/D, and D. For soils assigned a dual HSG, the first letter applies to the drained condition and the second to the undrained condition. HSG A consists of deep, well to excessively well-drained sand or gravel soils. HSG B consists of moderately deep or deep, moderately well or well-drained soils that have moderately fine texture to moderately course texture with moderate infiltration rate when thoroughly wetted. HSG C consists of moderately fine to fine-textured soil that restricts percolation of water. HSG D consists of soils with permanently high-water tables and often indicative of wetlands or depressions. According to soil surveys, there are 15 different soil types within the US 41 and Bonita Beach Road Study Area. The soil types are depicted in **Figure 2-3**.

Figure 2-3: NRCS Soils Map



2.4 Natural Features

The study area was evaluated for natural features and potential impacts to these features. The northern limit of the study area is adjacent to the Imperial River, which is an Outstanding Florida Water (OFW). There are two parks within the study area that are associated with the Imperial River. The Imperial River Boat Ramp is owned by Lee County and is located east of US 41 in the northern end of the study area. The other park within the study area is River Park, which is owned by the City of Bonita Springs and is located in the study area's northern portion on US 41's west side. Based on the Preferred Alternative evaluated, no impacts are anticipated to the Imperial River or associated park lands.

There are three conservation easements (CE) within and adjacent to the study area. All three CEs are dedicated to the SFWMD. The first CE (CE No. 970501-8-CE1) is located within the study area west of US 41, south of the Walgreens at the US 41 and Bonita Beach Road intersection. The second CE (CE No. 990414-11-CE1) is located adjacent to the study area on the west side of US 41, west of Wendy's and south of the Beachway Professional Center. The third CE (CE No. 071108-12-CE1) is located within the study area west of US 41, south of CE No. 990414-11-CE1 and north of St. Leo Catholic Church. Based on the Preferred Alternative, no impacts to these CEs are anticipated. FDOT will complete any necessary coordination with the SFWMD if impacts to these CEs are anticipated.

2.4.1 Aquatic Preserves and Outstanding Florida Waters

The Imperial River, a tributary of Estero Bay (a designated Aquatic Preserve) is located adjacent to the northern boundary of the study area. Estero Bay tributaries are designated OFWs. Special protection is given to OFWs under 62-302.700, F.A.C. The project, including the proposed stormwater management system, will be developed to meet the design and performance criteria established in the SFWMD Environmental Resource Permit Applicant's Handbook Volumes I and II for the treatment and attenuation of discharges to OFWs. Best management practices will also be utilized during project activities to prevent impacts (primarily siltation) to proximate estuarine habitats.

Figure 2-4 shows natural features within and adjacent to the study area.

Figure 2-4: Natural Features Map

Section 3 Protected Species and Habitat

Ecologists used online resources and field surveys to determine whether protected species and habitat occur or have the potential to occur in the US 41 and Bonita Beach Road Study Area. The term protected species refers to those species that are protected by law regulation, or rule. Specifically, the term protected species refers to those species listed under the Endangered Species Act (ESA) of 1973, as amended; those species listed under Florida's Endangered and Threatened Species List, Chapter 68A-27, F.A.C.; or those species listed under the Preservation of Native Flora of Florida, Chapter 5B-40, F.A.C. Florida also affords protection to federally-listed species, thus all federally-listed species are also state listed, pursuant to Chapter 68A-27.003(b). The study area was also evaluated for the occurrence of Critical Habitat as defined by the ESA of 1973, as amended and 50 CFR Part 424. This analysis is consistent with the Protected Species and Habitat chapter of the PD&E Manual.

3.1 Efficient Transportation Decision Making

According to the ETDM Summary Report No. 6291 dated January 18, 2020, Florida Fish and Wildlife Conservation Commission (FWC), SFWMD, and USFWS indicated that the project alternatives may create a "Minimal" Degree of Effect (DOE) on wildlife habitat resources. The primary issues were the potential for state and federally listed species to occur within the project area and the loss of wetland habitats. Avoidance and minimization measures will be implemented for the noted species to the greatest extent practicable. In order to minimize the effect of the proposed project on protected species, FDOT will provide commitments that will be tracked through project completion. FDOT will coordinate with the USFWS and FWC to obtain concurrence with the effect determinations listed below and address potential impacts to each species.

3.2 Data Collection and Methodology

The study methodology included GIS analysis, Environmental Technical Advisory Team (ETAT) comments review, agency coordination, agency database searches, general wildlife surveys, and species-specific surveys. The data sources utilized for review include but are not limited to:

FNAI Biodiversity Matrix Map Server

(https://www.fnai.org/biodiversity-matrix-intro)

U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Maps

(https://www.fws.gov/wetlands/data/mapper.html)

USFWS CA and Critical Habitats Maps

(https://crithab.fws.gov/)

- USFWS Wood Stork Nesting Colonies and CFA Maps
- USFWS Information for Planning and Consultation (IPac)
- USFWS Environmental Conservation Online System (ECOS)

National Marine Fisheries Service (NMFS) Essential Fish Habitat (EFH) Maps

(https://www.habitat.noaa.gov/protection/efh/habitatmapper.html)

Florida Fish and Wildlife Conservation Commission (FWC) Scrub-Jay Observation Maps

(http://myfwc.com/research/gis/)

FWC Bald Eagle Nesting Territory Maps

(https://publictemp.myfwc.com/FWRI/EagleNests/nestlocator.aspx)

Audubon Florida EagleWatch Nest Website

(https://cbop.audubon.org/conservation/about-eaglewatch-program)

FWC Wildlife Occurrence Maps

(http://geodata.myfwc.com/datasets)

FWC Species Action Plans

(http://myfwc.com/wildlifehabitats/imperiled/species-action-plans/)

Ecologists familiar with Florida's protected species and natural habitats conducted general and species specific surveys in March 2020 and October 2023. The field surveys were performed using pedestrian surveys during daylight hours to document the presence of evidence of protected species utilizing the study area. A species-specific survey for the Florida bonneted bat was conducted in October 2023, in accordance with the survey protocols outlined by the USFWS. Species-specific survey methodologies were submitted to USFWS for approval before the surveys were conducted.

Agency coordination is included in **Appendix D**. Ecologists also documented habitat types and predominant plant species, including general wetland limits, during field reviews. Listed species occurrences are shown on **Figure 3-1**.

A total of 35 protected species have the potential to occur in the US 41 and Bonita Beach Road Study Area, according to the information obtained during the preliminary data collection. These include the 12 bird, one (1) insect, six (6) mammal, four (4) reptile, and 12 plant species shown on **Table 3-1**. Ecologists determined a species' potential occurrence in the study area based on its habitat preferences and distributions, existing site conditions, historical data, and field survey results. The likelihood of occurrence was rated as no, low, moderate, high, or observed. Definitions for the likelihood of occurrence are provided below:

No – Species with a no likelihood of occurrence are those species that are known to occur in Lee County but have specialized habitat requirements that do not occur in the project area.

Low – Species with a low likelihood of occurrence are those species that are known to occur in Lee County, limited habitat occurs within the project site, but there are no known adjacent populations, limited dispersal abilities, and the species has not been observed or documented within the site.

Moderate – Species with a moderate likelihood of occurrence are those species that are known to occur in Lee County, for which suitable habitat occurs within the project site, but there are no positive indications to verify presence, and the species has not been observed in or documented within the site.

High – Species with a high likelihood of occurrence are those species that are known to occur in Lee County, are suspected in the project area based on the existence of suitable habitat within the project site, are known to occur adjacent to the site, or have been previously documented in the project vicinity.

Observed – the species has been observed during this evaluation.

Table 3-1: Protected Species with Potential to Occur in the US 41 and Bonita Beach Road Study Area

Scientific Name	Common Name	USFWS	FWC	FDACS	Potential Occurrence
Birds					
Aphelocoma coerulescens	Florida scrub-jay	T	T		No
Athene cunicularia floridana	Florida burrowing owl		T		Low
Calidris canutus rufa	Rufa Red Knot	T	T		No
Egretta caerulea	Little blue heron		T		Observed
Egretta rufescens	Reddish egret		T		Moderate
Egretta tricolor	Tricolored heron		T		Observed
Grus canadensis	Florida sandhill crane		T		Moderate
Haliaeetus leucocephalus	Bald eagle	BGEPA/MBTA	M		Observed
Mycteria americana	Wood stork	T	T		High
Laterallus jamaicensis jamaicensis	Eastern black rail	T	T		No
Platalea ajaja	Roseate spoonbill		T		Moderate
Sternula antillarum	Least tern		T		No
Insects					
Danaus plexippus	Monarch butterfly	C			Moderate
Mammals					
Eumops floridanus	Florida bonneted bat	E	E		Moderate
Perimyotis subflavus	Tricolored bat	C			Moderate
Puma concolor coryi	Florida Panther	E	E		Low
Sciurus niger avicennia	Big Cypress fox squirrel		T		Low
Trichechus manatus	West Indian manatee	T	T		No
Ursus americanus floridanus	Florida black bear		M		High
Reptiles					
Crocodylus acutus	American crocodile	T	T		No
Drymarchon couperi	Eastern indigo snake	T	T		Moderate
Gopherus polyphemus	Gopher tortoise		T		Burrows Observed
Pituophis melanoleucus mugitus	Florida pine snake		T		Moderate
Plants					
Andropogon arctatus	Pinewoods bluestem			T	Low
Calopogon multiflorus	Many-flowered grass-pink			T	Low
Chamaesyce cumulicola	Sand-dune spurge			E	Low
Deeringothamnus pulchellus	Beautiful pawpaw	E			Low
Harrisia aboriginum	Aboriginal prickly-apple	E			Low
Lechea cernua	Nodding pinweed			T	Low
Lechea divaricata	Pine pinweed			E	Low
Linum carteri var. smallii	Small's flax			E	Low
Nemastylis floridana	Celestial lily			E	Low
Nolina atopocarpa	Florida beargrass			T	Low
Pteroglossaspis ecristata	Giant orchid			T	Low
Stylisma abdita	Scrub stylisma			E	Low

E = Endangered **T** = Threatened **C** = Candidate **M** = Managed **T/S** = Threatened due to Similarity of Appearance
BGEPA = Bald and Golden Eagle Protection Act **MBTA** = Migratory Bird Treaty Act
FDACS = Florida Department of Agriculture and Consumer Services
FWC = Florida Fish and Wildlife Conservation Commission
USFWS = United States Fish and Wildlife Service

Figure 3-1: Protected Species and Habitat Map

3.3 Federally Listed Species and Designated Critical Habitat

3.3.1 American Crocodile

The American crocodile is federally listed at threatened. It is one of two species of crocodilians in the United States; the other is the American alligator. The crocodile is distinguished from the alligator by its head shape and color. The crocodile's snout is narrower than the alligator's, and its lower teeth are visible when its mouth is shut. The crocodile is a brownish color whereas the alligator is a blackish color. The crocodile typically inhabits brackish or saltwater habitats, such as ponds, creeks, and coves within mangrove swamps. They are occasionally found inland in freshwater habitats, typically due to South Florida's canal system. Its nesting habitat includes sandy shorelines, raised marl creek banks next to deep water, and even man-made structures such as canal berms. The USFWS identified critical habitat for the crocodile in extreme south Florida, well outside the project area.

Suitable habitat for the crocodile was not observed within the study area. No crocodiles were observed during the field survey. The project will not impact suitable crocodile habitat and no in-water work is proposed. Therefore, the proposed project will have "**no effect**" on the American crocodile.

3.3.2 Eastern Black Rail

The eastern black rail is listed by the USFWS as threatened due to habitat loss, destruction, and modification; sea level rise and tidal flooding, and incompatible land management. They are wetland-dependent birds and are primarily associated with herbaceous, persistent emergent plant cover. They require dense overhead perennial herbaceous cover with underlying moist to saturated soils with or adjacent to very shallow water.

No eastern black rails were observed during the field reviews and no suitable habitat was observed. Based on the best available information, there is no evidence that the eastern black rail occurs within the project area. According FNAI, no individuals have been documented in the project area. As part of this project, wetland impacts will be mitigated to prevent loss of wetland functions and values. Based on this information, the proposed project is anticipated to have "**no effect**" on the eastern black rail.

3.3.3 Eastern Indigo Snake

The eastern indigo snake is a large, stout-bodied, shiny black snake with a red throat and chin. The eastern indigo snake is listed by the USFWS as threatened due to over-collecting for the pet trade as well as habitat loss and fragmentation and is widely distributed throughout central and south Florida. They occur in a broad range of habitats, from scrub and sandhill to wet prairies and mangrove swamps. Indigo snakes are most closely associated with habitats occupied by gopher tortoises whose burrows provide refugia from cold or desiccating conditions.

Suitable habitat is present for the indigo snake within the study area. No indigo snakes were observed during the field reviews. Suitable habitat for the gopher tortoise was also observed within the study area. A 100% gopher tortoise survey was not conducted during this PD&E Study

but will be required before construction activities commence. Multiple gopher tortoise burrows were observed during meandering pedestrian surveys in the project area. To address any potential effects to the eastern indigo snake, all potentially occupied gopher tortoise burrows within the limits of construction will be excavated and the Standard Protection Measures for the Indigo Snake (**Appendix E**) will be implemented during construction activities. According to the *Eastern Indigo Snake Effect Determination Key* (**Appendix F**), the proposed project will result in the following sequential determination: A>B>C>D>E = "**may affect, but is not likely to adversely affec**t" the eastern indigo snake.

3.3.4 Florida Bonneted Bat

The entire study area is within the USFWS Florida bonneted bat CA. The Florida bonneted bat is classified as endangered due to habitat loss, degradation, and modification, as well as other man-made and natural factors including a small population size with few colonies, restricted range, slow reproductivity, and low fecundity. It has short glossy fur consisting of bicolored hairs and large broad ears that project over the eyes and are joined at the midline of the head. The Florida bonneted bat is a subtropical species that does not hibernate and is active year-round. Habitat consists of relatively open areas that provide sources of prey and drinking water, including open fresh water, permanent or seasonal freshwater wetlands, wetland and upland forests, wetland and upland shrub, and agricultural areas. In urban areas, suitable foraging habitat can be found at golf courses, parking lots, and parks. Potential roosting habitats include forests or areas with tall or mature trees or other areas with potential roost structures, including utility poles and artificial roosts. This includes habitat in which suitable structural features for breeding and sheltering are present. Roosting habitat contains one or more of the following structures: tree snags, and trees with cavities, hollows, deformities, decay, crevices, or loose bark. The study area contains stormwater ponds, forested upland and wetland habitat, and wetlands associated with the Imperial River. There is proposed Critical Habitat for this species; however, the proposed project is not within the Critical Habitat.

A full acoustic survey and roost survey were conducted in October 2023 to determine Florida bonneted bat activity within the study corridor. The survey methodology was submitted and approved by the USFWS prior to the commencement of the surveys (**Appendix D**). A supplemental survey methodology was developed based on the need to adjust proposed detector locations due to ongoing construction activities and access. This amended survey methodology was submitted and approved by USFWS (**Appendix D**). Qualified ecologists with the required acoustic survey course training and experience conducted the acoustic and roost surveys. The acoustic survey was conducted from October 04 through October 10, 2023.

Based on the results of the roost and acoustic surveys, no evidence of roosting or foraging by the Florida bonneted bat within the project corridor was detected. No Florida bonneted bat calls were detected as a result of the acoustic survey. A "**No Effect**" determination was made utilizing the Florida Bonneted Bat Consultation Key (USFWS 2019). This effect determination was made using the following sequence from the key: **1a-2a-3b-6b**. The survey report is included in **Appendix G**.

3.3.5 Florida Panther

The Florida panther is listed by the USFWS as endangered due to habitat loss and degradation. The project area is not within the USFWS Florida panther CA; however, according to the IPaC tool and ECOS, the project site is within the panther's range. Panthers require large blocks of mostly forested communities with a mosaic of habitats to utilize as resting and denning sites, hunting grounds, and travel corridors. Numerous factors influence panther home range size, including habitat quality, prey density, and landscape configuration.

The proposed project is within the range of the Florida panther and approximately 3.5 miles from the primary habitat zone. Telemetry and roadkill data suggest they do not utilize the project corridor, with the nearest occurrences approximately three miles away near the I-75 corridor. The proposed project corridor lacks the habitats the panther requires to fulfill its life history requirements. No suitable habitat, individuals, or signs of habitat utilization were observed. Therefore, the proposed project will have "**no effect**" on the Florida panther.

3.3.6 Florida Scrub-Jay

The entire study area occurs within the USFWS Florida scrub-jay CA. The scrub-jay is classified as threatened due to habitat loss, degradation, and fragmentation. They are restricted to xeric scrub habitats with optimal habitat consisting of fire-dominated, low-growing oak scrub found on well-drained sandy soils with patches of bare sandy soil.

The study area consists mostly of urban and built-up land uses. The natural areas present within the study area include wetland and upland habitats that do not contain the xeric scrub required by the Florida scrub-jay. According to FNAI and FWC's statewide occurrence data, there are no documented occurrences within the study area. No individuals or suitable scrub-jay habitat was observed within the project area. Due to the lack of suitable habitat, the proposed project will have "**no effect**" on the Florida scrub-jay.

3.3.7 Monarch Butterfly

The monarch butterfly is a candidate species proposed for federal listing. In many regions, monarchs breed year-round, including southern Florida. During the breeding season they lay their eggs on their obligate milkweed host plant (primarily *Asclepias* spp.). Milkweed and flowering plants are needed for monarch habitat. No monarchs or milkweed was observed during the field reviews, however flowering plants and habitat suitable to support milkweed species was observed. Consultation with USFWS under Section 7 of the ESA is not required for candidate species, like the monarch. FDOT will continue consultation with the USFWS regarding the monarch butterfly listing status and potential impacts to this species during the design and permitting phase as needed.

3.3.8 Rufa Red Knot

The rufa red knot is listed as threatened due to the loss of breeding and nonbreeding habitat from sea level rise, coastal engineering/stabilization, coastal development, and arctic ecosystem change; reduced prey throughout the nonbreeding range; and increasing frequency and severity of asynchronies in the timing of annual migration relative to favorable food and weather

conditions. Florida's central Gulf Coast is one of four wintering regions for the red knot. Coastal habitats used by this species include coastal marine and estuarine habitats with large areas of exposed intertidal sediments, including sparsely vegetated beaches, shoals, tidal or mud sand flats, or mangrove-dominated shorelines.

Habitats associated with the Imperial River may provide suitable habitat for wintering and migratory populations. However, these habitats are outside the project area and will not be impacted as a result of the Preferred Alternative. No individuals or suitable habitat was observed within the project area during the field reviews. As a result, the proposed project will have "**no effect**" on the rufa red knot.

3.3.9 Tricolored Bat

The tricolored bat is a candidate species proposed for federal listing. It is Florida's smallest bat and is distinguished by its unique tricolored fur and pink forearms that contrast their black wings. This wide-ranging species is found throughout the central and eastern United States and portions of Canada, Mexico, and Central America. Typically hibernating in caves and mines during the winter, tricolored bats in the southeastern U.S. have increased utilization of culverts as hibernacula, with shorter hibernation durations and increased winter activity. The tricolored bat is mostly associated with forested habitats and requires habitat suitable for roosting, foraging, and commuting between winter and summer habitats. Roosting singly or in small groups, the tricolored bat prefers to roost in caves, tree foliage, tree cavities, Spanish moss, and man-made structures such as buildings and culverts. They form summer colonies in forested habitats, utilizing cavities, bark, and foliage. They forage most commonly over watercourses and along forest edges.

Suitable roosting and foraging habitats are present within the project limits. Acoustic and roost surveys were conducted in October 2023 in accordance with the Florida bonneted bat survey guidelines. No tricolored bat calls were identified as a result of the acoustic survey. No evidence of bat roosts was observed. FDOT will continue consultation with the USFWS regarding the tricolored bat listing status and potential impacts to this species during the design and permitting phase as needed. During the design phase, FDOT will confirm the listing status of the tricolored bat and, if necessary, reevaluate its effect determination and the need for further consultation.

3.3.10 West Indian Manatee

The West Indian manatee is a large, aquatic mammal distributed from the southern United States through the Caribbean Islands, Central America, and to northern South America. In the United States, the Florida manatee (a sub-species of the West Indian manatee) inhabits Florida's coastal waters, rivers, and springs, where they graze on seagrasses and other aquatic plants. The manatee is federally listed as threatened due to habitat loss, degradation, and fragmentation; watercraft collisions; loss of winter warm-water habitat; and poaching.

The study area is located approximately 0.5 miles outside of the USFWS CA for the manatee. The Imperial River, which is located outside of the study area adjacent to the northern limits, is designated critical habitat for the West Indian manatee. While manatee observations and mortality are documented in the Imperial River (**Figure 3-1**), no occurrences have been

documented within the study area according to FWC manatee synoptic survey data. Critical habitat for the manatee will not be impacted by the proposed project. The project is not located in waters accessible to manatees and will not directly or indirectly affect manatees. Therefore, the proposed project will have "**no effect**" on the West Indian manatee.

3.3.11 Wood Stork

The wood stork is listed by the USFWS as threatened due to a reduction in food attributed to the loss of suitable foraging habitat (SFH). Wood storks are associated with freshwater and estuarine wetlands that are used for nesting, roosting, and foraging. Nesting typically occurs in medium to tall trees that occur in stands located in swamps or islands surrounded by open water. Because of their specialized feeding behavior, they forage most effectively on shallow water with highly concentrated prey. The USFWS defines SFH for the wood stork as shallow open-water areas that are relatively calm and have a permanent or seasonal water depth between two to fifteen inches. SFH includes freshwater marshes, swamps, lagoons, tidal creeks and pools, ponds, ditches, and flooded pastures.

According to the USFWS South Florida Ecological Service Office, the habitats within 18.6 miles of a wood stork breeding colony are considered to be wood stork CFAs. The proposed project site is within the CFA of one wood stork colony: the Corkscrew colony. SFH is limited to the littoral edge of existing stormwater ponds and roadside ditches. The proposed project will impact approximately 0.49 acres of SFH. This acreage was calculated based on direct impacts to surface waters and herbaceous wetlands which provide SFH for wood storks. According to the *South Florida Programmatic Concurrence Key for the Wood Stork* (**Appendix H**), the proposed project will result in the following sequential determination: A>B = "**may affect, but is not likely to adversely affect**" the wood stork. Based on the current design, the project will impact less than five acres of wetlands, and therefore, a foraging prey base analysis is not required. SFH will be restored in the post-construction condition with the construction of two new ponds and expansion of the existing FDOT pond. This will result in no net loss of SFH and therefore, the project will have no adverse impact on the wood stork. The final impacts will be calculated during the design phase and any mitigation will adhere to the requirements of the U.S. Army Corps of Engineers (USACE) and USFWS Effect Determination Key.

3.3.12 Federally Protected Plants

According to the FNAI and USFWS, two (2) federally protected plants have the potential to occur within the study area (**Table 3-1**). These species are listed as endangered and include beautiful pawpaw and aboriginal prickly-apple. Beautiful pawpaw occurs in slash pine woods on sandy substrates in Charlotte, Lee, and Orange counties, while aboriginal prickly-apple inhabits coastal hammock strands that have become uncommon in many coastal areas of central and south Florida due to clearing for development. No habitat for the beautiful pawpaw or aboriginal prickly-apple occurs within the Preferred Alternative, including the preferred pond sites. Due to the development within and adjacent to the study area, these species are unlikely to occur within the project area. Ecologists did not observe federally protected plants during field surveys. The FNAI database listed no Elemental Occurrences of protected plants within the study area. Due to the lack of suitable habitat, the proposed project will have "**no effect**" on federally listed plants.

3.3.13 Critical Habitat

No Critical Habitat designated for listed species occurs within the US 41 and Bonita Beach Road Study Area. The Imperial River, located north of the project area, is designated Critical Habitat for the West Indian manatee; however, this Critical Habitat area is located entirely outside of the study area and will not be impacted by project activities. Therefore, no destruction or adverse modification will occur.

3.4 State Listed Species

The FWC maintains the list of animals designated as federally endangered, federally threatened, state threatened. While the USFWS has primary responsibility for federally endangered or threatened species in Florida, the FWC works as a cooperating agency to help conserve these species and other imperiled species found in the state. Some listed and non-listed species are considered 'managed species' because of the well-developed programs that address their species' conservation, management, or recovery. The FWC has developed a comprehensive management plan and species action plans for the state's 59 state-listed species.

3.4.1 Big Cypress Fox Squirrel

The Big Cypress fox squirrel is listed by the FWC as threatened due to the loss, degradation, and fragmentation of their habitat and lack of regulatory protection. They are endemic to Florida and geographically restricted to southwest Florida. Optimal habitat requires trees for nesting, year-round food, and an open understory. Big Cypress fox squirrels build their nests almost exclusively in bald cypress trees, and occasionally in cabbage palm or slash pine.

The preferred pond alternatives will impact forested wetlands and pinelands. The forested wetlands within the proposed alternative are dominated by invasive exotic plant species with minimal cypress and are thus considered low-quality habitat for fox squirrels. Suitable habitat was observed within the proposed pond site located near the eastern terminus of the project. No fox squirrels were observed during the field reviews. Due to the limited suitable and low quality habitat within the project area, "**no adverse effect is anticipated**" for the Big Cypress fox squirrel.

3.4.2 Florida Burrowing Owl

The FWC listed the Florida burrowing owl as threatened due to loss of native habitat, dependence on altered habitat, and lack of regulatory protections. The burrowing owl is a non-migratory, year-round breeding resident of Florida, and maintains home ranges and territories while nesting. Burrowing owls inhabit upland areas that are sparsely vegetated. Natural habitats include dry prairie and sandhill, but they will make use of ruderal areas such as pastures, airports, parks, and road rights-of-way because much of their native habitat has been altered or converted to other uses.

Limited suitable habitat was observed within the study area. No burrowing owls were observed during general wildlife surveys or species-specific surveys. Burrowing owls usually dig their own burrows but are known to utilize gopher tortoise burrows and armadillo burrows as well. Gopher tortoise burrows and mammal burrows were observed within the site. Pre-construction surveys

will be conducted to adhere to the components of the Imperiled Species Management Plan (ISMP) and permitting guidelines and the necessary FWC coordination and permitting will be required if burrows are found prior to construction; therefore, "**no adverse effect is anticipated**" for the burrowing owl resulting from the proposed project.

3.4.3 Florida Pine Snake

The Florida pine snake is listed by the FWC as threatened due to habitat loss, fragmentation, and degradation to upland habitats from development and fire suppression. They inhabit areas that feature well-drained sandy soils with a moderate to open canopy. Preferred habitats include sandhill and former sandhill, including old fields and pastures, sand pine scrub, and scrubby flatwoods. The pine snake often coexists with gopher tortoises and pocket gophers, spending the majority of its time underground.

No pine snakes were observed during the field surveys. Suitable habitat was observed within the site. Gopher tortoise burrows and mammal burrows were observed within the site. A 100% gopher tortoise survey will be conducted prior to construction and gopher tortoise burrows within the construction limits will be excavated. Current FWC guidelines for the relocation of the Florida pine snake state that any incidentally captured pine snake should be released on-site or allowed to escape unharmed if habitat will remain post-development. Based on existing conservation measures, "**no adverse effect is anticipated**" for the Florida pine snake resulting from the proposed project.

3.4.4 Florida Sandhill Crane

The FWC listed the Florida sandhill crane as threatened due to the loss and degradation of nesting and foraging habitat from development and hydrologic alteration to their potential nesting habitat. The Florida sandhill crane is a heavy-bodied gray bird, with a long neck and long legs. It is widely distributed throughout most of peninsular Florida. Sandhill cranes rely on shallow marshes for roosting and nesting and open upland and wetland habitats for foraging.

No sandhill cranes were observed during field surveys. Suitable foraging habitat was observed; however, no nesting habitat was observed within the study area. Due to lack of suitable nesting habitat within the project limits, "**no adverse effect is anticipated**" for the Florida sandhill crane resulting from the proposed project.

3.4.5 Gopher Tortoise

The gopher tortoise is listed as threatened by the FWC. They occur in the southeastern Coastal Plain from Louisiana to South Carolina; the largest portion of the population is located in Florida. Gopher tortoises require well-drained, sandy soils for burrowing and nest construction, with a generally open canopy and an abundance of herbaceous groundcover, particularly broadleaf grasses, wiregrass, legumes and fruits for foraging. Gopher tortoises can be found in most types of upland communities including disturbed areas and pastures.

There are upland areas within and adjacent to the project limits that provide suitable habitat for tortoises. No gopher tortoises were observed; however, 12 potentially occupied gopher tortoise burrows were observed during the field survey (**Figure 3-1**). A 100% gopher tortoise survey was

not conducted, but a survey will be performed prior to construction. A relocation permit may be necessary from the FWC if tortoises are present within any permanent or temporary construction area. Mitigation contributions for the gopher tortoise will be calculated and provided to FWC during the gopher tortoise permitting process. Based on the information provided above, "**no adverse effect is anticipated**" for the gopher tortoise as a result of the proposed project.

3.4.6 Imperiled Wading Birds

Four wading birds have the potential to occur in the study area. These species are the little blue heron, reddish egret, roseate spoonbill, and tricolored heron. All are listed by the FWC as threatened due to the loss and degradation of habitat, particularly from hydrologic alterations to their essential foraging areas. Little blue herons, roseate spoonbills, and tricolored herons are widely distributed throughout peninsular Florida. Reddish egrets are found almost exclusively in coastal areas. Wading birds depend on healthy wetlands and vegetated areas suitable for resting and breeding which are near foraging areas. They forage in freshwater, brackish, and saltwater habitats. They tend to nest in multi-species colonies of a variety of woody vegetation types including cypress, willow, maple, black mangrove, and cabbage palm.

Little blue herons and tricolored herons were observed within the project area during field reviews. These observations include flyovers and foraging in stormwater ponds. No suitable nesting habitat for wading birds was observed within or adjacent to the site. Foraging habitat is limited and includes roadside ditches and the littoral edges of existing stormwater ponds. No nesting activity was observed within the project area, and there is no evidence that nesting occurs within the project site. According to the FWC Wading Bird Rookery Data, the nearest rookery is approximately 4.7 miles northwest of the project site. Based on the information provided, "**no adverse effect is anticipated**" for wading birds resulting from the proposed project.

3.4.7 Least Tern

The least tern is listed as threatened by FWC and is the smallest tern in North America. They are distributed along the Atlantic Coast of the United States, mid-Atlantic states, and down from Mexico to northern Argentina. They inhabit areas along the coasts of Florida, including estuaries and bays. Nesting occurs in colonies from one to several hundred pairs and may often be collocated with other seabirds like black skimmers. Nesting can occur in freshly disturbed areas that have had the removal of beach material, dumping of dredge sand, or clearing and scraping existing sand. Least terns also can nest in areas of gravel. Least terns typically nest between the middle of April and the beginning of May.

According to the FWC's ShoreMapper for imperiled beach-nesting birds, the project is not within a recent breeding site, critical brood-rearing site, or a critical roosting site for least tern. Suitable nesting habitat for the least tern is not present within the study area. No individuals were observed during field reviews. Therefore, as a result of the proposed project, "**no effect is anticipated**" for the least tern.

3.4.8 State Listed Plants

Through regulation by the FDACS Division of Plant Industry, Florida protects plant species native to the state that are endangered, threatened, or commercially exploited. The Florida Regulated Plant Index includes all plants listed as endangered, threatened, or commercially exploited as defined in Chapter 5B-40.0055, F.A.C. According to the FNAI and FDACS, 10 state protected plant species have the potential to occur in Lee County (**Table 3-1**). State threatened plant species include the pinewoods bluestem, many-flowered grass-pink, nodding pinweed, Florida beargrass, and giant orchid. Endangered plants with potential to occur in Lee County include sand-dune spurge, pine pinweed, Small's flax, celestial lily, and scrub stylisma. However, the FNAI database listed no Elemental Occurrences of protected plants within the study area. Habitat for these state-listed plant species is limited within the study area, and no suitable habitat occurs within the Preferred Alternative, including the preferred pond sites. Ecologists did not observe state listed plants during the field survey. The Preferred Alternative will not impact suitable habitat; therefore, "**no effect is anticipated**" for state listed plant species resulting from the proposed project.

3.5 Other Protected Species or Habitats

3.5.1 Bald Eagle

The bald eagle was removed from the ESA in 2007 and Florida's Endangered and Threatened Species list in 2008; however, it remains protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The bald eagle is a member of the Accipitridae family. Bald eagles tend to nest in the tops of very tall trees that provide unobstructed lines of sight to nearby habitats, particularly lakes and other open waters. Because eagles are piscivorous (fish-eating) raptors, nearly all eagles' nests occur within 1.8 miles of water.

Suitable habitat for the bald eagle was observed throughout the study area. Two bald eagles were observed during the field reviews. According to FWC's Eagle Nest locator and the Audubon Florida EagleWatch Nest website (EagleWatch), there are five (5) nests identified within and adjacent to the study area. Three (3) of these nests (LE050, LE050b, and LE097a) have been documented as destroyed by EagleWatch, and their absence was confirmed in the field. Nest LE050a was documented as "inactive" for the 2023 breeding season and could not be located during the October 2023 field reviews. Construction activities associated with the Angler's Paradise development are currently underway within the 660-foot buffer of this nest's previously documented location. Nest LE097 was observed, and the two eagles observed in the field were perched in a pine near this nest. No other bald eagle nests were identified in the field. The proposed activities are outside of the 660-foot buffer of eagle nest LE097, and the project will therefore have no impact on bald eagles.

3.5.2 Florida Black Bear

The Florida black bear was removed from Florida's Endangered and Threatened Species list in 2012; however, it remains protected under Chapter 68A-4.009 F.A.C., the Florida Black Bear Conservation Plan. The project area is within the abundant range of the South Bear Management Unit (BMU). The black bear requires large amounts of space for its home range and a variety of forested habitats, including flatwoods, swamps, scrub oak ridges, bayheads, and hammocks. Self-

sustaining populations of bears are generally found on large tracks of contiguous forests with understories of berry producing shrubs or trees.

According to the most recent FWC data, three recent bear calls have occurred within the study area. These calls occurred in June and July of 2018. The occurrence potential of the black bear was categorized as high due to these documented occurrences in the project vicinity. However, the project area is highly developed and does not provide suitable habitat or a natural corridor for connectivity to suitable habitat outside the study area. The natural areas within and adjacent to the project area near the norther project terminus have been cleared and are currently being developed into residential subdivisions. Due to the lack of habitat within the project limits as a result of the highly developed project corridor and surrounding land use, the proposed project will have no impact on the Florida black bear. No further coordination with FWC will be required.

3.5.3 Strategic Habitat Conservation Areas

Strategic Habitat Conservation Areas (SHCA) are lands in need of protection to maintain natural communities and viable populations of many species that are indicators of the state's biological diversity. In 1994, FWC biologists completed a project entitled Closing the Gaps in Florida's Wildlife Habitat Conservation System, which assessed the security of rare and imperiled species on existing conservation lands in Florida. This research identified important habitat areas in Florida with no conservation protection. These SHCA serve as a foundation for conservation planning for species protection through habitat conservation. No SHCA occurs within the study area.

Section 4 Wetlands and Other Surface Waters

Ecologists performed a wetland evaluation of the study area. The wetland evaluation relied on literature reviews and field surveys to identify the location, extent, and functional value of wetlands in the study area; the potential direct, indirect, or cumulative effects of the project's actions to those wetlands; and available mitigation options to satisfy permit requirements from regulatory agencies. This wetland evaluation was performed in accordance with the Presidential Executive Order (EO) 11990 ("Protection of Wetlands"); U.S. Department of Transportation Order 5560.1A ("Preservation of Nation's Wetlands"); Federal Highway Administration Technical Advisory T6640.8A regarding the preparation of environmental documents; and the *Wetlands and Other Surface Waters* chapter of the FDOT's PD&E Manual.

4.1 Efficient Transportation Decision Making

According to the ETDM Summary Report No. 6291, dated January 18, 2020, the U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency, Florida Department of Environmental Protection (FDEP), SFWMD, NMFS, and USFWS indicated the project alternatives may create a "Minimal" DOE to wetlands and surface waters. The primary issues were the potential loss of wildlife habitat, and degradation of water quality in wetlands and surface waters due to increased stormwater runoff. Other issues of concern included indirect impacts to the Imperial River, which drains into Little Hickory Bay and Fish Trap Bay. In order to provide reasonable assurances that direct, indirect, or cumulative impacts from construction, alteration, and intended or reasonably expected uses of the Preferred Alternative will not contribute to

violations of water quality standards or adverse impacts to the functions of wetlands or other surfaces waters, the FDOT will calculate the appropriate mitigation during the design and permitting phase to satisfy the requirements of 33 United States Code (U.S.C.) § 1344 and Part IV of Chapter 373, Florida Statutes (F.S.).

4.2 Data Collection and Methodology

The wetland evaluation included GIS analysis, agency database search, and field reviews. The data sources utilized for review include but are not limited to:

Natural Resources Conservation Service (NRCS) Soil Maps

(https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm)

Florida Natural Areas Inventory (FNAI) Cooperative Land Cover Maps

(http://www.fnai.org/landcover.cfm)

U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Maps

(https://www.fws.gov/wetlands/data/mapper.html)

Ecologists familiar with Florida's natural plant communities performed a study area assessment to identify wetland vegetation, wetland hydrology, and hydrologic indicators to determine wetlands and other surface waters presence within the study area. Field reviews were conducted March 2020 and October of 2023. A formal wetland delineation to determine jurisdictional boundaries was not performed; however, the general limits of wetlands and other surface waters were identified in the field using the criteria established in Rule 62-340, F.A.C. The wetland limits have not been reviewed by the agencies. Wetlands and surface waters were classified per the FLUCFCS (FDOT 1999), and the Classification of Wetlands and Deepwater Habitats of the US (NWI) (Cowardin et al. 1979). The UMAM was utilized, per Chapter 62-345, F.A.C., for the functional assessment of wetlands within the US 41 and Bonita Beach Road Study Area.

4.3 Wetlands and Surface Waters

Wetlands and other surface waters with potential to be affected by the proposed project were identified within the study area (**Figure 4-1**). The following section includes a brief description of each wetland type and other surface water within the study area. **Table 4-1** provides details identifying each wetland and surface water including number, FLUCFCS and NWI classification, and a brief description. FLUCFCS classifications are based on the results of the data analysis and field reviews of the study area. NWI classifications were not altered and are based on the listed classification of the nearest NWI wetland system as applicable.

Figure 4-1: Wetlands and Other Surface Waters Map

Table 4-1: Other Surface Waters in the US 41 and Bonita Beach Road Study Area

Surface Water ID	FLUCFCS Classification	NWI Classification	Description	Wetland Regulatory Jurisdiction
WL 1	630	PFO4/1A	Wetland Forested Mixed	Federal and State
WL 2	617	PFO3/2C	Mixed Wetland Hardwoods	Federal and State
WL 3	612/625	PSS4A, PFO4A, PSS1/EM1R, E2SS3N	Mangrove Swamps/Hydric Pine Flatwoods	Federal and State
WL 4	612	E2SS3N, E2EM1P	Mangrove Swamps	Federal and State
SW 1	510	N/A	Streams and Waterways	Federal and State
SW 2	510	N/A	Streams and Waterways	Federal and State
SW 3	510	PUBHx	Streams and Waterways	Federal and State
SW 4	510	N/A	Streams and Waterways	Federal and State
SW 5	530	PUBHx	Reservoirs	Federal and State
SW 6	530	PUBHx	Reservoirs	Federal and State
SW 7	510	N/A	Streams and Waterways	Federal and State
SW 8	510	N/A	Streams and Waterways	Federal and State
SW 9	530	N/A	Reservoirs	Federal and State
SW 10	510	N/A	Streams and Waterways	Federal and State

4.3.1 Mangrove Swamps

FLUCFCS: 612

NWI: PSS4A, PFO4A, PSS1/EM1R, E2SS3N, E2EM1

Wetlands: WL 3, WL 4

Mangrove swamps are communities of coastal hardwoods dominated by mangroves. These areas are found at the northern terminus of the project on both the east and west sides of US 41. Species observed in these communities include red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*), Brazilian pepper (*Schinus terebinthifolia*), cabbage palm (*Sabal palmetto*), and salt bush (*Baccharis halimifolia*). The proposed project will have no impacts to WL 3 and WL 4.

4.3.2 Mixed Wetland Hardwoods

FLUCFCS: 617

NWI: PFO3/2C

Wetlands: WL 2

Mixed wetland hardwood habitat is located in the northeastern quadrant of the US 41 and Bonita Beach Road intersection, north of the proposed pond site. This habitat consists of hardwood species with cabbage palm, slash pine (*Pinus elliotti*), Australian pine (*Casuarina equisetifolia*), and Brazilian pepper encroachment. The proposed project will have no impacts to WL 2.

4.3.3 Hydric Pine Flatwoods

FLUCFCS: 625

NWI: PSS4A, PFO4A

WL 3

Hydric Pine Flatwoods are located at the project's northern terminus, east of US 41. This habitat type is associated with the Imperial River and makes up a portion of WL 3. This canopy consists of slash pine and cabbage palm. Understory and groundcover species include Brazilian pepper, elderberry (*Sambucus nigra*), Carolina willow (*Salix caroliniana*), Peruvian primrose willow (*Ludwigia peruviana*), wax myrtle (*Morella cerifera*), rush Fuirena (*Fuirena scirpoidea*), and swamp fern. No impacts to WL 3 are anticipated as a result of the proposed project.

4.3.4 Wetland Forested Mixed

FLUCFCS: 630

NWI: PFO4/1A

Wetlands: WL 1

Wetland Forested Mixed wetlands contain communities in which neither hardwoods nor conifers achieve 66 percent canopy composition. WL 1 occurs east of US 41, and is adjacent to the western edge of the existing FDOT pond. Observed canopy vegetation includes slash pine, cabbage palm, melaleuca (*Melaleuca quinquenervia*), laurel oak (*Quercus laurifolia*), Australian pine, and earleaf acacia (*Acacia auriculiformis*). Understory and groundcover species include Brazilian pepper, Carolina willow, Peruvian primrose willow, and swamp fern (*Telmatoblechnum serrulatum*). Direct impacts to WL 1 are 3.21 acres as a result of the proposed North Pond site expansion.

4.3.5 Streams and Waterways

FLUCFCS: 510

NWI: PUBHx

Surface Waters: SW 1, SW 2, SW 3, SW 4, SW 7, SW 8, SW 10

Streams and waterways include rivers, creeks, canals, and other linear bodies of water. The surface waters within the study area consist of canals and roadside ditches. These ditches generally contain standing water during the rainy season and are shallow or dry during the dry season. Many of these systems support hydrophytic vegetation. Typical vegetation observed in these surface waters includes duck potato (*Sagittaria latifolia*), pickerelweed (*Pontederia cordata*),

frog's bit (*Limnobium spongia*), and Carolina willow. Impacts to SW 1, SW 3, SW 6, SW 7 are anticipated as a result of the roadway construction. Total impacts to these surface waters are approximately 0.42 acres. Mitigation is not required for impacts to these upland cut ditches pursuant to Subsection 10.2.2.2 of the Applicant's Handbook, Volume 1. SW 4 was identified as part of this study. However, SW 4 is located within the City's Northwest Quadrant Roadway proposed alignment and is not within the limits of the US 41 and Bonita Beach Road Preferred Alternative. No impacts to SW 4 will result from the Preferred Alternative. The northern extent of SW 8 is wetland cut and will be impacted by the proposed roadway construction. Direct impacts resulting in 0.02 acres of impacts to the wetland cut portion of this ditch were included in the functional loss detailed in **Table 4-3** below.

4.3.6 Reservoirs

FLUCFCS 530

NWI: PUBHx N/A

Surface Waters: SW 5, SW 6, SW 9, SW 11

Reservoirs are artificial impoundments of water used for irrigation, flood control, and municipal and rural water supplies. SW 5 and SW 6 are located on either side of US 41 north of the US 41 and Bonita Beach Road intersection. SW 9 is located within one of the proposed pond sites. These surface waters are permitted stormwater ponds. SW 11 was identified as part of this study. However, SW 11 is located within the City's Northwest Quadrant Roadway proposed alignment and is not within the limits of the US 41 and Bonita Beach Road Preferred Alternative. No impacts to SW 11 will result from the Preferred Alternative. SW 9 will be expanded by the proposed project and incur approximately 0.40 acres of impacts from the proposed roadway construction. Impacts to SW 6 are approximately 0.07 acres as a result of the proposed roadway construction. No impacts to SW 5, and SW 11 are anticipated.

4.4 Wetland and Surface Water Impacts

Data collected during the literature review, previous permit history, and field survey were used to evaluate the potential adverse direct and secondary impacts of the project to wetlands and the potential cumulative impacts to those wetlands and surface waters in the project limits. Practicable measures to avoid or minimize impacts to wetlands and surface waters were considered during the US 41 Study. Any unavoidable adverse impacts will be mitigated pursuant to Section 373.4137, F.S., to satisfy all mitigation requirements of Part IV of Chapter 373, F.S., and U.S.C. §1344. **Table 4-2** details the proposed wetland and surface water impacts.

Table 4-2: Proposed Wetland and Other Surface Water Impacts

ID	FLUCFCS	Description	Type	Direct Impact (ac)
WL 1	630	Wetland Forested Mixed	Pond North	3.21
*SW 1	510	Streams and Waterways	ROW	0.14
*SW 3	510	Streams and Waterways	ROW	0.14
*SW 6	530	Reservoirs	ROW	0.07
*SW 7	510	Streams and Waterways	ROW	0.10
SW 8	510	Streams and Waterways	ROW	0.02
	510	Streams and Waterways (wetland cut ditch)	Pond North	0.02
*SW 9	530	Reservoirs	ROW	0.40
			Total Proposed Impacts	4.10 acres
			Total Impacts Included in UMAM	3.23 acres
* No mitigation required for upland cut ditches and reservoirs				

4.4.1 Direct Impacts

The Preferred Alternative will result in 3.21 acres of direct impacts to wetlands and 0.89 acres of direct impacts to other surface waters, including permitted stormwater ponds and upland cut roadside ditches. Final direct impacts will be determined during design and permitting and will be assessed accordingly.

4.4.2 Indirect Impacts

No secondary impacts are anticipated as a result of the proposed project.

4.4.3 Cumulative Impacts

Cumulative impacts can result from incremental but collectively significant impacts within the basin over time. In order to provide reasonable assurances that the project will not cause unacceptable cumulative impacts, mitigation will be provided from within the same drainage basin as the anticipated impacts or the project will utilize a regional mitigation plan pursuant to Section 373.4137, F.S.

4.5 Avoidance and Minimization

The project was designed to avoid and minimize impacts to wetlands, other surface waters, and protected species habitat to the greatest extent practicable. This was accomplished by utilizing the existing right-of-way and stormwater ponds when practicable. Complete avoidance of impacts was not feasible due to the nature of the intersection improvement project and the occurrence of wetland habitats immediately adjacent to the proposed project, including proposed pond sites.

4.6 Wetland Assessment

Wetlands and other surface waters (OSWs) with potential to be affected by the proposed project were identified within the US 41 and Bonita Beach Road Study Area. The wetland assessment

was conducted in accordance with the UMAM, as described in Chapter 62-345, F.A.C. The UMAM is the state-wide methodology for determining the functional value provided by wetlands and other surface waters and the amount of mitigation required to offset adverse impacts to those areas for regulatory permits. The 0.47 acres of impacted OSWs are considered upland cut components of the existing manmade drainage system; and therefore, these OSWs were not included in the wetland assessment as mitigation is not anticipated pursuant to Subsection 10.2.2.2 of the Applicant's Handbook, Volume 2. Under this subsection, wetland mitigation is not required for impacts to drainage ditches that were constructed in uplands and do not provide significant habitat for threatened and endangered species, and were not constructed to divert natural stream flow. The results of the UMAM assessment are provided in **Table 4-3**. UMAM summary sheets can be found in **Appendix I**. These values may be refined during the design and permitting phases of the project.

Table 4-3: Proposed Functional Loss

Wetland ID	Wetland Type	Impact Type	LLS	WE	CS	Impact Area (ac)	Functional Loss
WL 1	630	Forested	5	5	4	3.21	1.498
SW 8	510	Surface Water	3	3	3	0.02	0.006
					Total	3.23	1.504

LLS = Location and Landscape Support **WE** = Water Environment **CS** = Community Structure

4.7 Wetlands Finding

The Preferred Alternative was evaluated for impacts to wetlands in accordance with EO 11990 and USDOT Order 5560.1A. The Preferred Alternative was designed to avoid impacts to wetlands and will be constructed almost entirely within the existing ROW. Due to the constraints of the corridor, unavoidable impacts associated with the location of the proposed North Pond expansion cannot be avoided. It has been determined that no practicable alternative to the proposed construction in wetlands exists. Any unavoidable impacts to wetlands will be mitigated to achieve no net loss of wetland function. Based upon the above considerations, it is determined that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.

4.8 Conceptual Mitigation

As proposed the project will directly impact 3.21 acres of jurisdictional wetlands, and 0.89 acres of surface waters, of which 0.87 acres of surface waters will not require mitigation. Therefore, 3.21 acres of wetland impacts and 0.02 acres of surface water impacts result in a functional loss of 1.504 UMAM units for state and federal jurisdictional wetlands. Wetland impacts which will result from the construction of this project will be mitigated pursuant to Section 373.4137, F.S., to satisfy all mitigation requirements of Part IV of Chapter 373, F.S., and U.S.C. §1344. Compensatory mitigation for this project will be completed through the use of mitigation banks and any other mitigation options that satisfy state and federal requirements.

The study area is within the Estero Bay and West Collier regulatory basins. Freshwater forested credits are available from Corkscrew Regional Mitigation Bank and Little Pine Island Mitigation Bank to cover the anticipated 1.504 mitigation credits needed for the proposed wetland impacts.

Section 5 Essential Fish Habitat

The National Marine Fisheries Service (NMFS) is the regulatory agency responsible for the nation's living marine resources and their habitats, including essential fish habitat (EFH). This authority is designated by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended. The MSFCMA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. § 1802(10)].

In accordance with the MSFCMA, Section 7 of the ESA, and the Essential Fish Habitat chapter of the FDOT's PD&E Manual, the US 41 and Bonita Beach Road Study Area was evaluated for potential EFH. According to their ETDM Summary Report No. 6291, dated January 18, 2020, NMFS staff did not indicate that the project will impact EFH. It was noted that the Imperial River, which is located adjacent to the study area, drains to Little Hickory Bay and Fish Trap Bay. The mouth of the Imperial River, Little Hickory Bay, and Fish Trap Bay contain estuarine habitat used by federal managed species and their prey. No involvement with EFH resources is anticipated.

Section 6 Anticipated Permits

FDOT construction and maintenance activities are regulated by numerous environmental laws and regulations administered by state and federal agencies. These agencies have established environmental programs to conserve, protect, manage, and control the air, land, water and natural resources of the state or U.S. The following is a list of anticipated permits needed from the state and federal agencies for the proposed project.

6.1 CWA Section 404 Permit

Section 404 of the CWA established a program to regulate the discharge of dredged or fill material into waters of the United States, including wetlands. Responsibility for Section 404 is typically handled by the USACE. However, the State of Florida requested and was granted authority on December 22, 2020 (85 FR 83553), to operate the Section 404 Program for work in most non-tidal waters in the state. The State 404 Program is administered by the FDEP. All waters of the United States with potential to be impacted by the proposed project are not retained by the USACE and are therefore assumed by FDEP. Based on the amount of potential direct impacts and location of the project, an Individual State 404 is anticipated for the proposed work.

6.2 National Pollutant Discharge Elimination System Permit

As authorized by the CWA, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. The Environmental Protection Agency (EPA) delegated its authority to implement the NPDES program to the FDEP. This permit is required because the proposed project will disturb more than one acre of land, and the stormwater runoff will discharge to waters of the state. A Stormwater Pollution Prevention Plan (SWPPP) is required to be developed as part of the

NPDES and implemented during construction. The objectives of the SWPPP are to prevent erosion where construction activities occur, prevent pollutants from mixing with stormwater, and prevent pollutants from being discharged by trapping them on-site, before they can affect the receiving waters. The Contractor will be responsible for obtaining the NPDES permit. The applicant must submit a Notice of Intent with the FDEP at least two days prior to the commencement of construction.

6.3 Environmental Resource Permit

FDEP and Florida's five Water Management Districts implemented Chapter 62-330, F.A.C, Environmental Resource Permitting (ERP) to govern certain regulated activities, such as works in waters of the state, including wetlands, and construction of stormwater management systems. The proposed project is located within the jurisdiction of the SFWMD. The proposed project is expected to require an ERP for a stormwater management plan and impacts to wetlands and other surface waters.

6.4 Gopher Tortoise Relocation Permit

Gopher tortoises and their burrows are protected by Chapter 68A-27.003, F.A.C. A gopher tortoise relocation permit must be obtained from FWC before disturbing burrows and construction activities within 25 feet of a gopher tortoise burrow. The number of gopher tortoise burrows located within 25 feet of the project footprint will determine the type of gopher tortoise relocation permit that is needed. A 100% gopher tortoise survey will be completed during the design of the project to finalize the type of permit needed. Surveys, permitting, excavation, and relocation must be performed by an FWC Authorized Gopher Tortoise Agent.

Section 7 Conclusion

The proposed project avoids and minimizes impacts to wetlands, other surface waters, protected species, and their habitats to the greatest extent practicable. Based on existing information and both general and species-specific surveys, the Preferred Alternative will not jeopardize the continued existence of a protected species and/or result in the destruction or adverse modification of critical habitat (**Table 7-1**). However, additional coordination with wildlife and habitat conservation agencies will be required during the design and permitting phase and additional wildlife surveys may be required prior to or during construction.

No EFH is located within the project area. No involvement with EFH resources is anticipated.

Table 7-1: Effect Determinations for Listed Species

Scientific Name	Common Name	Status	Effect Determination
Birds			
Aphelocoma coerulescens	Florida scrub-jay	FT	NO EFFECT
Athene cunicularia floridana	Florida burrowing owl	ST	NAEA
Calidris canutus rufa	Rufa Red Knot	FT	NO EFFECT
Egretta caerulea	Little blue heron	ST	NAEA
Egretta rufescens	Reddish egret	ST	NAEA
Egretta tricolor	Tricolored heron	ST	NAEA
Grus canadensis	Florida sandhill crane	ST	NAEA
Haliaeetus leucocephalus	Bald eagle	BGEPA/MBTA	N/A
Mycteria americana	Wood stork	FT	MANLAA
Laterallus jamaicensis jamaicensis	Eastern black rail	FT	NO EFFECT
Platalea ajaja	Roseate spoonbill	ST	NAEA
Sternula antillarum	Least tern	ST	NEA
Insects			
Danaus plexippus	Monarch butterfly	C	N/A
Mammals			
Eumops floridanus	Florida bonneted bat	FE	NO EFFECT
Perimyotis subflavus	Tricolored bat	C	N/A
Puma concolor coryi	Florida panther	FE	NO EFFECT
Sciurus niger avicennia	Big Cypress fox squirrel	ST	NAEA
Trichechus manatus	West Indian manatee	FT	NO EFFECT
Ursus americanus floridanus	Florida black bear	M	N/A
Reptiles			
Crocodylus acutus	American crocodile	FT	NO EFFECT
Drymarchon couperi	Eastern indigo snake	FT	MANLAA
Gopherus polyphemus	Gopher tortoise	ST	NAEA
Pituophis melanoleucus mugitus	Florida pine snake	ST	NAEA
Plants			
Andropogon arctatus	Pinewoods bluestem	ST	NEA
Calopogon multiflorus	Many-flowered grass-pink	ST	NEA
Chamaesyce cumulicola	Sand-dune spurge	SE	NEA
Deeringothamnus pulchellus	Beautiful pawpaw	FE	NO EFFECT
Harrisia aboriginum	Aboriginal prickly-apple	FE	NO EFFECT
Lechea cernua	Nodding pinweed	ST	NEA
Lechea divaricata	Pine pinweed	SE	NEA
Linum carteri var. smallii	Small's flax	SE	NEA
Nemastylis floridana	Celestial lily	SE	NEA
Nolina atopocarpa	Florida beargrass	ST	NEA
Pteroglossaspis ecristata	Giant orchid	ST	NEA
Stylisma abdita	Scrub stylisma	SE	NEA

MANLAA = May Affect, Not Likely to Adversely Affect **NAEA** = No Adverse Effect Anticipated **NEA** = No Effect Anticipated
FE = Federally Endangered **FT** = Federally Threatened
SE = State Endangered **ST** =State Threatened **C** = Candidate **M** = Managed
BGEPA = Bald and Golden Eagle Protection Act **MBTA** = Migratory Bird Treaty Act

The proposed project will directly impact approximately 3.21 acres of wetlands and 0.89 acres of surface waters resulting in 1.504 functional loss units. During the design and permitting phase, final impacts will be calculated along with the appropriate mitigation to satisfy the requirements of 33 U.S.C. § 1344 and Part IV of Chapter 373, F.S.

7.1 Implementation Measures

To ensure the project will not adversely affect protected species or contribute to water quality degradation, the following measures will be implemented.

- Surveys for gopher tortoise burrows, as well as commensal species, will be conducted during the design phase and permits to relocate tortoises and commensals as appropriate will be obtained from the FWC.

- Surveys for the Florida burrowing owl will be conducted during the design phase. If it is determined individuals or nest areas are found and could be impacted by the project, FDOT will coordinate with FWC to determine appropriate avoidance and minimization measures to apply during construction.

- Per current FWC guidelines for the relocation of the Florida pine snake, any incidentally captured pine snake will be released on-site or allowed to escape unharmed if habitat will remain post-development.

- FDOT will provide compensatory mitigation for wetland impacts resulting from project design and construction, per 373.4137, FS and 33 USC § 1344.

- Best Management Practices will be incorporated during construction to minimize wetland impacts and provide sediment and erosion control.

7.2 Commitments

To ensure the project will not adversely affect protected species and their habitats, the following commitments will be implemented.

- The most recent version of the USFWS Standard Protection Measures for the Eastern Indigo Snake will be utilized during construction.

- The listing status of the monarch butterfly is elevated by USFWS to threatened or endangered and the Preferred Alternative is located within the consultation area, FDOT commits to re-initiating consultation with the USFWS during the design and permitting phase to determine the appropriate survey methodology and to address USFWS regulations regarding the protection of the monarch butterfly.

- If the listing of the tricolored bat is elevated by USFWS to threatened or endangered and the Preferred Alternative is located within the consultation area during the design and permitting phase of the proposed project, FDOT commits to re-initiating consultation with the USFWS to determine the appropriate survey methodology and to address USFWS regulations regarding the protection of the tricolored bat.

- If required, FDOT will provide mitigation for impacts to wood stork SFH within the Service Area of a Service-approved wetland mitigation bank or wood stork conservation bank.

7.3 Agency Coordination

7.3.1 Prior Coordination

In January of 2020, comments from the ETAT were provided in the ETDM Summary Report No. 6291. ETAT members submitted comments related to protected species and their habitats, noting the need for protected species surveys and coordination during the PD&E Study, and implementation of protection measures during construction. ETAT members also commented on potential impacts to wetlands and surface waters, noting the need to avoid and/or minimize impacts to wetlands, document cumulative impact criteria, meet water quality and quantity requirements, and implement proper best management practices during construction. Through the PD&E process, these issues have been addressed and documented in this report.

A pre-application meeting was held with SFWMD on July 26, 2023. The purpose of the meeting was to discuss the drainage criteria and approach for the US 41 and Bonita Beach Road PD&E Study with SFWMD staff. A summary of the meeting discussion is provided in **Appendix D.**

A species-specific survey was conducted for the Florida bonneted bat. Coordination with USFWS was conducted for survey requirements and methodology approval in October 2023. Agency coordination documentation is included in **Appendix D**.

7.3.2 Continuing Coordination

Agency coordination will continue during and throughout the design phase of the project when environmental permitting typically occurs. Environmental permits will be required from the FDEP and SFWMD, and possibly FWC for the proposed project. Permit applications will be reviewed by the regulatory agencies for potential impacts to environmental resources. During the permitting process, the regulatory agencies will likely request input from the commenting agencies to ensure consistency with regulatory criteria under their purview. Consultation with, or technical assistance by the USFWS shall be required for potential impacts to federally protected species, particularly the Florida bonneted bat.

Section 8 References

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Appendix A

Land Use and Habitat Descriptions

Urban and Built-up (FLUCFCS 100)

This land use type consists of areas of intensive use with much of the land occupied by man-made structures. Residential, commercial, recreational, industrial, and institutional developments are included in this category. Within the project corridor, identified Urban land uses include: Fixed Single-Family Units (FLUCFCS 121), Multiple Dwelling Units Low Rise (FLUCFCS 133), Commercial and Services (FLUCFCS 140), Shopping Centers (FLUCFCS 141), Commercial and Services Under Construction (FLUCFCS 140), Institutional (FLUCFCS 170), and Open Land (FLUCFCS 190). This FLUCFCS type is found throughout the project corridor. The majority of these areas lack natural habitat, and as a result provide little to no habitat for listed species.

Upland Forests (FLUCFCS 400)

Upland Forests consists of upland areas which support a tree canopy closure of ten percent or more. This category includes both xeric and mesic forest communities. Within the project corridor, identified Upland Forests include: Sand Pine (FLUCFCS 413) and Hardwood-Conifer Mixed (FLUCFCS 434).

This FLUCFCS type occurs sporadically throughout the corridor in the northeast, northwest, and southeast quadrants of the intersection between US 41 and Bonita Beach Road. The upland forests within the project corridor are limited and surrounded by development, however they provide valuable foraging habitat for listed species and common wildlife species.

Water (FLUCFCS 500)

Water includes all areas within the land mass of the United States that are predominantly or persistently water covered. Within the project corridor, identified water types include: Streams and Waterways (FLUCFCS 510) and Reservoirs (FLUCFCS 530). This land use type occurs throughout the project corridor and consists of roadside ditches, canals, and stormwater ponds. These areas provide valuable foraging and nesting habitat for listed species, including state listed wading birds.

Wetlands (FLUCFCS 600)

Wetlands consist of areas where the water is at, near or above the land surface for a significant portion of most years. This category includes forested and non-forested wetlands. Within the project corridor, identified Wetlands include Wetland Forested Mixed (FLUCFCS 630). Wetland Forested Mixed is the only wetland habitat that will be impacted by the proposed project. In this wetland system, neither hardwoods nor conifers achieve a 66 percent dominance. Vegetation within these areas include a canopy comprised of slash pine (*Pinus elliottii*), cabbage palm (*Sabal palmetto*), melaleuca (*Melaleuca quinquenervia*), laurel oak (*Quercus laurifolia*), Australian pine (Casuarina equstiffolia), and earleaf acacia (*Acacia auriculiformis*). Understory and groundcover species include Brazilian pepper (*Schinus terebinthifolia*), Carolina willow (*Salix caroliniana*), Peruvian primrose willow (*Ludwigia peruviana*), and swamp fern (*Blechnum serrulatum*). These wetlands provide valuable habitat for listed species.

Communication, Transportation, and Utilities (FLUCFCS 800)

Roads and Highways (FLUCFCS 814) occur within the study area. Roads and Highways include limited access of rights-of-way and service facilities. Roads and Highways within the project area include US 41 and Bonita Beach Road.

Appendix B

Photographs

Photo 1: Representative of Sand Pine habitat within proposed pond site

Photo 2: Representative of Hardwood-Conifer Mixed habitat within project limits

Photo 3: Representative of wetland vegetation within WL 1

Photo 4: Melaleuca observed within WL 1

Photo 5: Area under construction adjacent to project limits

Photo 6: Gopher tortoise burrow observed within right-of-way of US 41

Photo 7: Tricolored herons observed within proposed pond site

Photo 8: Bald eagle observed adjacent to study area

Appendix C

NRCS Soil Descriptions

LEE COUNTY SOIL DATA							
Soil No.	USDA Soil Name	Seasonal High Ground Water		HSG	Soil Classification		
		Depth (feet)	Duration (months)		Depth (inches)	Unified	AASHTO
10	Pompano fine sand, 0 to 2 percent slopes	0-1.0	Jun-Nov	B/D	0-80	SP, SP-SM	A-3, A-2-4
24	Kesson fine sand, tidal, 0 to 1 percent slopes	0-0.5	Jan-Dec	D	0-6	SP-SM	A-3, A-2-4
					6-23	SP, SP-SM	A-3
					23-38	SP, SP-SM	A-3
					38-80	SP, SP-SM	A-3
36	Immokalee sand-urban land complex, 0 to 2 percent slopes	0-1.0	Jun-Nov	B/D	0-6	SP, SP-SM	A-3
					6-37	SP-SM, SM	A-3
					37-70	SP, SP-SM	A-3, A-2-4
					70-80	SP, SP-SM	A-3
53	Myakka fine sand, frequently ponded, 0 to 1 percent slopes	+2-1.0	Jun-Feb	D	0-29	SP, SP-SM	A-3
					29-46	SM, SP-SM	A-3, A-2-4
					46-80	SP, SP-SM	A-3
59	Urban land, 0 to 2 percent sloes	--	--	--	--	--	--
99	Water	--	--	--	--	--	--
100	Waters of the Gulf of Mexico	--	--	--	--	--	--
106	Daytona sand-urban land complex, 0 to 5 percent slopes	3.5-5.0	Jun-Oct	A	0-5	SP-SM, SP	A-2-4, A-3
					5-36	SP-SM, SP	A-3
					36-47	SP-SM, SM	A-2-4, A-3
					47-80	SP-SM, SP	A-2-4, A-3
123	Myakka fine sand-urban land complex, 0 to 2 percent slopes	0.5-1.5	Jun-Nov	A/D	0-6	SP-SM, SM	A-2-4, A-3
					6-20	SP-SM, SM	A-2-4, A-3
					20-36	SP-SM, SM	A-2-4, A-3
					36-80	SP-SM, SM	A-2-4, A-3
124	Myakka fine sand, ponded-urban land complex, 0 to 1 percent slopes	0-1.0	Jun-Feb	A/D	0-5	SP-SM, SM	A-2-4, A-3
					5-25	SP-SM, SM	A-2-4, A-3
					25-39	SM	A-2-4
					39-80	SP-SM, SM	A-2-4, A-3

131	Pompano fine sand-urban land complex. 0 to 2 percent slopes	0.5-1.5	Jun-Nov	A/D	0-4	SP-SM, SM	A-2-4, A-3
					4-80	SP-SM, SM	A-2-4, A-3
134	Satellite fine sand-urban land complex, 0 to 2 percent slopes	1.5-3.5	Jun-Nov	A	0-3	SP-SM, SM	A-2-4, A-3
					3-65	SP-SM, SM	A-2-4, A-3
					65-80	SP-SM, SM	A-2-4, A-3
136	Valkaria fine sand-urban land complex, 0 to 2 percent slopes	0.5-1.5	Jun-Nov	A/D	0-5	SP-SM, SM	A-2-4, A-3
					5-16	SP-SM, SM	A-2-4, A-3
					16-51	SP-SM, SM	A-2-4, A-3
					51-80	SP-SM, SM	A-2-4, A-3
138	Wabasso sand, limestone substratum-urban land complex, 0 to 2 percent slopes	0.5-1.5	Jun-Nov	C/D	0-6	SP-SM, SM, SP	A-2-4, A-3
					6-25	SP-SM, SM, SP	A-2-4, A-3
					25-35	SP-SM, SM, SP	A-2-4, A-3
					35-45	CL, SC-SM, SC	A-2-4, A-6
					45-55	--	--
145	Gator muck, ponded-urban land complex, 0 to 1 percent slopes	0-1.0	Jan-Dec	C/D	0-18	PT	A-8
					18-36	CL, SC, SM	A-4, A-6, A-7-6
					36-55	SC-SM, SC, SM	A-2-4, A-4, A-6
					55-80	SP-SM, SM	A-2-4, A-3

Appendix D

Agency Coordination

Meeting Minutes

3000 Dovera Drive, Suite 200, Oviedo, FL 32765 I P: 407-971-8850 I F: 407-971-8955 I www.inwoodinc.com

DATE: July 27, 2023

TO: **Patrick Bateman, P.E. – FDOT Project Manager**

FROM: Zach Evans, P.E.

RE: 444321-1; US 41 at Bonita Beach Road Intersection PD&E Study – SFWMD Meeting

CC: Brent Setchell (FDOT), Nicole Monies (FDOT), Patrick Bateman (FDOT), Melissa Roberts (SFWMD), Angelica Hoffert (SFWMD), Richard Batewell (SFWMD), Jack Freeman (Kittelson), Renato Chuw (Inwood), Jason Houck (Inwood), Ben Shepherd (Inwood)

FDOT's monthly pre-application meeting with SFWMD was held via TEAMS on July 26, 2023, at 10:00 am. The purpose of the meeting was to discuss the drainage criteria and approach for this PD&E Study with SFWMD staff. A summary of the meeting discussion is below:

- The meeting started with an introduction of the project team followed by a brief overview of the project. The project is a FDOT District One PD&E study to evaluate intersection improvement alternatives for US 41 at Bonita Beach Road (BBR) in Lee County.
- Two intersection alternatives were evaluated (a signalized intersection and a partial Displaced Left Turn – DLT). The partial DLT alternative is the recommended preferred option. The partial DLT concept was shared in the meeting via a KMZ in Google Earth.
- US 41 consists of 6 travel lanes with curb and gutter and closed drainage systems. Bonita Beach Road consists of 4 travel lanes with curb and gutter and 6 travel lanes from the Center of Bonita Springs entrance to Arroyal Road, and closed drainage systems.
- US 41 north and south of the intersection is treated within an FDOT pond north of the intersection located near the Imperial River east of US 41. Treatment and attenuation is provided within the pond before discharging to roadway swales, flowing to the Imperial River.
- Bonita Beach Road east of the intersection discharges directly to the concrete box culvert underneath the roadway, which flows to the Arroyal Mall Pond. The Arroyal Mall Pond is controlled by a weir structure north of Crown Lake Blvd, which outfalls to a ditch system flowing to the Imperial River.
- West of the intersection Bonita Beach Road is collected and conveyed to the Windsor Road swale, which outfalls north to the Imperial River.
- The Imperial River is the ultimate outfall for the project and is an Outstanding Florida Water (OFW); therefore, a 50% additional water quality treatment will be required. The WBID is also impaired for nutrients (a TMDL exists for Dissolved Oxygen and Total Nitrogen). A nutrient loading analysis will be performed.
- The proposed roadway improvements will include new quadrant roadways NW and NE of the intersection. The NW quadrant roadway will initially be built by the City of Bonita Springs. This project is only widening the NW quadrant's US 41 approach leg to accommodate future traffic.

- The NW quadrant roadway will provide a connection between US 41 and Bonita Beach Road via Windsor Road. The City of Bonita Springs is designing portions of this new roadway connection and a triangular pond in a remnant parcel created by the new road. Our intent is to evaluate if this pond can serve the stormwater requirements for the PD&E study.

- A large canal exists east of the intersection draining regional areas south of US 41 and surrounding developments by the intersection. The two existing box culverts convey the canal under US 41 and BBR. This canal discharges to the existing Arroyal Mall pond.

- The intersection's NE quadrant will be improved with the DLT alternative. The improvements will encroach into the Arroyal Mall pond and the existing canal. During the study, the minimization of impacts on the pond will be evaluated with the potential use of walls. The current canal will be enclosed with a box culvert along the NE quadrant segment. Inwood mentioned that the encroachments will slightly reduce the pond capacity. SFWMD indicated pre vs post conditions for the Arroyal Mall pond must be met.

- Stormwater alternatives will be investigated including: (1) evaluating if the Arroyal Mall pond can be expanded to increase capacity, (2) route stormwater from Bonita Beach Road away from the Arroyal Mall pond to other proposed stormwater treatment alternatives. Ultimately, the goal will be to maintain existing peak stages in the Arroyal Mall pond.

- SFWMD stated clear documentation of the volumetric impacts to the pond and exhibits of the drainage areas routed away from the culvert will need to be provided to ensure no negative impacts to the stormwater facility will occur.

- The existing FDOT pond that treats US 41 contains a diversion berm. Alternatives were discussed to obtain more capacity in the pond to treat the improvements on US 41. One option is to eliminate the diversion berm and relocate the inflow and outflow of the ponds to keep the maximum flow path in the pond. The other option is expanding the pond to the parcel/lots adjacent west.

- Inwood stated the approach for water quality treatment will be to provide for the net new impervious. An additional 50% treatment volume will be provided to meet OFW Criteria. Nutrient Loading analysis will be provided due to the adopted TMDL for the basin.

- The improvements associated with the PD&E study will modify both the Arroyal Mall pond and the existing FDOT US 41 permits.

- FEMA floodplains associated with the Imperial River are located on the project. The Imperial River is tidal within the project limits and Inwood asked if floodplain compensation would be required. SFWMD stated that documentation would need to be provided that this area was tidal, but compensation would not be required for floodplain impacts.

- Inwood asked if pre vs post attenuation would be required for the project due to the tidal condition of the Imperial River. SFWMD stated that the existing permit for the US 41 pond meets the pre vs post attenuation criteria and should be followed for this study. Approved discharges to the Imperial River should also be met.

*****END OF MEETING*****

NOTE: THE ABOVE REFLECTS THE WRITER'S UNDERSTANDING OF THE CONTENTS OF THE MEETING. IF ANY MISINTERPRETATION OR INACCURACIES ARE INCLUDED, PLEASE CONTACT ZACH EVANS AT (407) 971-8850 OR ZEVANS@INWOODINC.COM AS SOON AS POSSIBLE FOR RESOLUTION AND REVISIONS IF NECESSARY.

Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

August 31, 2023

Mr. John Wrublik
U.S. Fish and Wildlife Service
777 37th Street, Suite D-101
Vero Beach, Florida 32960
Office (772) 226-831
john_wrublik@fws.gov

Subject: US 41 and Bonita Beach Road PD&E Study
Intersection of US 41 and Bonita Beach Road
Florida Bonneted Bat Acoustic/Roost Survey Methodology Memorandum
Financial Project Number: 444321-1
Lee County, Florida

Dear Mr. Wrublik,

The Florida Department of Transportation (FDOT), District 1, is conducting a Project Development and Environment Study to evaluate alternatives for the intersection of US 41 and Bonita Beach Road in Lee County, Florida. The project is located within Section 7, Township 47 South, Range 25 East and Section 4, Township 48 South, Range 25 East. A project location map (**Figure 1**) is included as part of this correspondence.

The project area is located within the U.S. Fish and Wildlife Service's (USFWS) Consultation Area (CA) for the Florida bonneted bat (FBB) (*Eumops floridanus*). Inwood Consulting Engineers, Inc. (Inwood) is preparing to conduct a full acoustic and roost survey to determine the presence/absence of the FBB in the project area. The current survey protocol for linear projects requires 5 detector nights per 0.6 mile (.97 Km). Based on the project length, Inwood is proposing 6 survey sites to accommodate the linear survey requirement, including proposed pond sites, for a total of 30 survey nights. The proposed survey sites are shown on **Figure 2.** These sites have been selected based on existing habitats within the project area that provide suitable roosting and/or foraging habitat for the FBB, with the primary focus given to roosting habitat that may be lost or modified as a result of the proposed project. Potential roosting habitat for the FBB includes forests or other areas with tall or mature trees or other areas with potential roost structures including utility poles and artificial roosts. Potential foraging habitat consists of relatively open

areas that provide sources of prey and drinking water including open fresh water, permanent or seasonal freshwater wetlands, wetland and upland forests, wetland and upland shrub, and agricultural areas.

Inwood will conduct the full acoustic/roost survey in accordance with current USFWS Florida Bonneted Bat Consultation Guidelines (October 2019) during September 2023. A pedestrian roost survey will be conducted to identify and inspect potential roosts for evidence of bats, including natural and artificial structures, within the project footprint. The acoustic survey will be conducted by a qualified biologist who has acoustic survey experience and has taken the required acoustic survey course. A full spectrum detector (Pettersson DX500) with an omnidirectional microphone mounted a minimum of 15 feet above the ground will be deployed at each survey site. The detectors will be preset to automatically record at least ½ hour before sunset and ½ hour after sunrise. The detectors will be deployed to record five survey nights per .6 mile. Inwood will monitor the weather utilizing the nearest NOAA National Weather Service Station to ensure the weather conditions meet the USFWS criteria. Additional survey nights may be necessary if any of the following weather conditions occur within the first five hours of the survey:

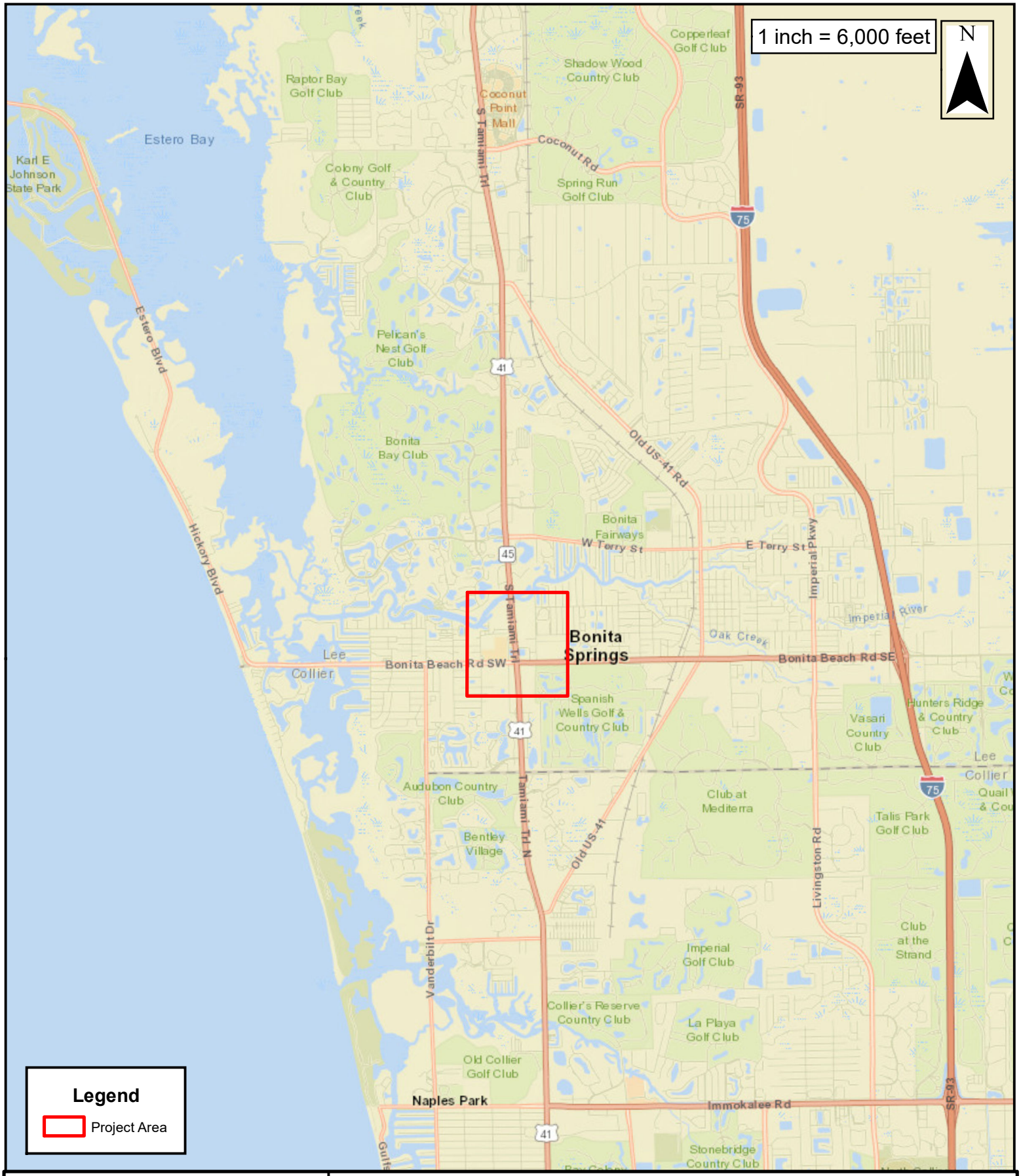
- Temperatures fall below 65°f;
- Precipitation (rain and/or fog) exceeding 30 minutes or continues intermittently; and
- Sustained winds greater than 9 mph for 30 minutes or more.

SonoBat software will be utilized to analyze the recordings. Additionally, the results will be reviewed, and all calls at and below 20kHz will be manually vetted by experienced personnel. All data will be submitted to USFWS utilizing NABat upon completion of the study.

We are requesting that you please review the proposed FBB acoustic survey methodology, above, and the attached figures, and provide concurrence that these are acceptable to USFWS. We appreciate your cooperation and look forward to working with you on this project. If you have any questions, concerns, or need additional information, please contact me at 863-519-26255 or Jeffrey.James@dot.state.fl.us

Sincerely,

Jeffrey W. James
Environmental Manager
FDOT, District 1



FDOT

District 1

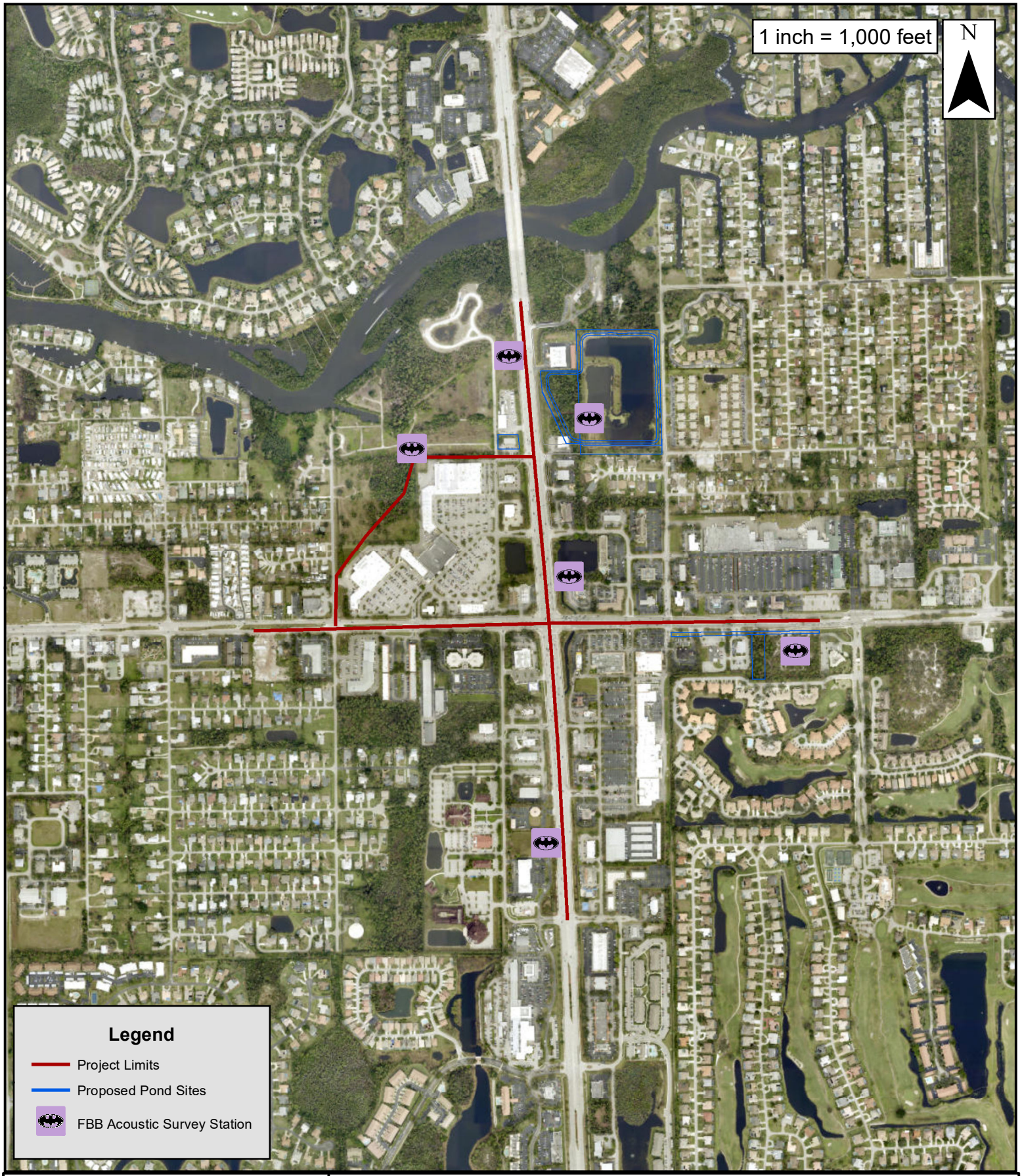
US 41 at CR 865

Lee County, Florida

Financial Project ID: 444321-1
Federal Project No: N/A

PROJECT LOCATION MAP

Figure 1



FDOT

District 1

US 41 at CR 865

Lee County, Florida

Financial Project ID: 444321-1
Federal Project No: N/A

FLORIDA BONNETED BAT ACOUSTIC SURVEY MAP

Figure 2

Jada Barhorst

From: Wrublik, John <john_wrublik@fws.gov>
Sent: Friday, September 1, 2023 6:43 AM
To: James, Jeffrey W
Cc: Barnett, Emily; Bateman, Patrick
Subject: Re: [EXTERNAL] REVIEW: Florida Bonneted Bat Acoustic/Roost Survey Methodology Memorandum / US 41 at Bonita Beach Road / 444321-1 / Lee County

Jeffrey,

I have reviewed the attached information, and the Florida bonneted bat survey methodology proposed for the referenced project is acceptable to the Service.

Sincerely.

John M. Wrublik
U.S. Fish and Wildlife Service
777 37th Street, Suite D-101
Vero Beach, Florida 32960
Office: (772) 226-8130
email: John_Wrublik@fws.gov

From: James, Jeffrey W <Jeffrey.James@dot.state.fl.us>
Sent: Thursday, August 31, 2023 5:05 PM
To: Wrublik, John <john_wrublik@fws.gov>
Cc: Barnett, Emily <Emily.Barnett@dot.state.fl.us>; Bateman, Patrick <Patrick.Bateman@dot.state.fl.us>
Subject: [EXTERNAL] REVIEW: Florida Bonneted Bat Acoustic/Roost Survey Methodology Memorandum / US 41 at Bonita Beach Road / 444321-1 / Lee County

John,

Please review and provide comments or concurrence of the attached survey plan.

Thanks

Jeffrey W. James

Environmental Manager
Florida Department of Transportation, District 1
801 North Broadway Avenue
P.O. Box 1249
Bartow, FL 33831-1249
(863) 519-2625
Jeffrey.James@dot.state.fl.us

Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

October 10, 2023

Mr. John Wrublik
U.S. Fish and Wildlife Service
777 37th Street, Suite D-101
Vero Beach, Florida 32960
Office (772) 226-831
john_wrublik@fws.gov

Subject: US 41 and Bonita Beach Road PD&E Study
Intersection of US 41 and Bonita Beach Road
Florida Bonneted Bat Revised Acoustic Survey Methodology
Financial Project Number: 444321-1
Lee County, Florida

Dear Mr. Wrublik,

The Florida Department of Transportation (FDOT), District 1, is conducting a Project Development and Environment Study to evaluate alternatives for the intersection of US 41 and Bonita Beach Road in Lee County, Florida. The project is located within Section 7, Township 47 South, Range 25 East and Section 4, Township 48 South, Range 25 East. A project location map (**Figure 1**) is included as part of this correspondence.

On August 31, 2023, FDOT sent a survey methodology memorandum for concurrence for the Florida bonneted bat survey that is currently being performed. The memorandum included six survey sites along US 41 and Bonita Beach Road. On October 3, 2023, Inwood Consulting Engineers, Inc. (Inwood) ecologists visited the project site to observe conditions in the field and deploy the acoustic detectors as proposed in the memorandum. A large development is now under construction in the northwest quadrant of the intersection between US 41 and Bonita Beach Road, south of the Bonita Springs River Park. Survey sites were proposed within and adjacent to the construction; however, this area no longer provides potential roosting or foraging habitat for Florida bonneted bats.

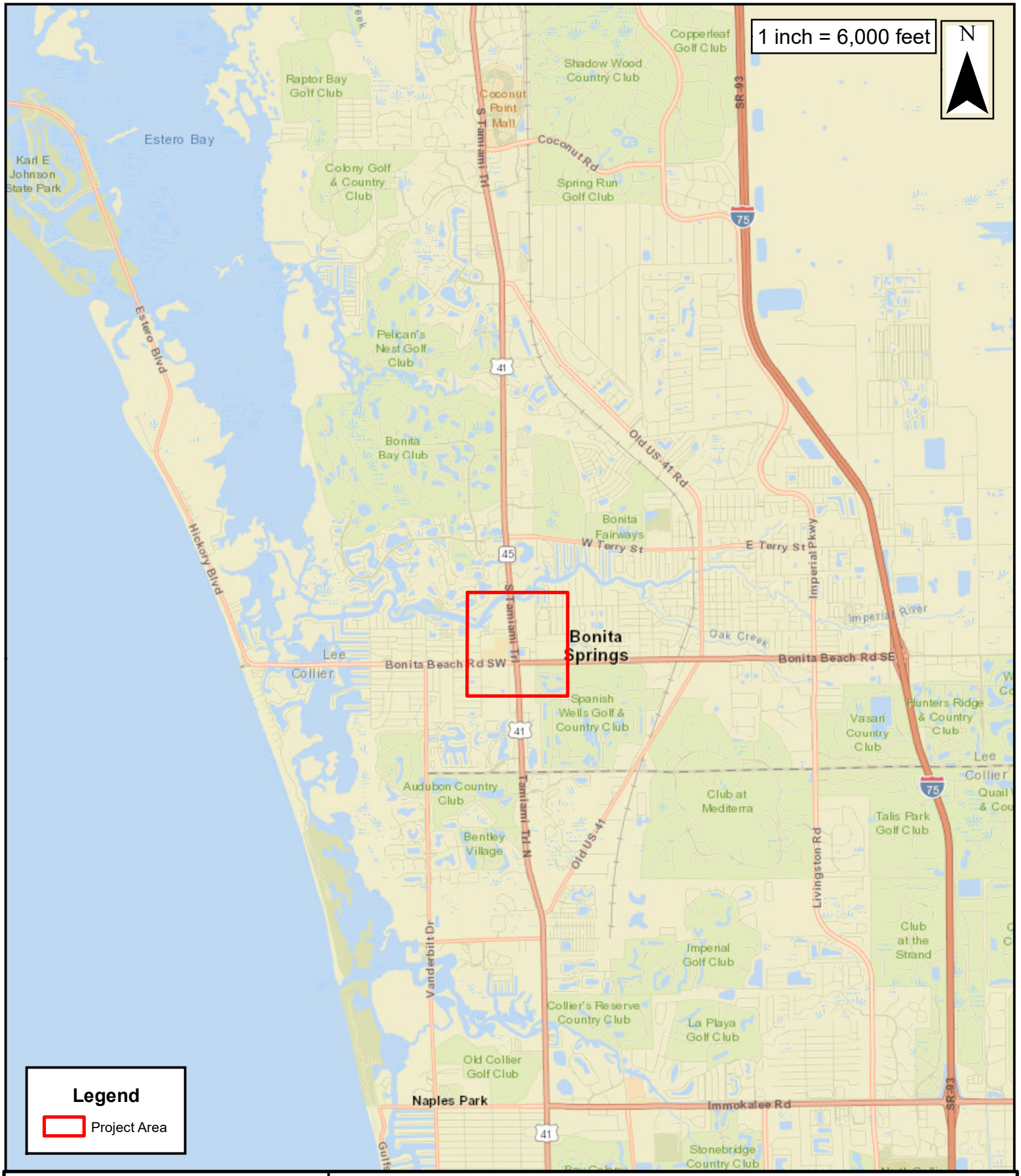
Inwood staff updated detector locations based on access and conditions observed in the field. These sites provide coverage of optimal area for bonneted bat foraging. Please see **Figure 2** for

the updated detector locations and the construction activities. The survey will continue to be conducted in accordance with current USFWS guidelines.

If you have any questions, concerns, or need additional information, please contact me at 863-519-2515 or ryan.ellis@dot.state.fl.us

Sincerely,

Ryan Ellis
Environmental Project Manager
FDOT, District 1



FDOT

District 1

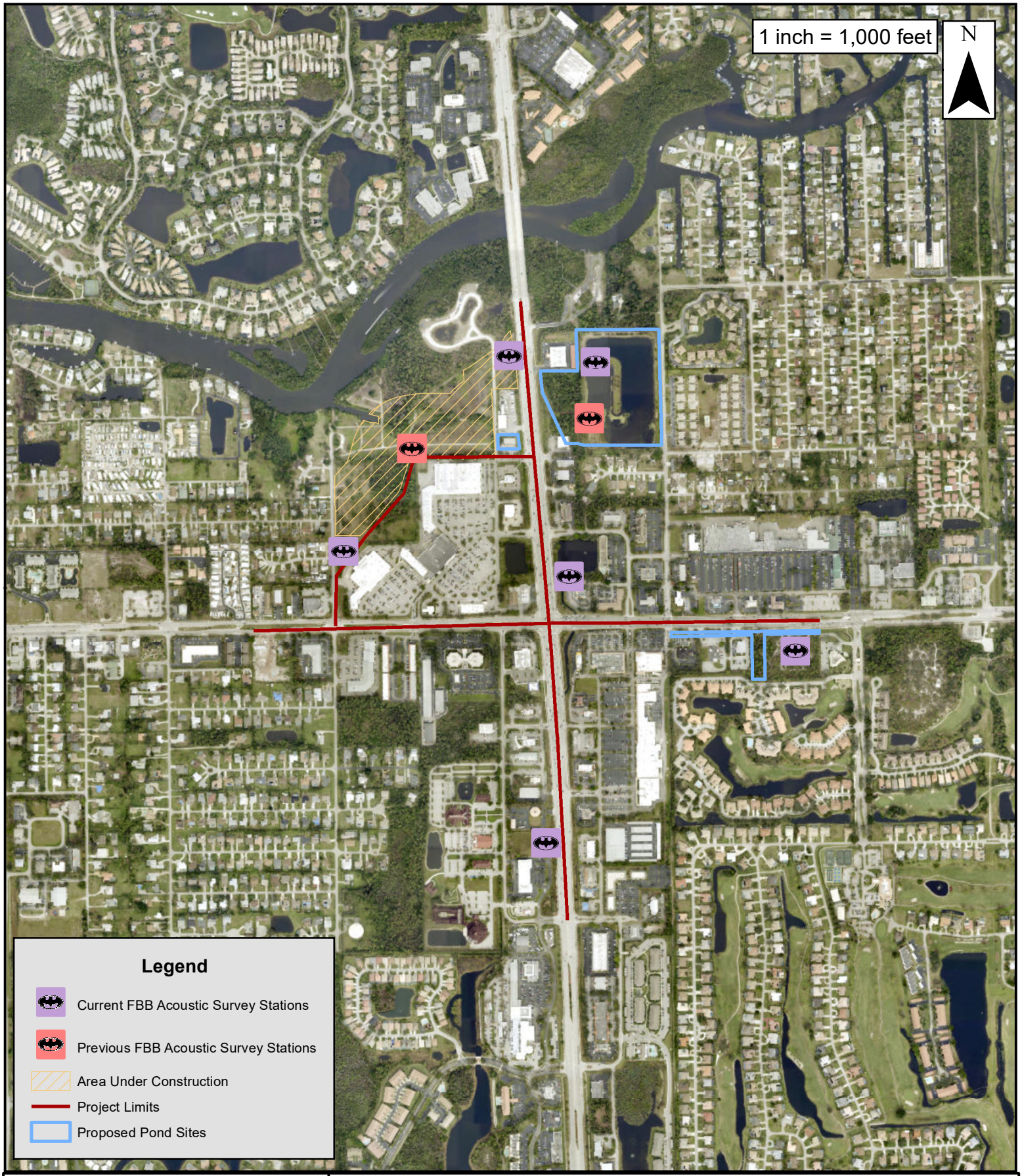
US 41 at CR 865

Lee County, Florida

Financial Project ID: 444321-1
Federal Project No: N/A

PROJECT LOCATION MAP

Figure 1



FDOT

District 1

US 41 at CR 865

Lee County, Florida

Financial Project ID: 444321-1
Federal Project No: N/A

FLORIDA BONNETED BAT ACOUSTIC SURVEY MAP

Figure 2

Photos: Area Under Construction

Jada Barhorst

From: Wrublik, John <john_wrublik@fws.gov>
Sent: Wednesday, October 11, 2023 11:00 AM
To: Ellis, Ryan
Cc: James, Jeffrey W; Bateman, Patrick; Jason Houck; Jada Barhorst
Subject: Re: [EXTERNAL] Intersection of US 41 and Bonita Beach Road, Florida Bonneted Bat Revised Acoustic Survey Methodology, FPID:444321-1

Ryan,

The changes in the detector locations described in your letter are acceptable to the Service.

John

John M. Wrublik
U.S. Fish and Wildlife Service
777 37th Street, Suite D-101
Vero Beach, Florida 32960
Office: (772) 226-8130
email: John_Wrublik@fws.gov

From: Ellis, Ryan <Ryan.Ellis@dot.state.fl.us>
Sent: Wednesday, October 11, 2023 10:20 AM
To: Wrublik, John <john_wrublik@fws.gov>
Cc: James, Jeffrey W <Jeffrey.James@dot.state.fl.us>; Bateman, Patrick <Patrick.Bateman@dot.state.fl.us>; Jason Houck <jhouck@inwoodinc.com>; Jada Barhorst <jbarhorst@inwoodinc.com>
Subject: [EXTERNAL] Intersection of US 41 and Bonita Beach Road, Florida Bonneted Bat Revised Acoustic Survey Methodology, FPID:444321-1

Morning Mr. Wrublik,

Please see revised methodology for the Florida bonneted bat survey for this project. Please let me know if you have any questions or concerns on the updated methodology.

Thanks

Ryan Ellis
Environmental Project Manager
Florida Department of Transportation, District One

801 North Broadway Avenue
Bartow, Florida 33830
(863) 519-2515
ryan.ellis@dot.state.fl.us

Appendix E

Standard Protection Measures for the Indigo Snake

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE

U.S. Fish and Wildlife Service

December 2023

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

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

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

STANDARD PROTECTION MEASURES

BEFORE AND DURING CONSTRUCTION ACTIVITIES:

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

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

- Prior to the onset of construction activities, the project proponent or designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational pamphlet including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office. Photos of eastern indigo snakes may be accessed on USFWS, Florida Fish and Wildlife Conservation Commission and/or Georgia Department of Natural Resources websites.
- Each day, prior to the commencement of maintenance or construction activities, the Contractor shall perform a thorough inspection for the species of all worksite equipment.
- If an eastern indigo snake (alive, dead or skin shed) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Office. The contact information for the USFWS is provided below and on the referenced posters and pamphlets.
- During initial site clearing activities, an onsite observer is recommended to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).
- Periodically during construction activities, the project area should be visited to observe the condition of the posters and Plan materials and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.
- For erosion control use biodegradable, 100% natural fiber, net-free rolled erosion control blankets to avoid wildlife entanglement.

POST CONSTRUCTION ACTIVITIES:

Whether or not eastern indigo snakes are observed during construction activities, a monitoring report should be submitted to the appropriate USFWS Field Office within 60 days of project completion (See USFWS Field Office Contact Information).

USFWS FIELD OFFICE CONTACT INFORMATION

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

POSTER & PAMPHLET INFORMATION

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

POSTER CONTENT (ENGLISH):

ATTENTION

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

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

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

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

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

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

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

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

• Stop land disturbing activities and immediately notify supervisor/applicant, and a USFWS Ecological Services Field Office, with the location information and condition of the snake.

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

• Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

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

in the throat area. They are not typically aggressive.

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

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

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

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

Florida Office: (352) 448-9151

Georgia Office: (706) 613-9493

POSTER CONTENT (SPANISH):

ATENCIÓN

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Oficina de Florida: (352) 448-9151

Oficina de Georgia: (706) 613-9493

Appendix F

Eastern Indigo Snake 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

August 1, 2017

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

Subject: Consultation Key for the Eastern Indigo Snake – Revised

Dear Mr. Kinard:

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

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

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

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

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

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

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

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

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

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

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

Scope of the Key

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

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

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

Habitat

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

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

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

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

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

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

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

Minimization Measures

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

Determinations

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

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

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

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

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

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

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

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

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

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

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

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

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

E. Any permit will be conditioned such that all gopher tortoise burrows, active or inactive, will be excavated prior to site manipulation in the vicinity of the burrow[1]. If an eastern indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Any permit will also be conditioned such that holes, cavities, and snake refugia other than gopher tortoise burrows will be inspected each morning before planned site manipulation of a particular area, and, if occupied by an eastern indigo snake, no work will commence until the snake has vacated the vicinity of proposed work.....**NLAA**[2]

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

End Key

---

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

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

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

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

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

Sincerely,

Roxanna Hinzman
Field Supervisor
South Florida Ecological Services

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

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Appendix G

Florida Bonneted Bat Survey Report

FLORIDA BONNETED BAT (EUMOPS FLORIDANUS) ACOUSTIC SURVEY REPORT

Florida Department of Transportation

District One

SR 45 (US 41) AT BONITA BEACH ROAD

Limits of Project: Along US 41 from Foley Road to South of Imperial River Bridge; Along Bonita Beach Road from Windsor Road to Spanish Wells Boulevard

Lee County, Florida

Financial Management Number: 444321-1-22-01

ETDM Number: 6291

Date: December 2023

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

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1.0 INTRODUCTION

Initiated in November 2019, this Project Development and Environment (PD&E) Study has been conducted to assess various intersection alternatives for US 41 at CR 865/Bonita Beach Road. CR 865 will be referred to as Bonita Beach Road throughout the remainder of this report.

The project is located within the United States Fish and Wildlife Service's (USFWS) Consultation Area (CA) for the Florida bonneted bat (*Eumops floridanus*). Potential roosting and foraging habitat was observed within the project corridor. As a result, Inwood Consulting Engineers, Inc. (Inwood) conducted an assessment to determine the potential effects of the proposed project on the Florida bonneted bat. The assessment included a full acoustic survey and roost survey of the project corridor in October 2023. The acoustic survey consisted of 8 survey sites for a total of 30 survey nights and was conducted in accordance with the current USFWS Florida Bonneted Bat Consultation Guidelines (October 2019) (Guidelines).

This report provides the methodology, results, and conclusions of the 2023 Florida bonneted bat survey and the anticipated effect determination.

2.0 PROJECT DESCRIPTION

The US 41 at Bonita Beach Road Project Development and Environment (PD&E) Study evaluated capacity, safety, and multi-modal improvements at the US 41 and Bonita Beach Road intersection, in the City of Bonita Springs, Florida. The study area limits extend along US 41 from Foley Road to just south of the Imperial River bridge, a distance of approximately 0.9 miles. Additionally, the study area extends along Bonita Beach Road from Windsor Road to Spanish Wells Boulevard, a distance of approximately 0.8 miles.

US 41 is a north-south principal arterial roadway running parallel to Interstate 75 (I-75) and facilitates movement of regional and local traffic (including truck traffic) along Florida's west coast. Bonita Beach Road is an east-west minor arterial roadway providing a connection to I-75 and is one of two east-west connections between the Lee County mainland and coastal communities and barrier island tourist destinations and beaches to the west. US 41 is a state roadway maintained by the Florida Department of Transportation (FDOT) District 1, while Bonita Beach Road is maintained by the Lee County. Both US 41 and Bonita Beach Road are designated as emergency evacuation routes.

US 41 within the project limits is a six-lane divided roadway with 5' on-street bicycle lanes and 5' sidewalks on both sides of the roadway. Bonita Beach Road is a four-lane divided roadway with 5' sidewalks on both sides but no on-street bicycle facilities.

The US 41 at Bonita Beach Road intersection of is currently a signalized intersection with two exclusive left turn lanes and an exclusive right turn lane in each approach. Aside from the main intersection, there is currently one other signalized intersection along US 41 at the Center of Bonita Springs (Tuffy Auto/Advanced Auto Parts). There are three additional signalized intersections along Bonita Beach Road at the Center of Bonita Springs, Arroyal Road, and Spanish Wells Boulevard.

The existing US 41 and Bonita Beach Road intersection has two high volume left turn movements, those being eastbound to northbound and southbound to eastbound. To partially address these

heavy movements, the City of Bonita Springs conducted the "Network Enhancement Alignment Study – Quadrant Plan" in May 2017. From this, the City will be designing and building a two-lane quadrant roadway connecting Bonita Beach Road at Windsor Road to US 41 at the Center of Bonita Springs. This Northwest Quadrant Roadway is currently in design by the City and anticipated to be built ahead of the US 41 and Bonita Beach Road intersection improvements.

The proposed improvements will modify the signalized configuration of the US 41 and Bonita Beach Road intersection to be a partial displaced left turn (PDLT), with the northbound and southbound left turn movements to crossover and be located outside of the opposing traffic flow. This configuration will allow the northbound and southbound left turning movements to operate in the same signal phase or simultaneously as the northbound and southbound through movements. To accommodate the PDTL configuration and facilitate the relocation of northbound and southbound turning vehicles, two new signalized "crossover" intersections will be added along US 41 approximately 675' south and 460' north of Bonita Beach Road. The southbound and eastbound left turn movements are proposed to have three lanes each, and the eastbound and westbound right turn movements are proposed to have two lanes each.

As noted above, a Northwest Quadrant Roadway is being constructed by the City of Bonita Springs. As part of the PD&E study's proposed improvements, the US 41 and the Center of Bonita Springs intersection is proposed to be changed from a standard signalized intersection to a "thru-cut" intersection. A thru-cut intersection restricts through movements from the minor street typically due to operational and/or geometric conditions. In this case, the west leg is being widened from two lanes to five lanes (four eastbound approach lanes and one westbound receiving lane) and the east leg is being widened from two lanes to four lanes (two westbound approach lanes and two eastbound receiving lanes). This creates skew issues for any east/west through movements and creates operational constraints that are alleviated by the thru-cut intersection configuration. Tying into the new east leg is a Northeast Quadrant Roadway proposed between US 41 and Arroyal Road, northeast of the US 41 and Bonita Beach Road intersection. This will be a new three-lane roadway with two lanes eastbound and one lane westbound.

Along US 41 in the northbound direction, a 6' sidewalk is proposed from Foley Road to Springs Plaza (Sta. 232+50) and a 12' shared-use path is proposed from Springs Plaza to just north of the Imperial River Boat Ramp (Sta. 271+00). In the southbound direction, a 12' shared-use path is proposed from just north of the Imperial River Boat Ramp (Sta. 271+00) to Bonita Funeral Home (Sta. 231+00) and a 6' sidewalk is proposed from Bonita Funeral Home to Foley Road. Along both sides of Bonita Beach Road, the sidewalks will be widened to 12' shared-use paths from the Center of Bonita Springs to Arroyal Road. Signalized marked crosswalks will be maintained on every leg of the PDLT, including the channelized right turn lanes. Signalized marked crosswalks will also be provided on every leg of each signalized intersection along US 41 and Bonita Beach Road within the study area.

The project location is shown in **Figure 1** and the study area is shown in **Figure 2**.

Figure 1: Project Location Map

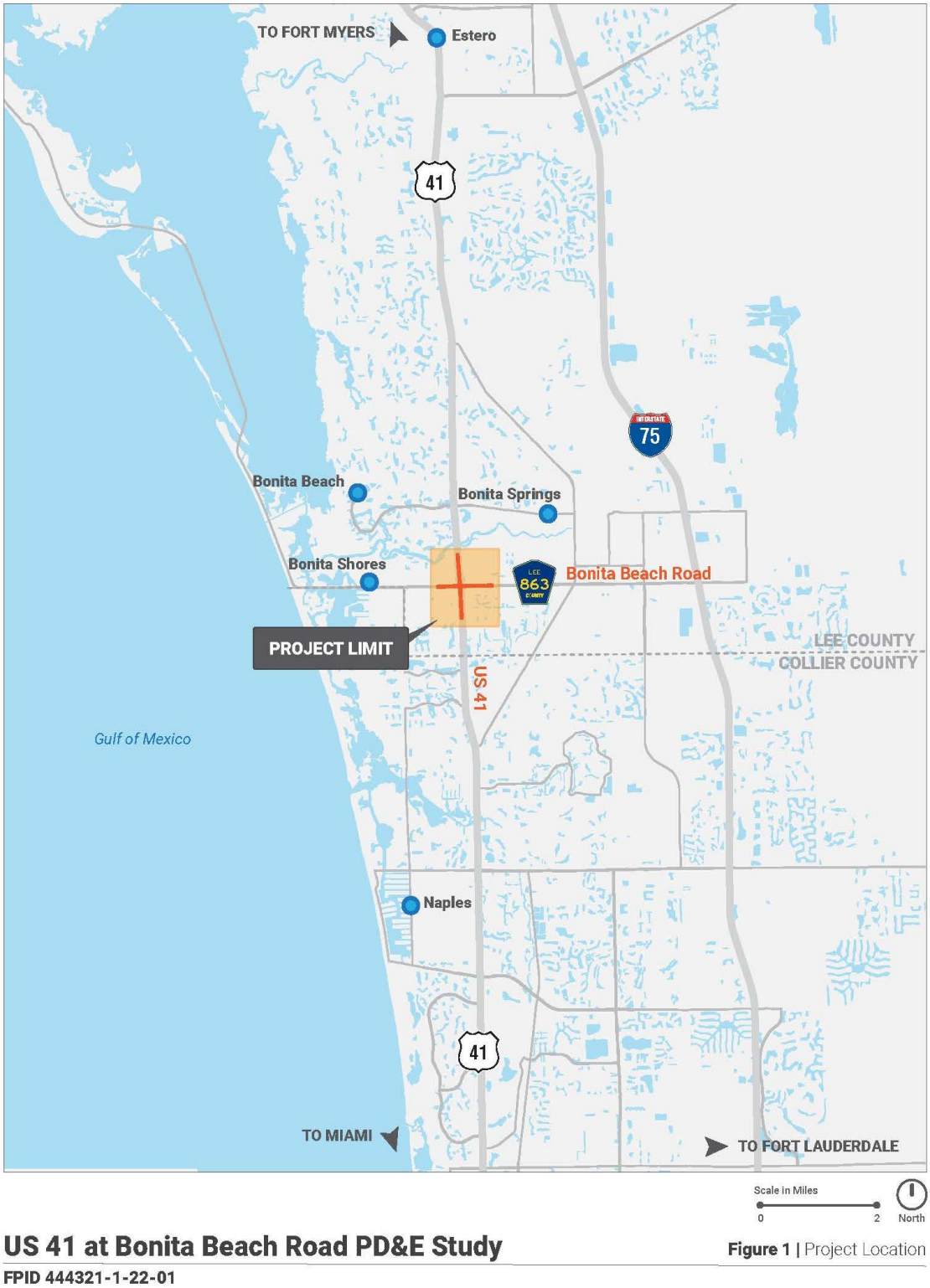
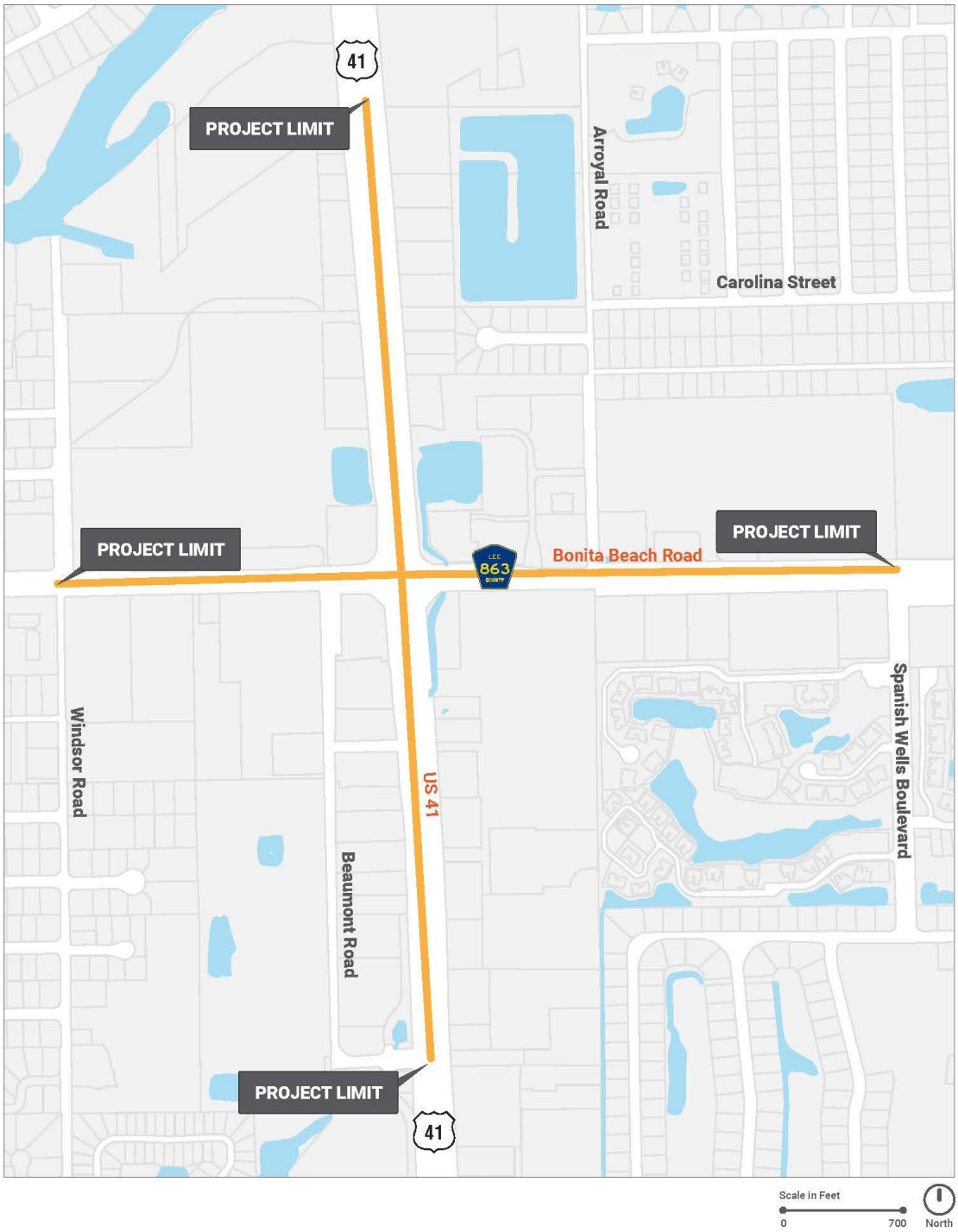


Figure 2: Study Area Map



3.0 STATUS, LIFE HISTORY, AND HABITAT

3.1 Federal Status

The Florida bonneted bat is a member of the Molossidae family and is the largest bat found in Florida. Previously known as the Florida mastiff bat, Wagner's mastiff bat, and mastiff bat (*Eumpos glaucinus floridanus*), the Florida bonneted bat was found to be a separate species in 2004 (Timm and Genoways 2004). The USFWS listed the Florida bonneted bat as endangered in October 2013 (USFWS 2013). The basis for this listing is due to habitat loss, degradation, and modification, as well as other manmade and natural factors, including a small population size with few colonies, restricted range, slow reproductivity, and low fecundity (USFWS 2013).

3.2 Life History

The Florida bonneted bat has short glossy fur consisting of bicolored hairs with a white base. The color is highly variable and ranges from black to brown, to brownish gray or cinnamon brown, with the ventral fur paler than the dorsal fur (Belwood 1992, Timm and Genoways 2004). It has large, broad ears that project over the eyes and are joined at the midline of the head. This identifying characteristic, along with its larger size, distinguishes it from the Brazilian free-tailed bat (*Tadarida brasiliensis*).

The Florida bonneted bat is a subtropical species that does not hibernate and is active year-round. It is thought to have a fairly extensive breeding season during summer months, with data suggesting the species might be polyestrous, with a second birthing season in January and February (Timm and Genoways 2004). Females give birth to one offspring per maternity season (USFWS 2013).

This species relies on speed and agility while foraging in open spaces to detect prey roughly 3 to 5 meters (10 to 16 ft) away (Belwood 1992). Bonneted bats are high-flyers, rarely flying below 10 meters (33f ft) (Belwood, 1992), and feed on flying insects, including beetles (Coleoptera), flies (Diptera), true bugs (Hemiptera), and moths (Lepidoptera) (Belwood, 1981).

3.3 Habitat

Habitat for the Florida bonneted bat consists of foraging areas and roosting sites, including artificial structures. Roosting and foraging vary with species occurring in forested, suburban, and urban areas (Timm and Arroyo-Cabrales, 2008).

The Guidelines define foraging habitat as relatively open areas that provide sources of prey and drinking water, including open fresh water, permanent or seasonal freshwater wetlands, wetland and upland forests, wetland and upland shrub, and agricultural areas. In urban areas, suitable foraging can be found at golf courses, parking lots, and parks.

Potential roosting habitats defined by the Guidelines include forests or other areas with tall or mature trees or other areas with potential roost structures, including utility poles and artificial roosts. This includes habitat in which suitable structural features for breeding and sheltering are present. Roosting habitat contains one or more of the following structures: tree snags and trees with cavities, hollows, deformities, decay, crevices, or loose bark.

4.0 METHODOLOGY

4.1 Preliminary Analysis

Prior to conducting the acoustic and roosting surveys, a preliminary analysis of publicly available documentation and geographic information systems (GIS) data were reviewed to determine the potential occurrence of the Florida bonneted bat within the project corridor.

The Guidelines currently require a minimum of five detector nights per 0.6 miles (0.97 km) for linear projects. Based on the approximate 2.1-mile proposed project length, which includes the modifications of the Quadrant Roadway, a minimum of 20 detector nights were required. Six acoustic monitoring sites were selected, providing 30 detector nights to accommodate the survey requirements sufficiently. The survey sites were chosen based on project length, proposed pond site locations, and existing habitats along the project corridor. These sites were selected to survey habitats most suitable for foraging and roosting while being placed in areas limited in clutter to maximize the effectiveness of the equipment. Based on the preliminary analysis, Inwood developed a Florida Bonneted Bat Survey Methodology for the US 41 and Bonita Beach Road PD&E Study that was submitted to the USFWS on August 31, 2023 (Appendix A) and subsequently approved on September 1, 2023. Due to access issues and existing development, the proposed monitoring locations were updated and provided in the Florida Bonneted Bat Revised Acoustic Survey Methodology submitted to the USFWS on October 11, 2023, and subsequently approved on October 11, 2023.

The acoustic survey, roost survey, and call data analysis were conducted by a qualified biologist with the required acoustic survey course training and experience.

4.2 Acoustic Survey

The acoustic survey was conducted from October 3 through October 10, 2023. Two deployments were utilized to accommodate equipment utilization. Six detectors were deployed at six monitoring locations. Two additional monitoring locations were added to ensure sufficient coverage due to an equipment issue. Photographs of detector deployment and representative habitat are included in **Appendix B**. Detector Deployment Data Forms are provided in **Appendix C**. **Table 1** provides the details of the detector deployment. **Figure 3** provides the location of each acoustic monitoring site.

Table 1: Detector Deployment Summary

SITE	DETECTOR NUMBER	LATITUDE	LONGITUDE
FBB1	11621	26.330170 N	-81.800292 W
FBB2	11534	26.331550 N	-81.805242 W
FBB3	11535	26.336611 N	-81.804782 W
FBB4	11622	26.337088 N	-81.806959 W
FBB5	11536	26.332315 N	-81.810862 W
FBB6	11537	26.326120 N	-81.806358 W
FBB7	11535	26.333724 N	-81.809306 W
FBB8	11534	26.334648 N	-81.806630 W

Figure 3: Florida Bonneted Bat Acoustic Survey Map

Each site consisted of one full spectrum detector (Pettersson DX500) with an omnidirectional microphone and directional cone. The microphones were mounted approximately 20 feet above the ground on metal poles to elevate the microphone above the shrub level. The poles were placed in a four-foot-tall PVC pipe holder that was hammered into the ground to provide stability. The detectors were preset to automatically record at least ½ hour before sunset and ½ hour after sunrise. Each detector and microphone were calibrated in accordance with the manufacturer and USFWS guidelines.

The weather was monitored utilizing the nearest National Oceanic Atmospheric Administration (NOAA) National Weather Service Station to ensure the weather conditions complied with the USFWS criteria. The nearest NOAA weather station for the project is located at Page Field Airport (Station KFMY) and is less than 900ft from SR 739. Additionally, biologists documented weather conditions during equipment checks. Supporting weather documentation is included in **Appendix D**.

Acoustic sampling efforts were repeated for nights when the weather conditions did not meet USFWS survey criteria and included any of the following conditions within the first five hours of the survey:

- Temperatures fall below 65°F;
- Precipitation (rain and/or fog) exceeding 30 minutes or continues intermittently; and
- Sustained winds greater than 9 mph for 30 minutes or more.

4.3 Acoustic Data Analysis

Full spectrum data were recorded on 32 gigabyte (GB) SanDisk memory cards. The data were downloaded and analyzed utilizing SonoBat software, version 30.0. All calls were analyzed to determine species' presence and subsequent identification, including the Florida bonneted bat. The results were reviewed, and all bat calls were vetted to determine the potential of being a Florida bonneted bat.

4.4 Roost Survey

During detector deployments and equipment checks, biologists surveyed the area for potential roosts. A 100% roost survey was conducted on October 4, 2023, by two biologists in accordance with the roost survey protocol outlined in the Guidelines. Pedestrian transects were spaced 25 feet or less to view potential roosts from multiple angles of the preferred alternative and proposed pond sites. All trees and artificial structures with cavities and/or crevices were inspected with a wireless Go-Pro camera.

5.0 RESULTS

5.1 Acoustic Survey

Eight acoustic monitoring sites collected data for a total of 30 detector nights between October 3 and October 10, 2023. A total of 22059 files were collected. SonoBat analysis resulted in a total of 18,868 potential bat call sequences. Manual vetting of the potential bat call sequences resulted in a total of 7,158 bat call sequences. Bat species identified as a result of the data analysis and manual vetting include:

- Big brown bat (*Eptesicus fuscus*)

- Brazilian free-tailed bat (*Tadarida brasiliensis*)
- Eastern red bat (*Lasiurus borealis*)/Seminole bat (*Lasiurus seminolus*)
- Evening bat (*Nycticeius humeralis*)
- Northern yellow bat (*Lasiurus intermedius*)

No Florida bonneted bat calls were identified as a result of the acoustic survey. SonoBat analysis identified three (3) calls as Florida bonneted bat calls. Manual vetting resulted in none of the calls being identified as Florida bonneted bat calls. The three (3) calls identified by SonoBat were found to contain multiple bats, with social directives, approach phase calls, and feeding buzz calls, which are not suitable for individual species identification. However, these calls are indicative of Brazilian free-tailed bats and it was determined that they are not Florida bonneted bats. The manual vetting result was listed as low frequency (LOF) due to multiple bats being present in the call file. The data corresponding to these three (3) calls are provided in **Table 2**.

Table 2: SonoBat Call Data Summary of Potential Florida Bonneted Bat Calls

Date (Parent Night)	Timestamp	WAV File ID	Station	Detector	Manually Vetted Result
05 October 2023	2023-10-06T04:55:20	M000735.WAV	FBB 1	11621	LOF
07 October 2022	2023-10-08T03:18:37	M001245.WAV	FBB 1	11621	LOF
07 October 2022	2023-10-08T04:35:46	M001275.WAV	FBB 1	11621	LOF

Nightly weather conditions were recorded for each deployment. Recorded nightly weather data is included in **Appendix D**.

5.2 Roost Survey

The 100% roost survey conducted on October 04, 2023, identified five (5) potential roosts consisting of natural structures. The location of each structure is provided in **Figure 4**. Each structure was inspected for evidence of roosting, such as staining, guano, and chirping. **Table 3** provides a summary of the observed structures. Roost Survey Data Forms are located in **Appendix E**.

Biologists were unable to access Potential Roost Trees (PRT) PRT 4 and PRT5 due to fencing and surrounding water but were able to get a clear view of all cavities using binoculars. No evidence of roosting was observed. All other cavities were easily inspected with the Go-Pro camera. No evidence of roosting was observed during the visual inspection of the cavities. Photographic documentation of the potential roost trees and cavities is provided in **Appendix B**. Based on the results of the roost survey, no evidence of roosting by Florida bonneted bats or other bats was observed.

Figure 4: Florida Bonneted Bat Roost Survey Map

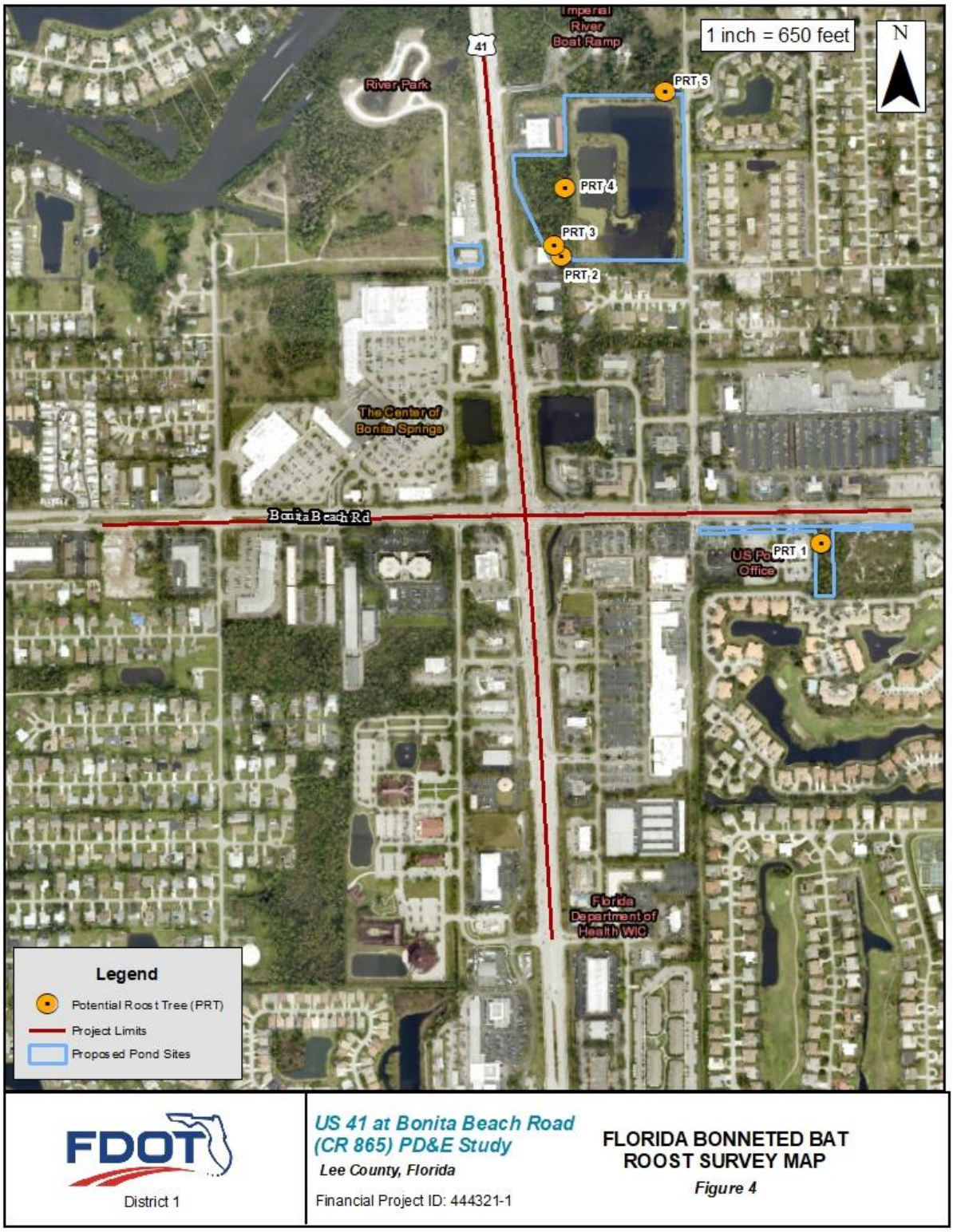


Table 3: Potential Roost Survey Data

Location	Structure Type	Health	Approximate DBH*	Approximate Height of Cavity	Latitude	Longitude	Staining Observed	Guano Observed	Auditory Chirping
PRT1	Live Oak	Dying	8.2 in	11′ and 23′	26.330194 N	-81.80863 W	No	No	No
PRT2	Laurel Oak	Dead	10.5 in	10′	26.334588 N	-81.305253 W	No	No	No
PRT3	Laural Oak	Dead	11.8 in	10′	263334764 N	-81.805375 W	No	No	No
PRT4	Slash Pine Snag	Dead	<10	30′-50′	26.335631 N	-81.802194 W	No	No	No
PRT5	Melaleuca	Healthy	<10	15′	26.337160 N	-81.803572 W	No	No	No
*DBH – Diameter at Breast Height									

6.0 CONCLUSION

Based on the Guidelines, it was determined that suitable Florida bonneted bat roosting and foraging habitat occurs within the US 41 at Bonita Beach Road project area. The majority of this habitat, particularly potential roosting habitat, is adjacent to the project footprint. The project area is highly developed, with landscaped vegetation within the project footprint, with the exception of the pond site locations. Particular attention was given to these areas when setting up the acoustic survey. As a result of the roost and acoustic surveys, no evidence of roosting or foraging was observed.

No Florida bonneted bat calls were detected as a result of the acoustic survey. A "**No Effect**" determination was made utilizing the Florida Bonneted Bat Consultation Key (USFWS 2019) (**Appendix E**). This effect determination was made using the following sequence from the key: **1a-2a-3b-6b**.

Based on the results of the roost and acoustic surveys, no evidence of roosting or foraging by the Florida bonneted bat within the project corridor was detected. Due to the absence of Florida bonneted bat activity, this project is expected to have "**No Effect**" on the Florida bonneted bat.

7.0 REFERENCES

Belwood, J.J. 1981. Wagner's mastiff bat, *Eumops glaucinus floridanus* (Molossidae) in southwestern Florida. Journal of Mammalogy 62:411-413.

Belwood, J.J. 1992. Florida mastiff bat *Eumops glaucinus* floridanus. Pages 216-233 in S.R. Humphrey (ed), Rare and endangered biota of Florida. Vol. I. Mammals. University Press of Florida. Gainsville, Florida.

Timm, R. and J.Arroyo-Cabrales. 2008. Eumops floridanus. In:IUCN 2011, IUCN Red List of Threatened Species. Version 2011.2 http://iucnredlist.org/.

Timm, R. M. and H. H. Genoways. 2004. The Florida bonnet bat, *Eumops floridanus* (Chiroptera: Molossidae): distribution, morphometrics, systematics, and ecology. Journal of Mammology 85:852-865.

USFWS. 2013. Endangered and threatened wildlife and plants; endangered species status for the Florida bonneted bat; Final Rule. Federal Register 78:61004.

USFWS, South Florida Ecological Services Office. 2019. Florida Bonneted Bat Consultation Guidelines.

APPENDIX A

AGENCY COORDINATION: APPROVED FLORIDA BONNETED BAT SURVEY METHODOLOGY

Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

August 31, 2023

Mr. John Wrublik
U.S. Fish and Wildlife Service
777 37th Street, Suite D-101
Vero Beach, Florida 32960
Office (772) 226-831
john_wrublik@fws.gov

Subject: US 41 and Bonita Beach Road PD&E Study
Intersection of US 41 and Bonita Beach Road
Florida Bonneted Bat Acoustic/Roost Survey Methodology Memorandum
Financial Project Number: 444321-1
Lee County, Florida

Dear Mr. Wrublik,

The Florida Department of Transportation (FDOT), District 1, is conducting a Project Development and Environment Study to evaluate alternatives for the intersection of US 41 and Bonita Beach Road in Lee County, Florida. The project is located within Section 7, Township 47 South, Range 25 East and Section 4, Township 48 South, Range 25 East. A project location map (**Figure 1**) is included as part of this correspondence.

The project area is located within the U.S. Fish and Wildlife Service's (USFWS) Consultation Area (CA) for the Florida bonneted bat (FBB) (*Eumops floridanus*). Inwood Consulting Engineers, Inc. (Inwood) is preparing to conduct a full acoustic and roost survey to determine the presence/absence of the FBB in the project area. The current survey protocol for linear projects requires 5 detector nights per 0.6 mile (.97 Km). Based on the project length, Inwood is proposing 6 survey sites to accommodate the linear survey requirement, including proposed pond sites, for a total of 30 survey nights. The proposed survey sites are shown on **Figure 2.** These sites have been selected based on existing habitats within the project area that provide suitable roosting and/or foraging habitat for the FBB, with the primary focus given to roosting habitat that may be lost or modified as a result of the proposed project. Potential roosting habitat for the FBB includes forests or other areas with tall or mature trees or other areas with potential roost structures including utility poles and artificial roosts. Potential foraging habitat consists of relatively open

areas that provide sources of prey and drinking water including open fresh water, permanent or seasonal freshwater wetlands, wetland and upland forests, wetland and upland shrub, and agricultural areas.

Inwood will conduct the full acoustic/roost survey in accordance with current USFWS Florida Bonneted Bat Consultation Guidelines (October 2019) during September 2023. A pedestrian roost survey will be conducted to identify and inspect potential roosts for evidence of bats, including natural and artificial structures, within the project footprint. The acoustic survey will be conducted by a qualified biologist who has acoustic survey experience and has taken the required acoustic survey course. A full spectrum detector (Pettersson DX500) with an omnidirectional microphone mounted a minimum of 15 feet above the ground will be deployed at each survey site. The detectors will be preset to automatically record at least ½ hour before sunset and ½ hour after sunrise. The detectors will be deployed to record five survey nights per .6 mile. Inwood will monitor the weather utilizing the nearest NOAA National Weather Service Station to ensure the weather conditions meet the USFWS criteria. Additional survey nights may be necessary if any of the following weather conditions occur within the first five hours of the survey:

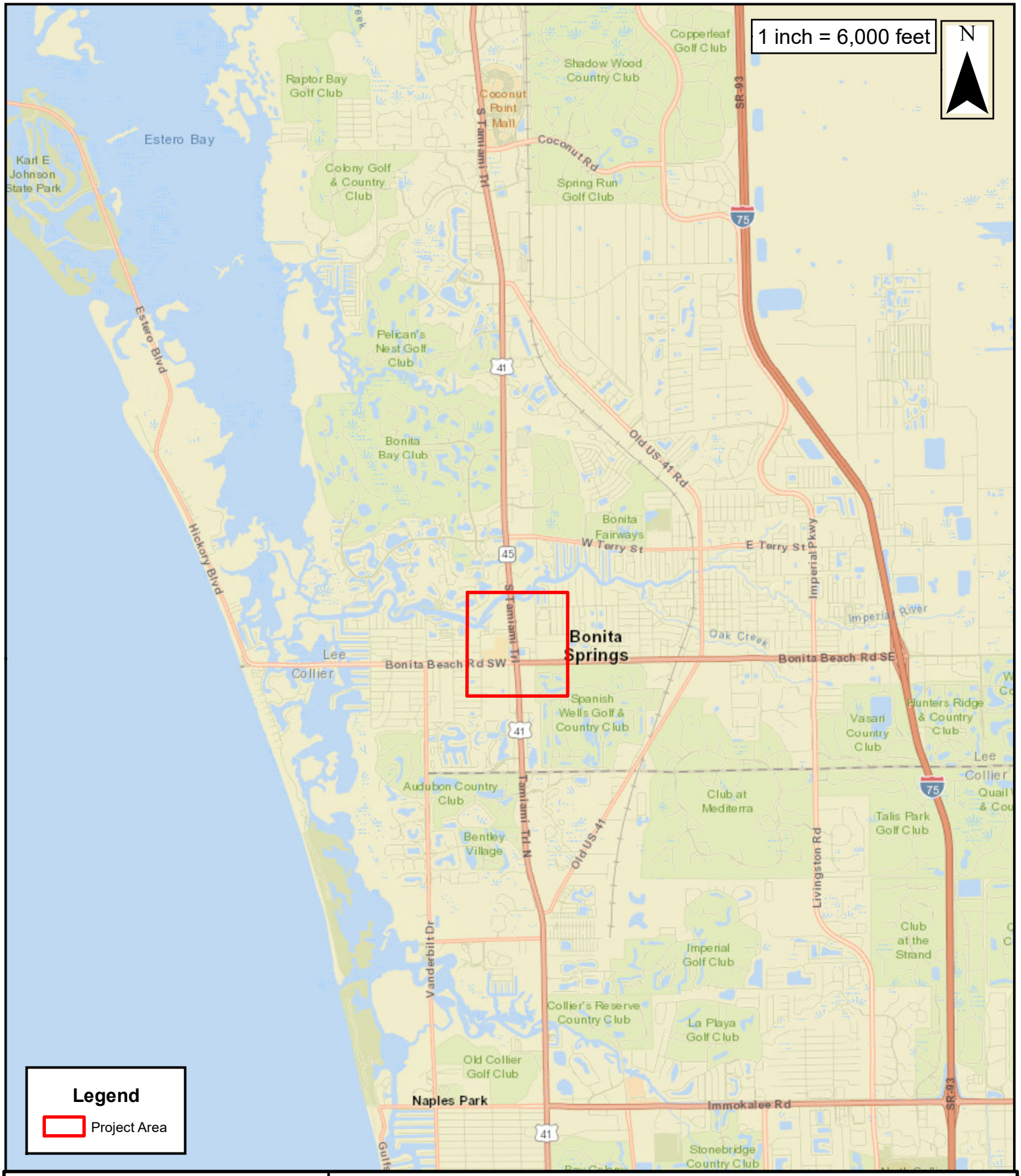
- Temperatures fall below 65°f;
- Precipitation (rain and/or fog) exceeding 30 minutes or continues intermittently; and
- Sustained winds greater than 9 mph for 30 minutes or more.

SonoBat software will be utilized to analyze the recordings. Additionally, the results will be reviewed, and all calls at and below 20kHz will be manually vetted by experienced personnel. All data will be submitted to USFWS utilizing NABat upon completion of the study.

We are requesting that you please review the proposed FBB acoustic survey methodology, above, and the attached figures, and provide concurrence that these are acceptable to USFWS. We appreciate your cooperation and look forward to working with you on this project. If you have any questions, concerns, or need additional information, please contact me at 863-519-26255 or Jeffrey.James@dot.state.fl.us

Sincerely,

Jeffrey W. James
Environmental Manager
FDOT, District 1



FDOT

District 1

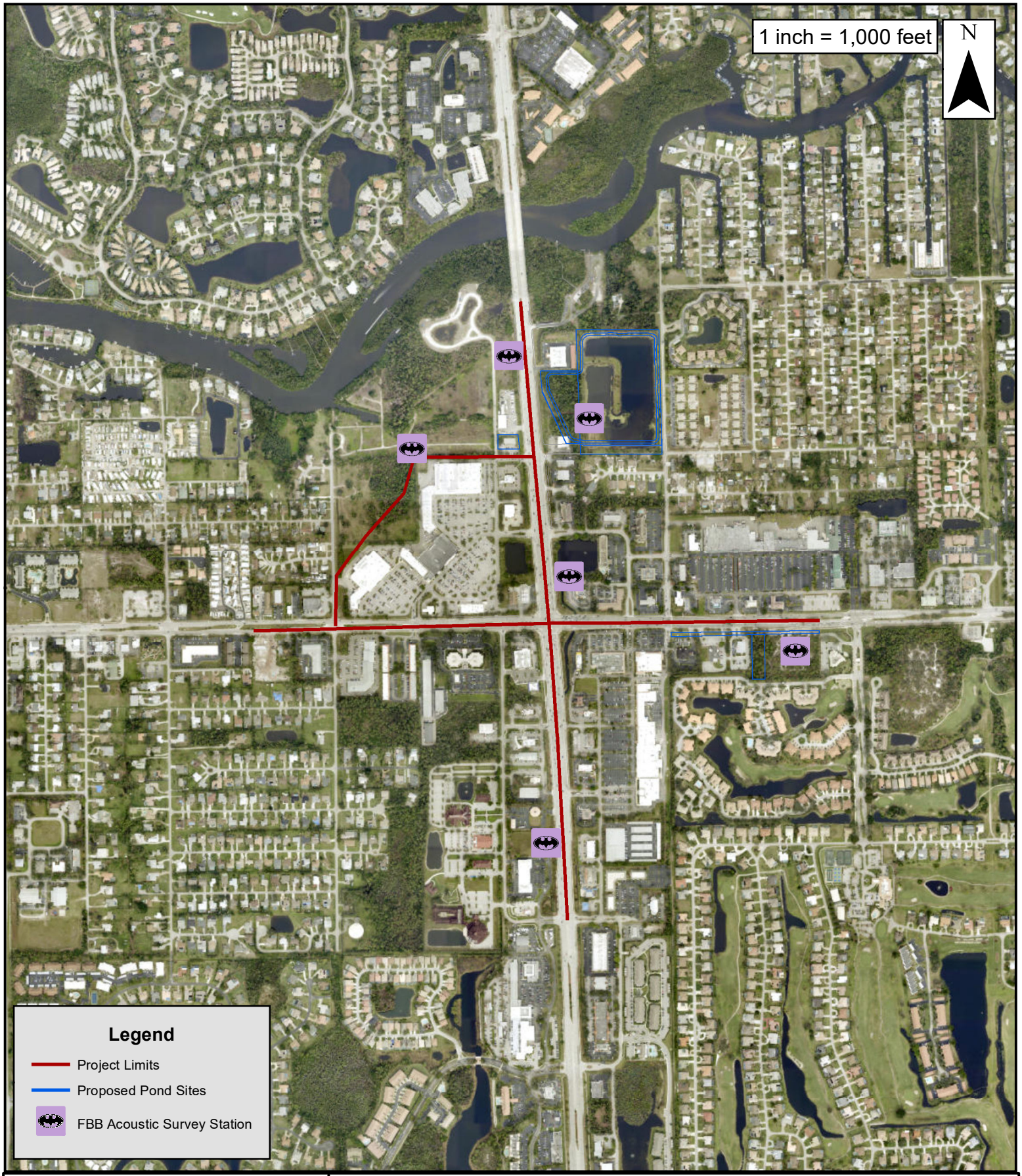
US 41 at CR 865

Lee County, Florida

Financial Project ID: 444321-1
Federal Project No: N/A

PROJECT LOCATION MAP

Figure 1



FDOT

District 1

US 41 at CR 865

Lee County, Florida

Financial Project ID: 444321-1
Federal Project No: N/A

FLORIDA BONNETED BAT ACOUSTIC SURVEY MAP

Figure 2

Jada Barhorst

From: Wrublik, John <john_wrublik@fws.gov>
Sent: Friday, September 1, 2023 6:43 AM
To: James, Jeffrey W
Cc: Barnett, Emily; Bateman, Patrick
Subject: Re: [EXTERNAL] REVIEW: Florida Bonneted Bat Acoustic/Roost Survey Methodology Memorandum / US 41 at Bonita Beach Road / 444321-1 / Lee County

Jeffrey,

I have reviewed the attached information, and the Florida bonneted bat survey methodology proposed for the referenced project is acceptable to the Service.

Sincerely.

John M. Wrublik
U.S. Fish and Wildlife Service
777 37th Street, Suite D-101
Vero Beach, Florida 32960
Office: (772) 226-8130
email: John_Wrublik@fws.gov

From: James, Jeffrey W <Jeffrey.James@dot.state.fl.us>
Sent: Thursday, August 31, 2023 5:05 PM
To: Wrublik, John <john_wrublik@fws.gov>
Cc: Barnett, Emily <Emily.Barnett@dot.state.fl.us>; Bateman, Patrick <Patrick.Bateman@dot.state.fl.us>
Subject: [EXTERNAL] REVIEW: Florida Bonneted Bat Acoustic/Roost Survey Methodology Memorandum / US 41 at Bonita Beach Road / 444321-1 / Lee County

John,

Please review and provide comments or concurrence of the attached survey plan.

Thanks

Jeffrey W. James

Environmental Manager
Florida Department of Transportation, District 1
801 North Broadway Avenue
P.O. Box 1249
Bartow, FL 33831-1249
(863) 519-2625
Jeffrey.James@dot.state.fl.us

Florida Department of Transportation

RON DESANTIS
GOVERNOR

605 Suwannee Street
Tallahassee, FL 32399-0450

JARED W. PERDUE, P.E.
SECRETARY

October 10, 2023

Mr. John Wrublik
U.S. Fish and Wildlife Service
777 37th Street, Suite D-101
Vero Beach, Florida 32960
Office (772) 226-831
john_wrublik@fws.gov

Subject: US 41 and Bonita Beach Road PD&E Study
Intersection of US 41 and Bonita Beach Road
Florida Bonneted Bat Revised Acoustic Survey Methodology
Financial Project Number: 444321-1
Lee County, Florida

Dear Mr. Wrublik,

The Florida Department of Transportation (FDOT), District 1, is conducting a Project Development and Environment Study to evaluate alternatives for the intersection of US 41 and Bonita Beach Road in Lee County, Florida. The project is located within Section 7, Township 47 South, Range 25 East and Section 4, Township 48 South, Range 25 East. A project location map (**Figure 1**) is included as part of this correspondence.

On August 31, 2023, FDOT sent a survey methodology memorandum for concurrence for the Florida bonneted bat survey that is currently being performed. The memorandum included six survey sites along US 41 and Bonita Beach Road. On October 3, 2023, Inwood Consulting Engineers, Inc. (Inwood) ecologists visited the project site to observe conditions in the field and deploy the acoustic detectors as proposed in the memorandum. A large development is now under construction in the northwest quadrant of the intersection between US 41 and Bonita Beach Road, south of the Bonita Springs River Park. Survey sites were proposed within and adjacent to the construction; however, this area no longer provides potential roosting or foraging habitat for Florida bonneted bats.

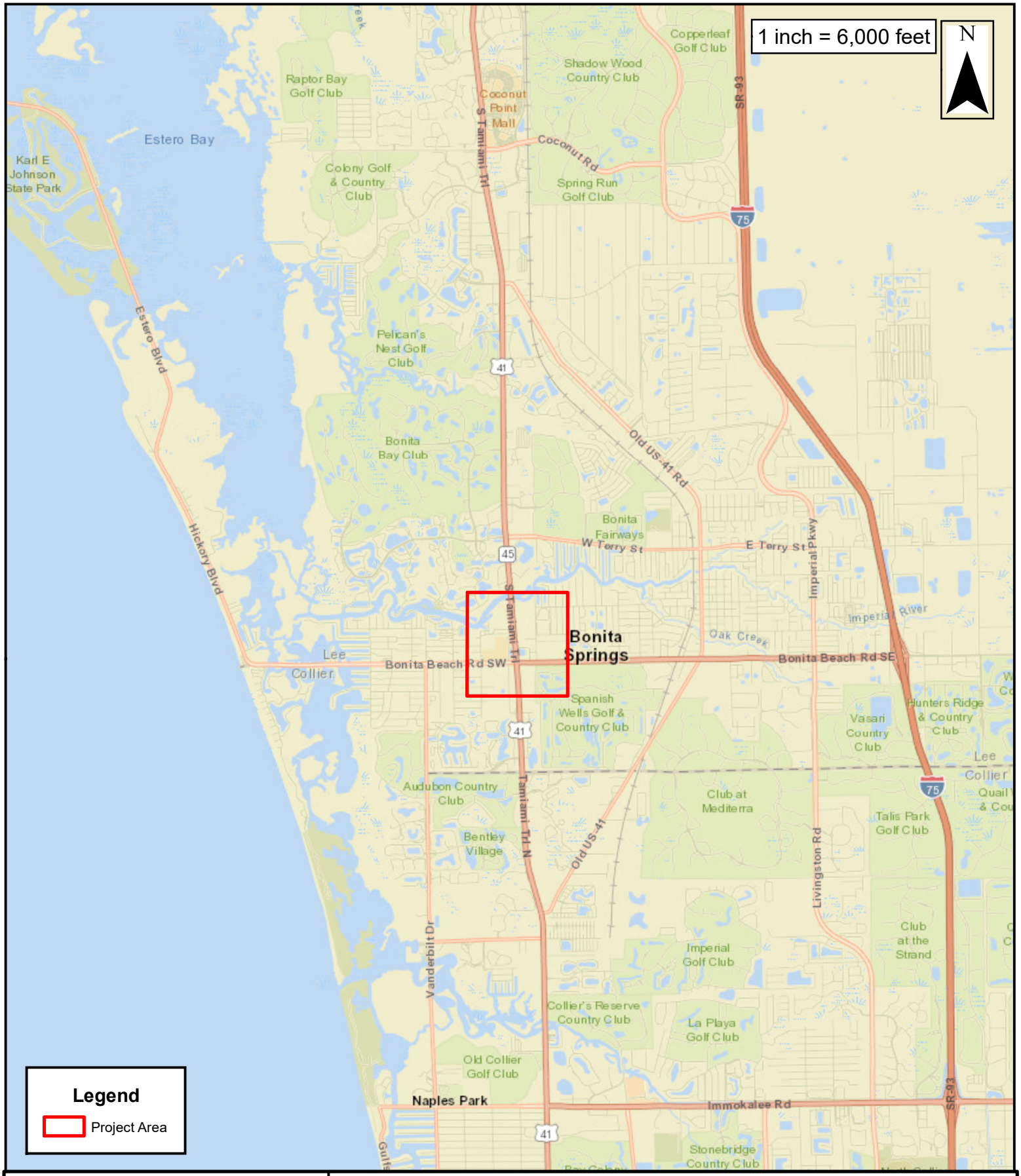
Inwood staff updated detector locations based on access and conditions observed in the field. These sites provide coverage of optimal area for bonneted bat foraging. Please see **Figure 2** for

the updated detector locations and the construction activities. The survey will continue to be conducted in accordance with current USFWS guidelines.

If you have any questions, concerns, or need additional information, please contact me at 863-519-2515 or ryan.ellis@dot.state.fl.us

Sincerely,

Ryan Ellis
Environmental Project Manager
FDOT, District 1



FDOT

District 1

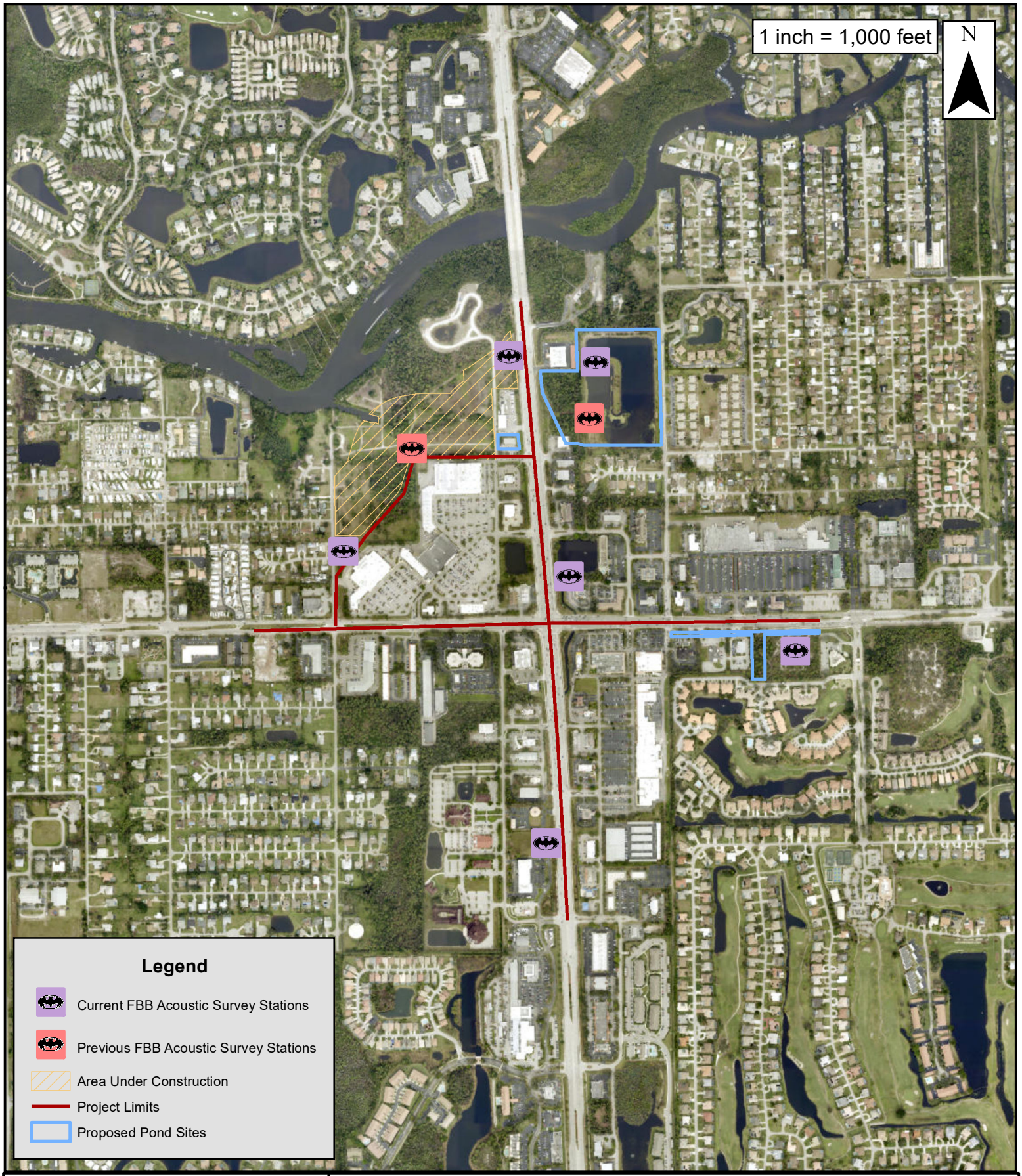
US 41 at CR 865

Lee County, Florida

Financial Project ID: 444321-1
Federal Project No: N/A

PROJECT LOCATION MAP

Figure 1



FDOT

District 1

US 41 at CR 865

Lee County, Florida

Financial Project ID: 444321-1
Federal Project No: N/A

FLORIDA BONNETED BAT ACOUSTIC SURVEY MAP

Figure 2

Photos: Area Under Construction

Jada Barhorst

From: Wrublik, John <john_wrublik@fws.gov>
Sent: Wednesday, October 11, 2023 11:00 AM
To: Ellis, Ryan
Cc: James, Jeffrey W; Bateman, Patrick; Jason Houck; Jada Barhorst
Subject: Re: [EXTERNAL] Intersection of US 41 and Bonita Beach Road, Florida Bonneted Bat Revised Acoustic Survey Methodology, FPID:444321-1

Ryan,

The changes in the detector locations described in your letter are acceptable to the Service.

John

John M. Wrublik
U.S. Fish and Wildlife Service
777 37th Street, Suite D-101
Vero Beach, Florida 32960
Office: (772) 226-8130
email: John_Wrublik@fws.gov

From: Ellis, Ryan <Ryan.Ellis@dot.state.fl.us>
Sent: Wednesday, October 11, 2023 10:20 AM
To: Wrublik, John <john_wrublik@fws.gov>
Cc: James, Jeffrey W <Jeffrey.James@dot.state.fl.us>; Bateman, Patrick <Patrick.Bateman@dot.state.fl.us>; Jason Houck <jhouck@inwoodinc.com>; Jada Barhorst <jbarhorst@inwoodinc.com>
Subject: [EXTERNAL] Intersection of US 41 and Bonita Beach Road, Florida Bonneted Bat Revised Acoustic Survey Methodology, FPID:444321-1

Morning Mr. Wrublik,

Please see revised methodology for the Florida bonneted bat survey for this project. Please let me know if you have any questions or concerns on the updated methodology.

Thanks

Ryan Ellis
Environmental Project Manager
Florida Department of Transportation, District One

801 North Broadway Avenue
Bartow, Florida 33830
(863) 519-2515
ryan.ellis@dot.state.fl.us

PHOTOGRAPHS

Photo 1: Station FBB 1

Photo 2: FBB 1 survey site habitat

Photo 3: Station FBB 2

Photo 4: FBB 2 survey site habitat

Photo 5: Station FBB 3

Photo 6: FBB 3 survey site habitat

Photo 7: Station FBB 4

Photo 8: FBB 4 survey site habitat

Photo 9: Station FBB 5

Photo 10: FBB 5 survey site habitat

Photo 11: Station FBB 6

Photo 12: FBB 6 survey site habitat

Photo 13: Station FBB 7

Photo 14: FBB 7 survey site habitat

Photo 15: Station FBB 8

Photo 16: FBB 8 survey site habitat

Photo 17: PRT 1 Cavity

Photo 18: PRT 2 Cavity

Photo 19: PRT 3 Cavity

Photo 20: PRT 4 Cavity

Photo 21: PRT 5 Cavity

DEPLOYMENT DATA FORMS

Detector Deployment Data Form

Project: US 41 at Bonita Beach Road	State: FL	County: Lee	Site: FBB1	Date: 10.3.2023
Biologist: J. Barkholst, R. Camfarra	GPS ID: Iphone GPS	Camera ID: Iphone		

DETECTOR DATA

Detector ID	Detector Make/Model	Microphone Make/Model	Microphone Type	Microphone Height	Microphone Orientation	Distance to Clutter	Clutter Type	% Clutter	Distance to Water	Water Type
1621	Pettersson D500X	Pettersson	omni-directional	18ft	SSW	3m	Yes	25%	160m	Reservoir

Latitude	Longitude	Broad Habitat	Horn	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
26.330170 N	-81.800292 W	Forested-Pine	✓	45	low then very low	NO	18:41	07:20hr

DETECTOR CHECKLIST: Time 1:53pm Mic Test ✓ Mic Placement ✓ Battery Check _____ CF Card ✓ Weatherproof Defective in Case

Detector/Gear Working and Armed ✓ Waypoint #/ID: US41 FBB1

Detector Placement/Site Description:

South of Bonita Beach Rd in forested lot between City of Bonita Springs City Hall and Cypress Landing Group Parcel in opening in forested area approximately 125ft east of proposed pond site

Remarks:

Detector Deployment Data Form

Project: US 41 at Bonita Beach Road	State: FL	County: Lee	Site: FBB2	Date: 10.2.2023
Biologist: J. Barhost, R. Campana	GPS ID: Iphone GPS	Camera ID: Iphone		

DETECTOR DATA

Detector ID	Detector Make/Model	Microphone Make/Model	Microphone Type	Microphone Height	Microphone Orientation	Distance to Clutter	Clutter Type	% Clutter	Distance to Water	Water Type
11534	Pettersson D500X	Pettersson	omni directional	20 ft	NE	5m behind	Veg	5%	15m	Retention Pond

Latitude	Longitude	Broad Habitat	Horn	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
26.331550 N	-81.805242 W	urban/pond	✓	45	10W then Norm low	NO	18:43h	07:51h

DETECTOR CHECKLIST: Time 2:40 Mic Test ✓ Mic Placement ✓ Battery Check ✓ CF Card ✓ Weatherproof in Ziploc bag in box

Detector/Gear Working and Armed ✓ Waypoint #/ID: US41 FBB2

Detector Placement/Site Description:

East of US 41, north of Bonita Beach Rd near the NW corner of parking lot (Aqua Restaurant) SW corner of Retention pond near eastern bank of canal - mic facing NE, open lagoon on bank of pond

Remarks:

Detector Deployment Data Form

Project: US 41 at Bonita Beach Road	**State:** FL	**County:** Lee	**Site:** FBG 3	**Date:** 10.3.2023
Biologist: J. Bachorst / Riley Campana		**GPS ID:** Inlure App		**Camera ID:** iPhone

DETECTOR DATA

Detector ID	Detector Make/Model	Microphone Make/Model	Microphone Type	Microphone Height	Microphone Orientation	Distance to Clutter	Clutter Type	% Clutter	Distance to Water	Water Type
11535	Pettersson Dx500	Pettersson	omnidirectional	20 ft	Horizontal E	5 m	veg	5%	25 m	Pond

Latitude	Longitude	Broad Habitat	Horn	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
26.336611 N	81.804782	water	✓	45	Low then Very low	NO	18:43	07:51

DETECTOR CHECKLIST: Time 5:03 pm Mic Test ✓ Mic Placement ✓ Battery Check ✓ CF Card ✓ Weatherproof Detector Inside

Detector/Gear Working and Armed ✓

Waypoint #/ID: US 41 FBG 3

Detector Placement/Site Description:

East of US 41 & North of Bonita Beach Rd at FDOT Pond. Mic placed on Bank across middle of pond facing E on 20 ft pole

Remarks:

Detector Deployment Data Form

Project: US 41 at Bonita Beach Road	State: FL	County: Lee	Site: FBB 4	Date: 10/3/23
Biologist: R. Campana, J. Barhorst	GPS ID: Iphone GPS	Camera ID: Iphone		

DETECTOR DATA

Detector ID	Detector Make/Model	Microphone Make/Model	Microphone Type	Microphone Height	Microphone Orientation	Distance to Clutter	Clutter Type	% Clutter	Distance to Water	Water Type
11536	Pettersson D500x	Pettersson	omni-directional	20 ft	horizontal	5m	Veg	20%	10m	dry detention pond

Latitude	Longitude	Broad Habitat	Horn	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
26.332315° N	-81.810862° W	URBAN	✓	45	Low (3) then very low (4)	no	18:44	07:53

DETECTOR CHECKLIST: Time 4:00 pm Mic Test ✓ Mic Placement ✓ Battery Check 6.0 V CF Card ✓ Weatherproof ✓

Detector/Gear Working and Armed ✓ Waypoint #/ID: US 41 FBB 4

Detector Placement/Site Description:

NW corner of retention pond located E of windsor road & W of shopping center; mic placed over mowed open area along bank of pond facing toward buildings (E)

Remarks:

clutter - edge clutter behind m.c

Detector Deployment Data Form

Project: US 41 at Bonita Beach Road	State: FL	County: Lee	Site: FBS5	Date: 10.3.2023
Biologist: J. Gathercoal, R. Campesino		GPS ID: Iphone App		Camera ID: Iphone

DETECTOR DATA

Detector ID	Detector Make/Model	Microphone Make/Model	Microphone Type	Microphone Height	Microphone Orientation	Distance to Clutter	Clutter Type	% Clutter	Distance to Water	Water Type
11622	Pettersson D501X	Pettersson 0500	Omnidirectional	20 ft	Horizontal SSW	3 m	Veg	25%		Pond

Latitude	Longitude	Broad Habitat	Horn	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
26.337088N	-81.806959W	wetland	✓	45	Low / Hi very low	NO	18:43	7:52

DETECTOR CHECKLIST: Time 5:27pm Mic Test ✓ Mic Placement ✓ Battery Check ✓ CF Card ✓ Weatherproof Detector in co

Detector/Gear Working and Armed ✓ Waypoint #/ID: US 41 FBS5

Detector Placement/Site Description:

West of US 41 + East of Bonita Springs Rd on Park entrance. Mic placed on 20ft pole facing SSW, at edge of treeline toward clearing/dead wetland - herbaceous wetland

Remarks:

Detector Deployment Data Form

Project: US 41 at Bonita Beach Road	State: FL	County: Lee	Site: FSBG	Date: 10 03 2023
Biologist: J. Barhorst, R Campann		GPS ID: Iphone GPS	Camera ID: Iphone	

DETECTOR DATA

Detector ID	Detector Make/Model	Microphone Make/Model	Microphone Type	Microphone Height	Microphone Orientation	Distance to Clutter	Clutter Type	% Clutter	Distance to Water	Water Type
11537	Pettersson D500X	Pettersson	omnidirectional	18 ft.	SW	Edge clutter 5m	Fence Veg	1%	~~10~~ 17 SM	Pond

Latitude	Longitude	Broad Habitat	Horn	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
26.326120 N	-81.806358 W	Urban	✓		Low/Med Veg	NO	18:43 h	07:52 h

DETECTOR CHECKLIST: Time 4:26 Mic Test ✓ Mic Placement ✓ Battery Check ✓ CF Card ✓ Weatherproof ✓

Detector/Gear Working and Armed ✓ Waypoint #/ID: US41 FSBG

Detector Placement/Site Description:

Placed in open lot south of Bonita Beach Rd and west of US 41. Between Waller Shikany's Funeral Home and Gulley Patio. Mic & Card are open mowed + maintained lot ferig SW

Remarks:

Edge Clutter is landscape palm trees

Detector Deployment Data Form

Project: US 41 at Bonita Beach Road	State: FL	County: Lee	Site: FB67	Date: 10.9.2023
Biologist: S. Barhorst		GPS ID: iPhone App	Camera ID: Explore	

DETECTOR DATA

Detector ID	Detector Make/Model	Microphone Make/Model	Microphone Type	Microphone Height	Microphone Orientation	Distance to Clutter	Clutter Type	% Clutter	Distance to Water	Water Type
11535	Petterson D500X	Petterson D500	omnidirectional	20 ft	NW horizontal	10 m	✓	25%	100 m	Imperial River

Latitude	Longitude	Broad Habitat	Horn	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
26.333724 N	-81.807306 W	Urban	✓	45	LOW	NO	1837	0755

DETECTOR CHECKLIST: Time 4:30pm Mic Test ✓ Mic Placement ✓ Battery Check ✓ CF Card ✓ Weatherproof ✓ detector in cone

Detector/Gear Working and Armed ✓ Waypoint #/ID: US41 FB67

Detector Placement/Site Description:

West of US 41 at edge of cleared parcel behind the Center of Bonita Springs only. Placed near treeline facing NW over cleared parcel w/ active construction of subdivision

Remarks:

Detector Deployment Data Form

Project: US 41 at Bonita Beach Road	State: FL	County: Lee	Site: FBSP	Date: 10.9.2023
Biologist: J Barkhurst		GPS ID: Echo App		Camera ID: Echo

DETECTOR DATA

Detector ID	Detector Make/Model	Microphone Make/Model	Microphone Type	Microphone Height	Microphone Orientation	Distance to Clutter	Clutter Type	% Clutter	Distance to Water	Water Type
11534	Pettersson D500X	Pettersson 2500	Omni-directional	20 ft	Horizontal S	20 m	bushy	5	200 m	River

Latitude	Longitude	Broad Habitat	Horn	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
26.334678 N	-81.806630 W	Urban	✓	45	Low	NO	1837	0754

DETECTOR CHECKLIST: Time 5:42pm Mic Test ✓ Mic Placement ✓ Battery Check ✓ CF Card ✓ Weatherproof In Box

Detector/Gear Working and Armed ✓ Waypoint #/ID: US41 FBSP

Detector Placement/Site Description:

W of US 41 in ROW, just south of Bonita Bat Center driveway + adjacent to Tuthy's Tire + Auto Sales. Planted new ROW facing open land + drainage ditch, facing S

Remarks:

WEATHER DOCUMENTATION

weather.gov

Weather observations for the past three days

Naples, Naples Municipal Airport

Enter Your "City, ST" or zip code Go

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (ºF) Air	Dwpt	6 hour Max.	6 hour Min.	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure altimeter (in)	Pressure sea level (mb)	Precipitation (in.) 1 hr	3 hr	6 hr
05	08:53	NE 6	10.00	Fair	CLR	79	73			82%	NA	82	29.94	1013.7			
05	07:53	NE 5	10.00	Fair	CLR	75	72	77	74	90%	NA	NA	29.92	1013.0			
05	06:53	NE 5	10.00	Fair	CLR	75	72			90%	NA	NA	29.91	1012.7			
05	05:53	NE 3	10.00	Fair	CLR	75	72			90%	NA	NA	29.90	1012.4			
05	04:53	N 6	10.00	Fair	CLR	75	72			90%	NA	NA	29.89	1012.1			
05	03:53	NE 6	10.00	Fair	CLR	75	72			90%	NA	NA	29.89	1012.0			
05	02:53	N 7	10.00	Fair	CLR	76	72			88%	NA	76	29.89	1011.9			
05	01:53	NE 7	10.00	Fair	CLR	77	72	83	77	85%	NA	78	29.90	1012.3			
05	00:53	NE 8	10.00	Fair	CLR	77	73			88%	NA	78	29.91	1012.8			
04	23:53	NE 8	10.00	Fair	CLR	78	73			85%	NA	80	29.92	1013.1			
04	22:53	NE 8	10.00	Fair	CLR	79	72			79%	NA	82	29.93	1013.3			
04	21:53	NE 9	10.00	Fair	CLR	80	72			76%	NA	84	29.92	1013.1			
04	20:53	NE 8	10.00	Fair	CLR	81	72			74%	NA	85	29.91	1012.7			
04	19:53	NE 9	10.00	Fair	CLR	83	71	92	83	67%	NA	88	29.89	1011.9			
04	18:53	NE 12	10.00	A Few Clouds	FEW080	85	70			61%	NA	90	29.86	1011.1			
04	17:53	E 13	10.00	A Few Clouds	FEW050	87	71			59%	NA	93	29.85	1010.8			
04	16:53	E 13	10.00	Fair	CLR	90	70			52%	NA	96	29.84	NA			
04	15:53	NE 8	10.00	Partly Cloudy	SCT048	90	70			52%	NA	96	29.85	1010.8			
04	14:53	NE 10	10.00	Mostly Cloudy	SCT048 BKN080	91	71			52%	NA	98	29.87	1011.4			
04	13:53	N 9	10.00	A Few Clouds	FEW042	89	70	89	74	53%	NA	94	29.90	1012.3			
04	12:53	NE 9	10.00	A Few Clouds	FEW038	87	71			59%	NA	93	29.92	1013.2			
04	11:53	NE 12	10.00	Partly Cloudy	SCT031	87	71			59%	NA	93	29.95	1014.0			
04	10:53	NE 9	10.00	Fair	CLR	85	72			65%	NA	91	29.95	1014.2			
04	09:53	NE 9	10.00	Fair	CLR	81	73			77%	NA	86	29.96	1014.2			
04	08:53	N 7	10.00	Fair	CLR	77	72			85%	NA	78	29.94	1013.7			
04	07:53	NE 6	10.00	Fair	CLR	74	71	75	73	91%	NA	NA	29.92	1013.2			
04	06:53	NE 8	10.00	Fair	CLR	73	71			94%	NA	NA	29.90	1012.5			
04	05:53	N 6	10.00	Fair	CLR	74	71			91%	NA	NA	29.89	1012.1			
04	04:53	N 7	9.00	Fair	CLR	74	71			91%	NA	NA	29.89	1011.9			
04	03:53	N 5	9.00	Fair	CLR	74	71			91%	NA	NA	29.88	1011.8			
04	02:53	NE 6	9.00	Fair	CLR	75	71			88%	NA	NA	29.88	1011.8			
04	01:53	NE 6	9.00	Fair	CLR	75	71	82	75	88%	NA	NA	29.90	1012.5			

04	00:53	NE 7	9.00	Fair	CLR	76	71			85%	NA	77	29.91	1012.8
03	23:53	NE 8	10.00	Fair	CLR	76	71			85%	NA	77	29.93	1013.2
03	22:53	NE 7	9.00	Fair	CLR	77	70			79%	NA	79	29.93	1013.4
03	21:53	NE 7	8.00	Fair	CLR	79	71			77%	NA	82	29.93	1013.5
03	20:53	NE 9	6.00	Fair with Haze	CLR	80	70			71%	NA	83	29.91	1012.8
03	19:53	NE 7	5.00	Partly Cloudy with Haze	SCT046	82	68	89	82	63%	NA	85	29.89	1012.0
03	18:53	NE 6	4.00	Partly Cloudy with Haze	SCT038	84	66			55%	NA	86	29.88	1011.7
03	17:53	NE 14	3.00	Overcast with Haze	OVC027	86	66			51%	NA	88	29.87	1011.3
03	16:53	NE 15 G 20	3.00	Overcast with Haze	OVC029	88	67			50%	NA	91	29.87	1011.3
03	15:53	NE 12 G 20	4.00	Partly Cloudy with Haze	SCT036	88	67			50%	NA	91	29.88	1011.6
03	14:53	E 17	4.00	A Few Clouds with Haze	FEW034 FEW047	89	68			50%	NA	93	29.89	1012.1
03	13:53	NE 13 G 22	3.00	Mostly Cloudy with Haze	BKN030	88	67	88	74	50%	NA	91	29.91	1012.6
03	12:53	NE 16 G 26	3.00	Mostly Cloudy with Haze	BKN028	88	66			48%	NA	90	29.93	1013.2
03	11:53	E 18 G 26	3.00	Overcast with Haze	BKN024 OVC030	86	68			55%	NA	89	29.94	1013.7
03	10:53	NE 15 G 24	3.00	Overcast with Haze	BKN027 OVC032	84	70			63%	NA	88	29.94	1013.8
03	09:53	NE 12 G 20	4.00	Fair with Haze	CLR	80	71			74%	NA	83	29.94	1013.7
03	08:53	NE 12	4.00	Fair with Haze	CLR	77	71			82%	NA	79	29.94	1013.6
03	07:53	Vrbl 6	4.00	Fog/Mist	FEW031	74	71	76	74	91%	NA	NA	29.93	1013.3
03	06:53	NE 7	6.00	Fog/Mist	FEW037	74	71			91%	NA	NA	29.91	1012.7
03	05:53	N 8	6.00	Fog/Mist	CLR	74	71			91%	NA	NA	29.90	1012.2
03	04:53	NE 7	6.00	Fog/Mist	CLR	75	71			88%	NA	NA	29.89	1011.9
03	03:53	NE 8	6.00	Fair with Haze	CLR	75	70			84%	NA	NA	29.89	1012.0
03	02:53	NE 8	6.00	Fair with Haze	CLR	75	70			84%	NA	NA	29.90	1012.4
03	01:53	NE 8	6.00	Fair with Haze	CLR	76	69	79	76	79%	NA	77	29.92	1012.9

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air	Dwpt	Max.	Min.	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.)	sea level (mb)	1 hr	3 hr	6 hr
						Temperature (ºF)		6 hour					Pressure		Precipitation (in.)		
03	00:53	NE 8	6.00	Fair with Haze	CLR	76	69			79%	NA	77	29.93	1013.4			
02	23:53	NE 8	6.00	Fair with Haze	CLR	76	69			79%	NA	77	29.94	1013.7			
02	22:53	NE 9	7.00	Fair	CLR	77	69			77%	NA	79	29.94	1013.9			
02	21:53	NE 6	7.00	Fair	CLR	78	71			79%	NA	80	29.95	1014.0			
02	20:53	NE 9	8.00	Fair	CLR	78	73			85%	NA	80	29.93	1013.4			
02	19:53	NE 12	8.00	Overcast	BKN034 OVC050	79	74	91	79	85%	NA	83	29.91	1012.7	0.02		0.02
02	18:53	E 16	10.00	A Few Clouds	FEW043	84	71			65%	NA	89	29.89	1012.1			
02	17:53	E 17 G 28	10.00	Fair	CLR	86	71			61%	NA	91	29.88	1011.6			
02	16:53	NE 17 G 25	10.00	Fair	CLR	88	70			55%	NA	93	29.87	1011.4			
02	15:53	E 22 G 28	10.00	A Few Clouds and Breezy	FEW034	89	72			57%	NA	96	29.87	1011.5			
02	14:53	NE 15 G 23	10.00	Partly Cloudy	FEW038 SCT055	89	73			59%	NA	97	29.89	1011.9			
02	13:53	NE 20 G 28	10.00	Partly Cloudy	FEW036 FEW047 SCT055	87	72	91	76	61%	NA	93	29.91	1012.7			
02	12:53	NE 18	10.00	A Few Clouds	FEW033	88	72			59%	NA	95	29.92	1013.2			
02	11:53	NE 14	10.00	Partly Cloudy	FEW028 FEW036 SCT043	86	74			67%	NA	94	29.94	1013.8			
02	10:53	NE 13	10.00	A Few Clouds	FEW026	85	74			70%	NA	93	29.94	1013.8			
02	09:53	E 13	10.00	Fair	CLR	82	73			74%	NA	87	29.93	1013.5			

26.57 °N, **81.75** °W

Fort Myers, FL Weather History ★

69° SOUTHWEST FLORIDA INTERNATIONAL AIRPORT STATION (/DASHBOARD/PWS/KFLFORTM507?CM_VEN=LOCALWX_PWSDASH) | CHANGE

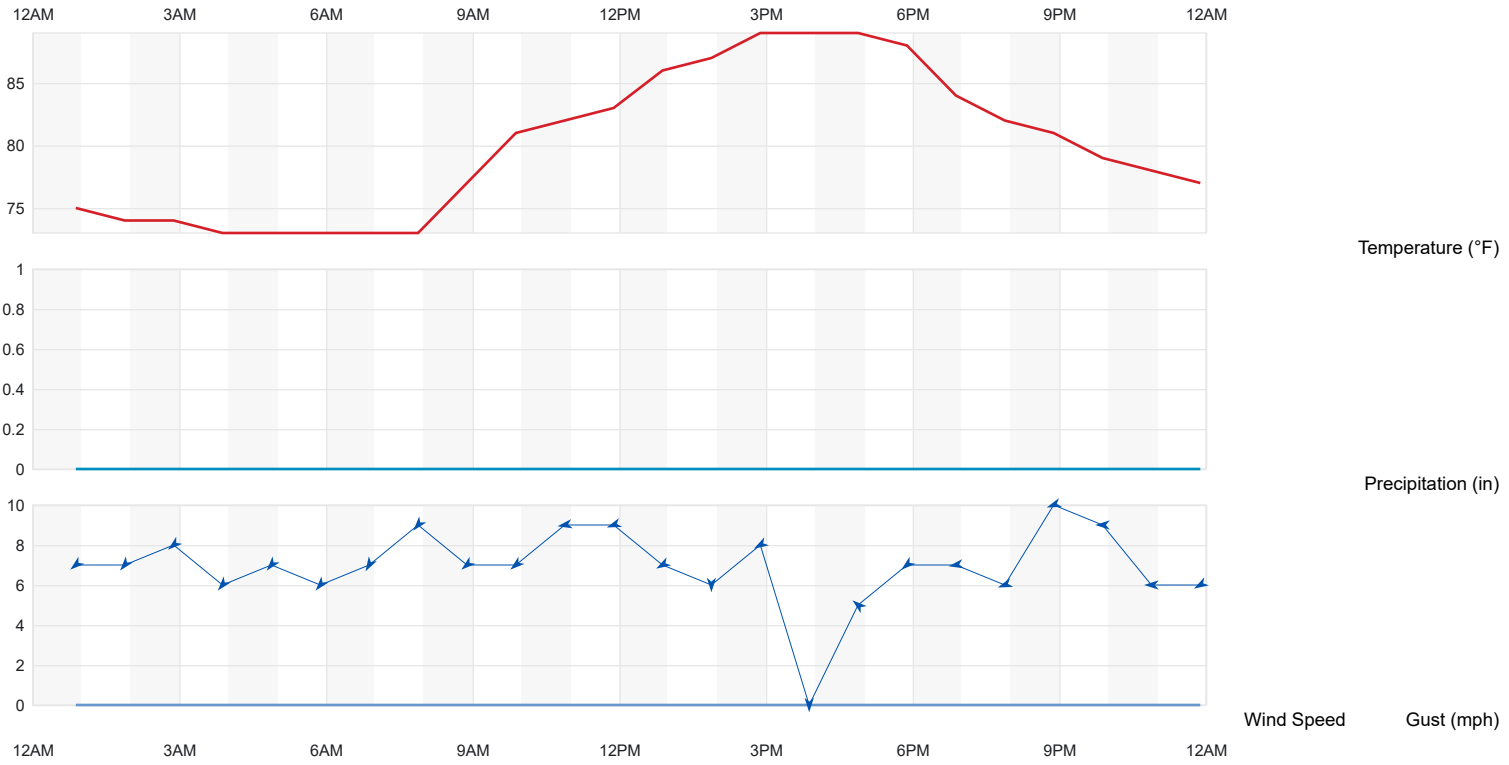
HISTORY (/HISTORY/DAILY/US/FL/FORT-MYERS/KRSW)

- TODAY (/WEATHER/US/FL/FORT-MYERS/KRSW)
- HOURLY (/HOURLY/US/FL/FORT-MYERS/KRSW)
- 10-DAY (/FORECAST/US/FL/FORT-MYERS/KRSW)
- CALENDAR (/CALENDAR/US/FL/FORT-MYERS/KRSW)
- HISTORY (/HISTORY/DAILY/US/FL/FORT-MYERS/KRSW)
- WUNDERMAP (/WUNDERMAP?LAT=26.57&LON=-81.751)

Daily | Weekly | Monthly

(/history/daily/us/fl/fort-myers/KRSW/date/2023-10-5) (/history/weekly/us/fl/fort-myers/KRSW/date/2023-10-5) (/history/monthly/us/fl/fort-myers/KRSW/date/2023-10)

October | 5 | 2023 | View



Summary

Temperature (°F)	Actual	Historic Avg.	Record
High Temp	89	88.4	93
Low Temp	73	72.2	60
Day Average Temp	80	80.3	-

Temperature (°F)	Actual	Historic Avg.	Record
Precipitation (in)	Actual	Historic Avg.	Record
Precipitation (past 24 hours from 04:53:00)	0.00	--	-
Dew Point (°F)	Actual	Historic Avg.	Record
Dew Point	72.21	-	-
High	74	-	-
Low	70	-	-
Average	72.21	-	-
Wind (mph)	Actual	Historic Avg.	Record
Max Wind Speed	10	-	-
Visibility	10	-	-
Sea Level Pressure (in)	Actual	Historic Avg.	Record
Sea Level Pressure	29.94	-	-
Astronomy	Day Length	Rise	Set
Actual Time	11h 48m	7:22 AM	7:11 PM
Civil Twilight		6:59 AM	7:34 PM
Nautical Twilight		6:32 AM	8:01 PM
Astronomical Twilight		6:05 AM	8:27 PM
Moon: waning gibbous		-	1:45 PM

Daily Observations

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Precip.	Condition
12:53 AM	75 °F	72 °F	90 %	NE	7 mph	0 mph	29.90 in	0.0 in	Fair
1:53 AM	74 °F	72 °F	93 %	NE	7 mph	0 mph	29.89 in	0.0 in	Fair
2:53 AM	74 °F	72 °F	93 %	NE	8 mph	0 mph	29.88 in	0.0 in	Fair
3:53 AM	73 °F	72 °F	96 %	NE	6 mph	0 mph	29.87 in	0.0 in	Fair
4:53 AM	73 °F	72 °F	96 %	NE	7 mph	0 mph	29.87 in	0.0 in	Fair
5:53 AM	73 °F	72 °F	96 %	NE	6 mph	0 mph	29.88 in	0.0 in	Fair
6:53 AM	73 °F	72 °F	96 %	NNE	7 mph	0 mph	29.90 in	0.0 in	Fair
7:53 AM	73 °F	73 °F	100 %	NE	9 mph	0 mph	29.91 in	0.0 in	Fair
8:53 AM	77 °F	73 °F	88 %	NE	7 mph	0 mph	29.92 in	0.0 in	Fair
9:53 AM	81 °F	74 °F	79 %	NE	7 mph	0 mph	29.94 in	0.0 in	Fair
10:53 AM	82 °F	74 °F	76 %	E	9 mph	0 mph	29.93 in	0.0 in	Partly Cloudy
11:53 AM	83 °F	73 °F	72 %	ENE	9 mph	0 mph	29.92 in	0.0 in	Partly Cloudy
12:53 PM	86 °F	72 °F	63 %	ENE	7 mph	0 mph	29.90 in	0.0 in	Mostly Cloudy
1:53 PM	87 °F	71 °F	59 %	VAR	6 mph	0 mph	29.87 in	0.0 in	Fair
2:53 PM	89 °F	70 °F	53 %	ENE	8 mph	0 mph	29.84 in	0.0 in	Fair
3:53 PM	89 °F	70 °F	53 %	CALM	0 mph	0 mph	29.82 in	0.0 in	Partly Cloudy
4:53 PM	89 °F	70 °F	53 %	SE	5 mph	0 mph	29.82 in	0.0 in	Mostly Cloudy
5:53 PM	88 °F	71 °F	57 %	NE	7 mph	0 mph	29.82 in	0.0 in	Partly Cloudy
6:53 PM	84 °F	72 °F	67 %	E	7 mph	0 mph	29.83 in	0.0 in	Fair
7:53 PM	82 °F	73 °F	74 %	ENE	6 mph	0 mph	29.84 in	0.0 in	Fair
8:53 PM	81 °F	73 °F	77 %	ENE	10 mph	0 mph	29.85 in	0.0 in	Fair

Bonita Springs Past Weather

Last 30 Days

Mon, Oct 9th 2023

Sun, Oct 8th 2023

Sat, Oct 7th 2023

Fri, Oct 6th 2023

High: 91.4ºf @4:30 PM **Low**: 73.04ºf @7:53 AM **Approx. Precipitation / Rain Total**: in.

Time (EDT)	Temp. (ºf)	Humidity (%)	Dew Point (ºf)	Barometer (inHG)	Wind Speed (mph)	Wind Direction	Wind Gust (mph)	1hr. Precip / Rain Total (in.)	Snow Depth
								-	-
								-	-
11:50 PM	78.8	83.6	73.4	29.91	-	-	-	-	-
11:45 PM	78.8	83.6	73.4	29.91	3	ne	-	-	-
11:40 PM	78.8	83.6	73.4	29.91	3	ne	-	-	-
11:35 PM	78.8	83.6	73.4	29.91	4	ene	-	-	-
11:30 PM	78.8	83.6	73.4	29.91	4	ene	-	-	-
11:25 PM	80.6	78.82	73.4	29.92	3	ne	-	-	-
11:10 PM	80.6	78.82	73.4	29.92	3	n	-	-	-
11:05 PM	80.6	74.19	71.6	29.92	-	-	-	-	-
11:00 PM	80.6	78.82	73.4	29.91	-	-	-	-	-
10:55 PM	78.8	78.68	71.6	29.91	-	-	-	-	-
10:53 PM	80.06	76.43	71.96	29.91	-	-	-	-	-
10:50 PM	80.6	74.19	71.6	29.91	-	-	-	-	-
10:45 PM	80.6	74.19	71.6	29.91	-	-	-	-	-

Time (EDT)	Temp. (ºf)	Humidity (%)	Dew Point (ºf)	Barometer (inHG)	Wind Speed (mph)	Wind Direction	Wind Gust (mph)	1hr. Precip / Rain Total (in.)	Snow Depth
10:40 PM	80.6	74.19	71.6	29.91	3	nnw	-	-	-
10:35 PM	80.6	74.19	71.6	29.91	-	-	-	-	-
10:30 PM	80.6	74.19	71.6	29.91	3	nnw	-	-	-
10:25 PM	80.6	74.19	71.6	29.91	3	nnw	-	-	-
10:10 PM	80.6	74.19	71.6	29.91	-	-	-	-	-
10:05 PM	80.6	74.19	71.6	29.91	3	nnw	-	-	-
10:00 PM	80.6	74.19	71.6	29.91	3	nnw	-	-	-
9:55 PM	80.6	74.19	71.6	29.91	-	-	-	-	-
9:53 PM	80.96	72	71.06	29.91	3	nnw	-	-	-
9:50 PM	80.6	74.19	71.6	29.9	-	-	-	-	-
9:45 PM	80.6	74.19	71.6	29.9	3	nnw	-	-	-
9:40 PM	80.6	74.19	71.6	29.9	-	-	-	-	-
9:35 PM	80.6	74.19	71.6	29.9	3	nw	-	-	-
9:30 PM	80.6	74.19	71.6	29.9	3	nw	-	-	-
9:25 PM	80.6	74.19	71.6	29.9	4	nw	-	-	-
9:10 PM	80.6	74.19	71.6	29.9	4	nw	-	-	-
9:05 PM	80.6	69.79	69.8	29.89	4	nw	-	-	-
9:00 PM	80.6	74.19	71.6	29.89	-	-	-	-	-
8:55 PM	82.4	65.83	69.8	29.89	3	nw	-	-	-
8:53 PM	82.04	67.01	69.98	29.89	3	nw	-	-	-
8:50 PM	82.4	65.83	69.8	29.89	3	nw	-	-	-
8:45 PM	82.4	65.83	69.8	29.89	4	nw	-	-	-
								-	-
								-	-
8:30 PM	82.4	65.83	69.8	29.88	4	nw	-	-	-
8:25 PM	82.4	65.83	69.8	29.88	3	nnw	-	-	-
8:10 PM	82.4	65.83	69.8	29.88	6	wnw	-	-	-
8:05 PM	82.4	65.83	69.8	29.87	5	wnw	-	-	-
8:00 PM	82.4	65.83	69.8	29.87	3	wnw	-	-	-
7:55 PM	82.4	65.83	69.8	29.87	4	wnw	-	-	-
7:53 PM	84.02	62.87	69.98	29.87	5	wnw	-	-	-
7:50 PM	84.2	62.13	69.8	29.87	4	wnw	-	-	-
7:45 PM	84.2	66.04	71.6	29.87	6	wnw	-	-	-
7:40 PM	84.2	66.04	71.6	29.87	6	wnw	-	-	-
7:35 PM	84.2	66.04	71.6	29.87	6	wnw	-	-	-
7:30 PM	84.2	66.04	71.6	29.87	4	w	-	-	-
7:25 PM	84.2	66.04	71.6	29.87	6	w	-	-	-

Time (EDT)	Temp. (ºf)	Humidity (%)	Dew Point (ºf)	Barometer (inHG)	Wind Speed (mph)	Wind Direction	Wind Gust (mph)	1hr. Precip / Rain Total (in.)	Snow Depth
7:10 PM	87.8	55.4	69.8	29.86	-	-	-	-	-
7:05 PM	86	58.66	69.8	29.86	-	-	-	-	-
7:00 PM	87.8	55.4	69.8	29.86	3	n	-	-	-
6:55 PM	87.8	55.4	69.8	29.86	-	-	-	-	-
6:53 PM	87.08	57.03	69.98	29.86	-	-	-	-	-
6:50 PM	87.8	55.4	69.8	29.86	-	-	-	-	-
6:45 PM	87.8	55.4	69.8	29.86	-	-	-	-	-
6:40 PM	87.8	55.4	69.8	29.86	-	-	-	-	-
6:35 PM	87.8	55.4	69.8	29.86	3	nnw	-	-	-
6:30 PM	87.8	55.4	69.8	29.86	4	nnw	-	-	-
6:25 PM	87.8	55.4	69.8	29.86	3	nnw	-	-	-
6:10 PM	87.8	55.4	69.8	29.86	4	nnw	-	-	-
6:05 PM	89.6	52.35	69.8	29.86	4	nw	-	-	-
6:00 PM	87.8	58.89	71.6	29.86	3	n	-	-	-
5:55 PM	87.8	58.89	71.6	29.86	4	nw	-	-	-
5:53 PM	87.98	55.43	69.98	29.86	4	-	-	-	-
5:50 PM	87.8	55.4	69.8	29.86	4	nw	-	-	-
5:45 PM	87.8	58.89	71.6	29.86	4	nw	-	-	-
5:40 PM	87.8	55.4	69.8	29.85	5	wnw	-	-	-
5:35 PM	87.8	58.89	71.6	29.85	7	wsw	-	-	-
5:30 PM	87.8	58.89	71.6	29.86	4	w	-	-	-
5:25 PM	87.8	52.09	68	29.85	-	-	-	-	-
								-	-
								-	-
5:00 PM	89.6	49.23	68	29.85	3	nne	-	-	-
4:55 PM	89.6	46.26	66.2	29.85	4	nne	-	-	-
4:53 PM	89.06	50.07	68	29.85	3	nne	-	-	-
4:50 PM	89.6	49.23	68	29.85	5	nne	-	-	-
4:45 PM	89.6	49.23	68	29.85	4	nne	-	-	-
4:40 PM	89.6	52.35	69.8	29.85	5	n	-	-	-
4:35 PM	91.4	49.49	69.8	29.85	5	n	-	-	-
4:30 PM	91.4	49.49	69.8	29.85	3	nne	-	-	-
4:25 PM	89.6	52.35	69.8	29.85	-	-	-	-	-
4:05 PM	91.4	49.49	69.8	29.85	6	ne	-	-	-
4:00 PM	89.6	49.23	68	29.85	4	n	-	-	-
3:55 PM	89.6	49.23	68	29.85	4	nnw	-	-	-
3:53 PM	89.06	50.07	68	29.85	4	-	-	-	-

Time (EDT)	Temp. (ºf)	Humidity (%)	Dew Point (ºf)	Barometer (inHG)	Wind Speed (mph)	Wind Direction	Wind Gust (mph)	1hr. Precip / Rain Total (in.)	Snow Depth
3:50 PM	89.6	49.23	68	29.85	3	wsw	-	-	-
3:45 PM	89.6	49.23	68	29.85	-	-	-	-	-
3:40 PM	89.6	49.23	68	29.86	4	nw	-	-	-
3:35 PM	89.6	52.35	69.8	29.86	5	nw	-	-	-
3:30 PM	89.6	52.35	69.8	29.86	3	wsw	-	-	-
3:25 PM	89.6	52.35	69.8	29.86	3	wnw	-	-	-
3:05 PM	89.6	52.35	69.8	29.86	-	-	-	-	-
3:00 PM	89.6	52.35	69.8	29.86	-	-	-	-	-
2:55 PM	89.6	52.35	69.8	29.86	3	ene	-	-	-
2:53 PM	89.96	52.08	69.98	29.86	4	ne	-	-	-
2:50 PM	89.6	55.65	71.6	29.86	4	n	-	-	-
2:45 PM	89.6	55.65	71.6	29.86	-	-	-	-	-
2:40 PM	89.6	52.35	69.8	29.86	4	nnw	-	-	-
2:35 PM	89.6	52.35	69.8	29.87	-	-	-	-	-
2:30 PM	89.6	52.35	69.8	29.87	-	-	-	-	-
2:25 PM	89.6	52.35	69.8	29.87	-	-	-	-	-
2:05 PM	87.8	55.4	69.8	29.87	-	-	-	-	-
2:00 PM	87.8	55.4	69.8	29.88	3	ne	-	-	-
1:55 PM	87.8	55.4	69.8	29.88	4	n	-	-	-
1:53 PM	89.06	55.58	71.06	29.88	3	-	-	-	-
1:50 PM	89.6	55.65	71.6	29.88	5	e	-	-	-
1:45 PM	89.6	55.65	71.6	29.88	3	wnw	-	-	-
								-	-
								-	-
1:30 PM	87.8	55.4	69.8	29.88	5	nnw	-	-	-
1:25 PM	89.6	55.65	71.6	29.88	4	nnw	-	-	-
1:05 PM	87.8	55.4	69.8	29.9	3	se	-	-	-
1:00 PM	86	58.66	69.8	29.9	-	-	-	-	-
12:55 PM	87.8	55.4	69.8	29.9	-	-	-	-	-
12:53 PM	87.08	57.03	69.98	29.9	3	e	-	-	-
12:50 PM	87.8	58.89	71.6	29.9	4	ene	-	-	-
12:45 PM	87.8	58.89	71.6	29.9	5	e	-	-	-
12:40 PM	86	58.66	69.8	29.9	6	e	-	-	-
12:35 PM	87.8	55.4	69.8	29.9	-	-	-	-	-
12:30 PM	87.8	58.89	71.6	29.9	-	-	-	-	-
12:25 PM	87.8	58.89	71.6	29.91	-	-	-	-	-
12:10 PM	87.8	58.89	71.6	29.91	6	n	-	-	-

Time (EDT)	Temp. (ºf)	Humidity (%)	Dew Point (ºf)	Barometer (inHG)	Wind Speed (mph)	Wind Direction	Wind Gust (mph)	1hr. Precip / Rain Total (in.)	Snow Depth
12:05 PM	87.8	58.89	71.6	29.91	5	ne	-	-	-
12:00 PM	84.2	66.04	71.6	29.91	-	-	-	-	-
11:57 AM	86	63.12	71.96	29.91	-	-	-	-	-
11:55 AM	86	62.35	71.6	29.92	-	-	-	-	-
11:53 AM	84.92	65.33	71.96	29.92	-	-	-	-	-
11:50 AM	84.2	66.04	71.6	29.92	3	nne	-	-	-
11:45 AM	84.2	66.04	71.6	29.92	-	-	-	-	-
11:40 AM	86	62.35	71.6	29.92	5	nne	-	-	-
11:35 AM	86	62.35	71.6	29.92	4	nne	-	-	-
11:30 AM	84.2	66.04	71.6	29.92	4	nne	-	-	-
11:25 AM	84.2	66.04	71.6	29.92	3	ese	-	-	-
11:05 AM	84.2	70.17	73.4	29.92	3	ne	-	-	-
11:00 AM	82.4	74.36	73.4	29.92	-	-	-	-	-
10:55 AM	82.4	74.36	73.4	29.92	4	e	-	-	-
10:53 AM	84.02	69.73	73.04	29.92	5	e	-	-	-
10:50 AM	82.4	74.36	73.4	29.92	3	ne	-	-	-
10:45 AM	82.4	74.36	73.4	29.92	5	ene	-	-	-
10:40 AM	82.4	74.36	73.4	29.92	-	-	-	-	-
10:35 AM	82.4	74.36	73.4	29.92	4	ne	-	-	-
10:30 AM	82.4	74.36	73.4	29.93	6	ne	-	-	-
10:25 AM	82.4	74.36	73.4	29.93	3	ne	-	-	-
10:10 AM	80.6	78.82	73.4	29.93	6	ene	-	-	-
								-	-
								-	-
9:55 AM	80.6	78.82	73.4	29.92	5	ne	-	-	-
9:53 AM	80.06	81.69	73.94	29.92	5	ene	-	-	-
9:50 AM	80.6	78.82	73.4	29.92	6	ene	-	-	-
9:45 AM	80.6	78.82	73.4	29.92	5	ne	-	-	-
9:40 AM	80.6	78.82	73.4	29.92	6	ne	-	-	-
9:35 AM	78.8	83.6	73.4	29.92	5	ne	-	-	-
9:30 AM	80.6	78.82	73.4	29.92	6	ne	-	-	-
9:25 AM	78.8	83.6	73.4	29.92	7	ne	-	-	-
9:10 AM	77	88.7	73.4	29.92	6	ene	-	-	-
9:05 AM	77	88.7	73.4	29.91	6	e	-	-	-
9:00 AM	77	94.2	75.2	29.91	5	ene	-	-	-
8:55 AM	77	88.7	73.4	29.91	5	ene	-	-	-
8:53 AM	77	90.32	73.94	29.91	4	ene	-	-	-

Time (EDT)	Temp. (ºf)	Humidity (%)	Dew Point (ºf)	Barometer (inHG)	Wind Speed (mph)	Wind Direction	Wind Gust (mph)	1hr. Precip / Rain Total (in.)	Snow Depth
8:50 AM	77	88.7	73.4	29.91	5	ene	-	-	-
8:45 AM	75.2	94.16	73.4	29.91	5	ene	-	-	-
8:40 AM	75.2	94.16	73.4	29.91	4	ne	-	-	-
8:35 AM	75.2	94.16	73.4	29.91	5	ne	-	-	-
8:30 AM	75.2	94.16	73.4	29.91	6	ne	-	-	-
8:25 AM	75.2	94.16	73.4	29.91	4	ne	-	-	-
8:10 AM	73.4	100	73.4	29.91	4	nne	-	-	-
8:05 AM	73.4	100	73.4	29.9	4	nne	-	-	-
8:00 AM	73.4	100	73.4	29.9	3	nne	-	-	-
7:55 AM	73.4	100	73.4	29.9	3	nne	-	-	-
7:53 AM	73.04	100	73.04	29.9	3	nne	-	-	-
7:50 AM	73.4	100	73.4	29.9	4	ne	-	-	-
7:45 AM	73.4	100	73.4	29.9	4	ne	-	-	-
7:10 AM	73.4	100	73.4	29.89	5	ne	-	-	-
7:05 AM	73.4	100	73.4	29.89	5	ne	-	-	-
7:00 AM	73.4	100	73.4	29.89	4	nne	-	-	-
6:55 AM	73.4	100	73.4	29.89	4	ne	-	-	-
6:53 AM	73.04	100	73.04	29.89	4	ne	-	-	-
6:50 AM	73.4	100	73.4	29.89	4	ne	-	-	-
6:45 AM	73.4	100	73.4	29.89	4	ne	-	-	-
6:40 AM	73.4	100	73.4	29.89	4	ne	-	-	-
6:35 AM	73.4	100	73.4	29.89	3	ne	-	-	-
								-	-
								-	-
6:10 AM	73.4	100	73.4	29.88	4	ne	-	-	-
6:05 AM	73.4	100	73.4	29.88	4	ne	-	-	-
6:00 AM	73.4	100	73.4	29.87	4	ne	-	-	-
5:55 AM	73.4	100	73.4	29.87	5	ne	-	-	-
5:53 AM	73.04	100	73.04	29.87	4	ne	-	-	-
5:50 AM	73.4	100	73.4	29.87	4	ne	-	-	-
5:45 AM	73.4	100	73.4	29.87	3	ne	-	-	-
5:40 AM	73.4	100	73.4	29.87	-	-	-	-	-
5:35 AM	73.4	100	73.4	29.87	4	ne	-	-	-
5:30 AM	73.4	100	73.4	29.87	4	ne	-	-	-
5:25 AM	73.4	100	73.4	29.87	4	ne	-	-	-
5:05 AM	73.4	100	73.4	29.86	4	ne	-	-	-
5:00 AM	73.4	100	73.4	29.86	4	ne	-	-	-

Time (EDT)	Temp. (ºf)	Humidity (%)	Dew Point (ºf)	Barometer (inHG)	Wind Speed (mph)	Wind Direction	Wind Gust (mph)	1hr. Precip / Rain Total (in.)	Snow Depth
4:55 AM	73.4	100	73.4	29.86	4	ne	-	-	-
4:53 AM	73.04	100	73.04	29.86	4	ne	-	-	-
4:50 AM	73.4	100	73.4	29.86	4	ene	-	-	-
4:45 AM	73.4	100	73.4	29.86	4	ene	-	-	-
4:40 AM	73.4	100	73.4	29.86	4	ene	-	-	-
4:35 AM	73.4	100	73.4	29.86	3	ene	-	-	-
4:30 AM	73.4	100	73.4	29.86	4	ene	-	-	-
4:25 AM	73.4	100	73.4	29.86	3	ene	-	-	-
4:05 AM	73.4	100	73.4	29.87	4	ne	-	-	-
4:00 AM	75.2	94.16	73.4	29.87	4	nne	-	-	-
3:55 AM	75.2	94.16	73.4	29.87	4	ne	-	-	-
3:53 AM	75.02	93.59	73.04	29.87	3	ne	-	-	-
3:50 AM	75.2	94.16	73.4	29.87	3	nne	-	-	-
3:45 AM	75.2	94.16	73.4	29.87	3	ne	-	-	-
3:10 AM	75.2	94.16	73.4	29.87	3	nne	-	-	-
3:05 AM	75.2	94.16	73.4	29.87	3	ne	-	-	-
3:00 AM	75.2	94.16	73.4	29.87	4	ne	-	-	-
2:55 AM	75.2	94.16	73.4	29.87	4	ne	-	-	-
2:53 AM	75.02	96.46	73.94	29.87	4	ne	-	-	-
2:50 AM	75.2	94.16	73.4	29.87	3	ne	-	-	-
2:45 AM	73.4	100	73.4	29.86	5	ene	-	-	-
2:40 AM	73.4	100	73.4	29.86	6	ene	-	-	-
								-	-
								-	-
2:25 AM	75.2	94.16	73.4	29.87	5	ene	-	-	-
2:10 AM	75.2	94.16	73.4	29.88	5	ene	-	-	-
2:05 AM	75.2	94.16	73.4	29.89	4	ne	-	-	-
2:00 AM	75.2	94.16	73.4	29.89	4	ene	-	-	-
1:55 AM	75.2	94.16	73.4	29.89	4	ne	-	-	-
1:53 AM	75.92	93.61	73.94	29.89	4	ne	-	-	-
1:50 AM	75.2	94.16	73.4	29.89	3	ne	-	-	-
1:45 AM	75.2	94.16	73.4	29.89	-	-	-	-	-
1:40 AM	75.2	94.16	73.4	29.89	3	ene	-	-	-
1:35 AM	75.2	94.16	73.4	29.89	3	ene	-	-	-
1:30 AM	75.2	94.16	73.4	29.9	3	ene	-	-	-
1:25 AM	75.2	94.16	73.4	29.89	4	ene	-	-	-
1:10 AM	75.2	94.16	73.4	29.9	5	ne	-	-	-

Time (EDT)	Temp. (ºf)	Humidity (%)	Dew Point (ºf)	Barometer (inHG)	Wind Speed (mph)	Wind Direction	Wind Gust (mph)	1hr. Precip / Rain Total (in.)	Snow Depth
1:05 AM	75.2	94.16	73.4	29.9	5	ne	-	-	-
1:00 AM	75.2	94.16	73.4	29.9	6	ne	-	-	-
12:55 AM	77	88.7	73.4	29.9	5	ne	-	-	-
12:53 AM	77	90.32	73.94	29.9	5	ne	-	-	-
12:50 AM	77	88.7	73.4	29.9	5	ne	-	-	-
12:45 AM	77	88.7	73.4	29.9	4	ne	-	-	-
12:40 AM	77	88.7	73.4	29.9	4	ne	-	-	-
12:35 AM	77	88.7	73.4	29.9	4	ne	-	-	-
12:30 AM	77	88.7	73.4	29.9	4	ne	-	-	-
12:25 AM	77	88.7	73.4	29.9	4	ne	-	-	-
12:10 AM	77	88.7	73.4	29.9	5	ene	-	-	-
12:05 AM	77	88.7	73.4	29.91	4	ene	-	-	-
12:00 AM	77	88.7	73.4	29.91	5	ene	-	-	-

- **Thu, Oct 5th 2023**
- **Wed, Oct 4th 2023**
- **Tue, Oct 3rd 2023**
- **Mon, Oct 2nd 2023**
- **Sun, Oct 1st 2023**
- **Sat, Sep 30th 2023**
- **Wed, Sep 27th 2023**
- **Tue, Sep 26th 2023**
- **Mon, Sep 25th 2023**
- **Sun, Sep 24th 2023**
- **Sat, Sep 23rd 2023**
- **Fri, Sep 22nd 2023**
- **Thu, Sep 21st 2023**
- **Wed, Sep 20th 2023**
- **Tue, Sep 19th 2023**
- **Mon, Sep 18th 2023**
- **Sun, Sep 17th 2023**

26.57 °N, **81.75** °W

Fort Myers, FL Weather History ★

69° SOUTHWEST FLORIDA INTERNATIONAL AIRPORT STATION (/DASHBOARD/PWS/KFLFORTM507?CM_VEN=LOCALWX_PWSDASH) | CHANGE

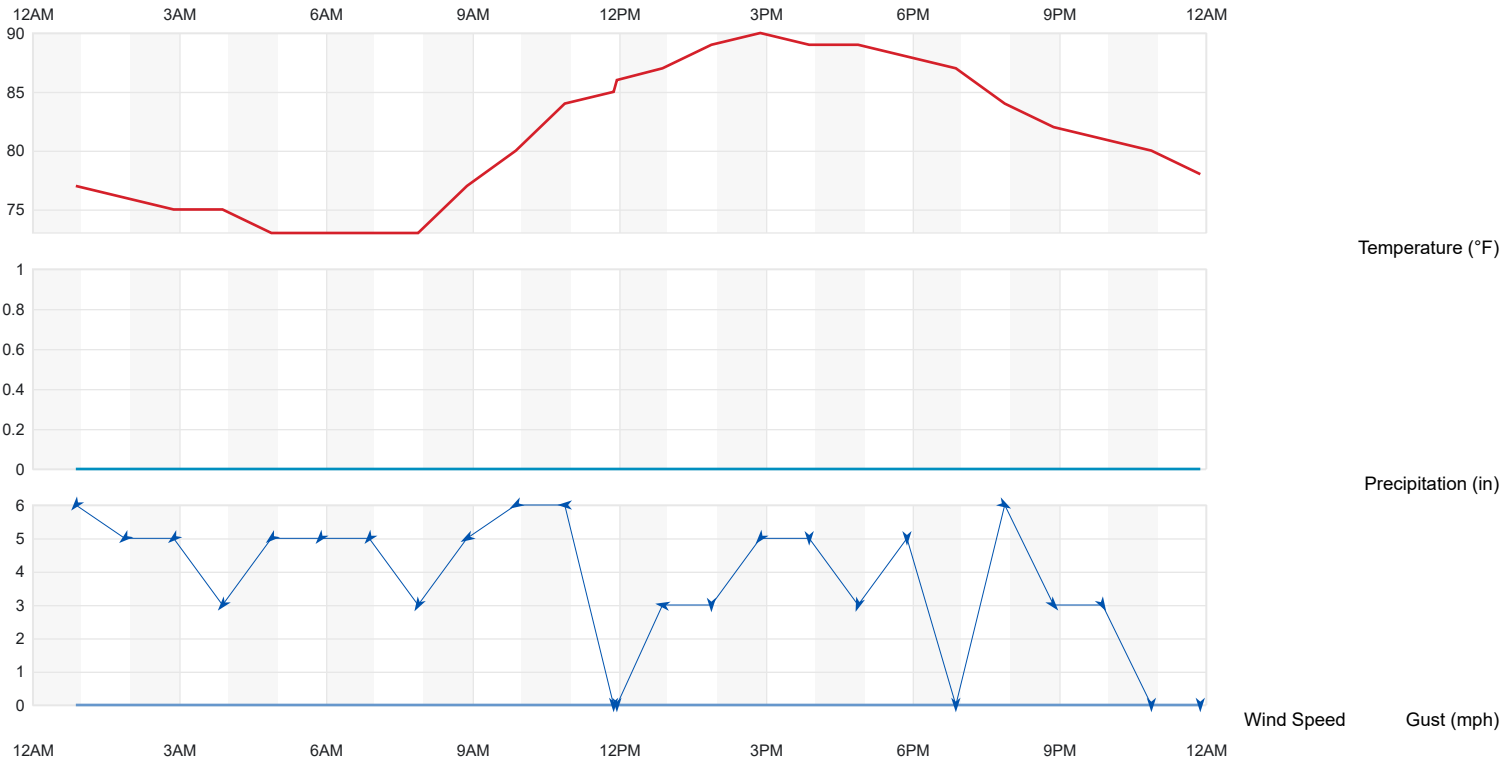
HISTORY (/HISTORY/DAILY/US/FL/FORT-MYERS/KRSW)

- TODAY (/WEATHER/US/FL/FORT-MYERS/KRSW)
- HOURLY (/HOURLY/US/FL/FORT-MYERS/KRSW)
- 10-DAY (/FORECAST/US/FL/FORT-MYERS/KRSW)
- CALENDAR (/CALENDAR/US/FL/FORT-MYERS/KRSW)
- HISTORY (/HISTORY/DAILY/US/FL/FORT-MYERS/KRSW)
- WUNDERMAP (/WUNDERMAP?LAT=26.57&LON=-81.751)

Daily | Weekly | Monthly

(/history/daily/us/fl/fort-myers/KRSW/date/2023-10-6) (/history/weekly/us/fl/fort-myers/KRSW/date/2023-10-6) (/history/monthly/us/fl/fort-myers/KRSW/date/2023-10)

October | 6 | 2023 | View



Summary

Temperature (°F)	Actual	Historic Avg.	Record
High Temp	90	88.3	93
Low Temp	73	72	63
Day Average Temp	81.24	80.2	-

Temperature (°F)	Actual	Historic Avg.	Record
Precipitation (in)	Actual	Historic Avg.	Record
Precipitation (past 24 hours from 04:53:00)	0.00	--	-
Dew Point (°F)	Actual	Historic Avg.	Record
Dew Point	71.8	-	-
High	74	-	-
Low	68	-	-
Average	71.8	-	-
Wind (mph)	Actual	Historic Avg.	Record
Max Wind Speed	6	-	-
Visibility	10	-	-
Sea Level Pressure (in)	Actual	Historic Avg.	Record
Sea Level Pressure	29.89	-	-
Astronomy	Day Length	Rise	Set
Actual Time	11h 47m	7:22 AM	7:09 PM
Civil Twilight		6:59 AM	7:33 PM
Nautical Twilight		6:32 AM	7:59 PM
Astronomical Twilight		6:05 AM	8:26 PM
Moon: waning gibbous		12:03 AM	2:36 PM

Daily Observations

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Precip.	Condition
12:53 AM	77 °F	74 °F	90 %	NE	6 mph	0 mph	29.87 in	0.0 in	Fair
1:53 AM	76 °F	74 °F	94 %	NE	5 mph	0 mph	29.86 in	0.0 in	Fair
2:53 AM	75 °F	74 °F	96 %	NE	5 mph	0 mph	29.84 in	0.0 in	Fair
3:53 AM	75 °F	73 °F	94 %	NE	3 mph	0 mph	29.84 in	0.0 in	Fair
4:53 AM	73 °F	73 °F	100 %	NE	5 mph	0 mph	29.83 in	0.0 in	Fair
5:53 AM	73 °F	73 °F	100 %	NE	5 mph	0 mph	29.84 in	0.0 in	Fair
6:53 AM	73 °F	73 °F	100 %	NE	5 mph	0 mph	29.86 in	0.0 in	Fair
7:53 AM	73 °F	73 °F	100 %	NNE	3 mph	0 mph	29.87 in	0.0 in	Fair
8:53 AM	77 °F	74 °F	90 %	ENE	5 mph	0 mph	29.88 in	0.0 in	Fair
9:53 AM	80 °F	74 °F	81 %	ENE	6 mph	0 mph	29.89 in	0.0 in	Fair
10:53 AM	84 °F	73 °F	69 %	E	6 mph	0 mph	29.89 in	0.0 in	Fair
11:53 AM	85 °F	72 °F	65 %	CALM	0 mph	0 mph	29.89 in	0.0 in	Fair
11:57 AM	86 °F	72 °F	63 %	CALM	0 mph	0 mph	29.88 in	0.0 in	Partly Cloudy
12:53 PM	87 °F	70 °F	57 %	E	3 mph	0 mph	29.87 in	0.0 in	Partly Cloudy
1:53 PM	89 °F	71 °F	55 %	VAR	3 mph	0 mph	29.85 in	0.0 in	Fair
2:53 PM	90 °F	70 °F	52 %	NE	5 mph	0 mph	29.83 in	0.0 in	Fair
3:53 PM	89 °F	68 °F	50 %	VAR	5 mph	0 mph	29.82 in	0.0 in	Partly Cloudy
4:53 PM	89 °F	68 °F	50 %	NNE	3 mph	0 mph	29.82 in	0.0 in	Partly Cloudy
5:53 PM	88 °F	70 °F	55 %	VAR	5 mph	0 mph	29.83 in	0.0 in	Fair
6:53 PM	87 °F	70 °F	57 %	CALM	0 mph	0 mph	29.83 in	0.0 in	Fair
7:53 PM	84 °F	70 °F	63 %	WNW	6 mph	0 mph	29.84 in	0.0 in	Partly Cloudy

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Precip.	Condition
8:53 PM	82 °F	70 °F	67 %	NW	3 mph	0 mph	29.86 in	0.0 in	Fair
9:53 PM	81 °F	71 °F	72 %	NNW	3 mph	0 mph	29.88 in	0.0 in	Fair
10:53 PM	80 °F	72 °F	76 %	CALM	0 mph	0 mph	29.88 in	0.0 in	Fair
11:53 PM	78 °F	73 °F	84 %	CALM	0 mph	0 mph	29.88 in	0.0 in	Fair

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Weather observations for the past three days

Naples, Naples Municipal Airport

Enter Your "City, ST" or zip code Go

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (ºF)				Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt	6 hour Max.	6 hour Min.				altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
09	05:53	N 7	10.00	Overcast	BKN031 BKN050 OVC085	72	62			71%	NA	NA	29.87	1011.3			
09	04:53	N 9	10.00	Mostly Cloudy	SCT065 BKN085	72	61			68%	NA	NA	29.86	1010.9			
09	03:53	N 9	10.00	Fair	CLR	72	59			64%	NA	NA	29.86	1010.9			
09	02:53	NE 5	10.00	A Few Clouds	FEW090	73	59			62%	NA	NA	29.87	1011.2			
09	01:53	N 6	10.00	Overcast	OVC090	74	59	80	74	60%	NA	NA	29.90	1012.2			
09	00:53	N 7	10.00	Overcast	OVC100	75	60			60%	NA	NA	29.90	1012.4			
08	23:53	NE 8	10.00	Mostly Cloudy	BKN100	75	63			66%	NA	NA	29.91	1012.6			
08	22:53	N 9	10.00	Overcast	OVC050	76	64			67%	NA	78	29.90	1012.5			
08	21:53	N 8	10.00	Partly Cloudy	SCT050 SCT120	77	65			66%	NA	79	29.89	1012.0			
08	20:53	N 6	10.00	Mostly Cloudy	BKN120	78	66			67%	NA	80	29.87	1011.4			
08	19:53	N 7	10.00	Overcast	OVC055	80	67	87	80	64%	NA	82	29.85	1010.7			
08	18:53	NW 7	10.00	Overcast	OVC075	83	69			63%	NA	87	29.84	1010.5			
08	17:53	NW 10	10.00	Mostly Cloudy	BKN075 BKN110	84	71			65%	NA	89	29.83	1010.1			
08	16:53	W 13	10.00	Overcast	BKN060 OVC110	84	71			65%	NA	89	29.83	1010.0			
08	15:53	W 9	10.00	Overcast	OVC060	83	72			70%	NA	88	29.84	1010.3			
08	14:53	W 8	10.00	Mostly Cloudy	BKN070	84	71			65%	NA	89	29.84	1010.5			
08	13:53	SW 7	10.00	Overcast	OVC070	86	68	88	75	55%	NA	89	29.86	1011.0			
08	12:53	Calm	10.00	Fair	CLR	87	68			53%	NA	90	29.88	1011.7			
08	11:53	Calm	10.00	Partly Cloudy	SCT050	84	71			65%	NA	89	29.91	1012.6			
08	10:53	Calm	10.00	Mostly Cloudy	FEW019 BKN050	83	72			70%	NA	88	29.92	1013.0			
08	09:53	N 6	10.00	Fair	CLR	81	72			74%	NA	85	29.91	1012.7			
08	08:53	N 6	10.00	Fair	CLR	78	71			79%	NA	80	29.89	1012.1			
08	07:53	NE 5	10.00	A Few Clouds	FEW120	75	71	78	75	88%	NA	NA	29.88	1011.6			
08	06:53	NE 5	9.00	Fair	CLR	75	71			88%	NA	NA	29.87	1011.3			
08	05:53	NE 3	9.00	Fair	CLR	75	71			88%	NA	NA	29.85	1010.7			
08	04:53	N 5	10.00	Fair	CLR	76	71			85%	NA	77	29.85	1010.6			
08	03:53	N 3	10.00	A Few Clouds	FEW110	77	72			85%	NA	78	29.85	1010.8			

08	02:53	N 3	10.00	Fair	CLR	77	72			85%	NA	78	29.86	1010.9
08	01:53	N 3	10.00	Fair	CLR	78	72	84	78	82%	NA	80	29.87	1011.5
08	00:53	NE 5	10.00	Fair	CLR	78	73			85%	NA	80	29.87	1011.3
07	23:53	NE 3	10.00	Fair	CLR	80	73			79%	NA	84	29.89	1012.0
07	22:53	N 3	10.00	Fair	CLR	81	74			79%	NA	86	29.89	1012.1
07	21:53	N 5	10.00	Fair	CLR	82	75			79%	NA	89	29.89	1011.9
07	20:53	NW 6 G 17	10.00	Partly Cloudy	SCT026	84	75			74%	NA	92	29.87	1011.5
07	19:53	NW 8	10.00	A Few Clouds	FEW027	84	73	89	84	70%	NA	90	29.86	1011.1
07	18:53	W 9	10.00	Fair	CLR	85	73			68%	NA	92	29.86	1011.1
07	17:53	W 13	10.00	A Few Clouds	FEW027	86	75			70%	NA	95	29.86	1011.0
07	16:53	W 9	10.00	A Few Clouds	FEW024	87	75			67%	NA	96	29.86	1010.9
07	15:53	W 12	10.00	Fair	CLR	87	74			65%	NA	95	29.86	1011.1
07	14:53	W 10	10.00	Fair	CLR	89	75			63%	NA	99	29.86	1011.2
07	13:53	SW 10	10.00	Fair	CLR	88	73	89	76	61%	NA	96	29.89	1012.0
07	12:53	SW 10	10.00	Fair	CLR	88	73			61%	NA	96	29.91	1012.7
07	11:53	SW 10	10.00	A Few Clouds	FEW034	88	73			61%	NA	96	29.92	1013.0
07	10:53	SE 6	10.00	Fair	CLR	87	74			65%	NA	95	29.92	1013.1
07	09:53	Vrbl 3	10.00	Fair	CLR	84	75			74%	NA	92	29.93	1013.3
07	08:53	E 3	10.00	Fair	CLR	80	75			85%	NA	85	29.91	1012.8
07	07:53	E 5	10.00	Fair	CLR	76	74	79	76	94%	NA	76	29.91	1012.8
07	06:53	E 5	10.00	Fair	CLR	76	74			94%	NA	76	29.89	1012.1
07	05:53	E 5	10.00	Fair	CLR	76	74			94%	NA	76	29.88	1011.7
07	04:53	E 6	10.00	Fair	CLR	76	73			91%	NA	76	29.87	1011.2
07	03:53	E 6	10.00	Fair	CLR	77	73			88%	NA	78	29.87	1011.3
07	02:53	E 6	10.00	Fair	CLR	77	73			88%	NA	78	29.87	1011.5
07	01:53	NE 3	10.00	Fair	CLR	79	72	83	79	79%	NA	82	29.88	1011.8
07	00:53	NW 3	10.00	Fair	CLR	80	72			76%	NA	84	29.88	1011.8
06	23:53	N 3	10.00	Mostly Cloudy	BKN060	82	72			72%	NA	87	29.90	1012.4
06	22:53	NW 5	10.00	A Few Clouds	FEW050	82	72			72%	NA	87	29.91	1012.6
06	21:53	NW 5	10.00	A Few Clouds	FEW055	83	73			72%	NA	89	29.90	1012.4
06	20:53	NW 5	10.00	Fair	CLR	83	73			72%	NA	89	29.89	1011.9
06	19:53	W 5	10.00	Fair	CLR	83	72	89	83	70%	NA	88	29.87	1011.4
06	18:53	W 9	10.00	Fair	CLR	85	72			65%	NA	91	29.86	1011.2
06	17:53	W 10	10.00	Fair	CLR	87	70			57%	NA	92	29.86	1010.9
06	16:53	W 12	10.00	Fair	CLR	88	69			54%	NA	93	29.85	1010.7
06	15:53	W 13	10.00	Fair	CLR	88	71			57%	NA	94	29.86	1010.9
06	14:53	W 10	10.00	Fair	CLR	88	71			57%	NA	94	29.86	1011.0
06	13:53	W 12	10.00	Fair	CLR	89	74	91	77	61%	NA	98	29.87	1011.5
06	12:53	W 6	10.00	Fair	CLR	87	73			63%	NA	94	29.89	1012.1

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air	Dwpt	Max. 6 hour	Min. 6 hour	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.)	sea level (mb)	1 hr	3 hr	6 hr
						Temperature (ºF)							Pressure		Precipitation (in.)		
06	11:53	Calm	10.00	A Few Clouds	FEW033	88	71			57%	NA	94	29.91	1012.6			
06	10:53	NE 5	10.00	Fair	CLR	86	73			65%	NA	93	29.91	1012.9			
06	09:53	NE 7	10.00	Fair	CLR	84	74			72%	NA	91	29.91	1012.8			
06	08:53	NE 6	10.00	Fair	CLR	80	74			82%	NA	85	29.90	1012.5			
06	07:53	NE 5	10.00	Fair	CLR	77	74	78	75	90%	NA	78	29.89	1011.9			
06	06:53	NE 3	10.00	Fair	CLR	75	73			94%	NA	NA	29.88	1011.8			

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metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (ºF)				Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt	6 hour Max.	6 hour Min.				altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
11	06:53	NE 7	10.00	Fair	CLR	75	73			94%	NA	NA	29.83	1010.1			
11	05:53	NE 3	10.00	Fair	CLR	75	72			90%	NA	NA	29.83	1009.8			
11	04:53	Calm	10.00	Fair	CLR	76	72			88%	NA	76	29.82	1009.6			
11	03:53	Calm	10.00	Fair	CLR	77	72			85%	NA	78	29.82	1009.8			
11	02:53	E 3	10.00	Fair	CLR	77	71			82%	NA	79	29.84	1010.3			
11	01:53	E 5	10.00	Fair	CLR	78	72	82	78	82%	NA	80	29.85	1010.7			
11	00:53	E 5	10.00	Fair	CLR	79	73			82%	NA	82	29.87	1011.4			
10	23:53	NE 7	10.00	Fair	CLR	79	73			82%	NA	82	29.88	1011.6			
10	22:53	Calm	10.00	Fair	CLR	79	73			82%	NA	82	29.88	1011.7			
10	21:53	Calm	10.00	Fair	CLR	80	73			79%	NA	84	29.88	1011.7			
10	20:53	Calm	10.00	Fair	CLR	81	73			77%	NA	86	29.88	1011.5			
10	19:53	W 3	10.00	Fair	CLR	81	73	88	81	77%	NA	86	29.86	1011.1			
10	18:53	NW 5	10.00	Fair	CLR	82	72			72%	NA	87	29.85	1010.8			
10	17:53	W 3	10.00	Fair	CLR	83	72			70%	NA	88	29.84	1010.4			
10	16:53	W 6	10.00	Fair	CLR	83	71			67%	NA	88	29.84	1010.4			
10	15:53	W 6	10.00	Fair	CLR	84	71			65%	NA	89	29.84	1010.4			
10	14:53	W 9	10.00	Fair	CLR	85	71			63%	NA	90	29.87	1011.2			
10	13:53	Vrbl 6	10.00	A Few Clouds	FEW040	88	69	88	72	54%	NA	93	29.88	1011.8			
10	12:53	N 6	10.00	Mostly Cloudy	BKN029	84	70			63%	NA	88	29.92	1012.9			
10	11:53	N 5	10.00	A Few Clouds	FEW026	84	69			61%	NA	88	29.92	1013.1			
10	10:53	NE 7	10.00	Fair	CLR	82	70			67%	NA	86	29.93	1013.5			
10	09:53	NE 8	10.00	Fair	CLR	79	69			72%	NA	82	29.94	1013.6			
10	08:53	NE 6	10.00	Overcast	OVC030	75	67			76%	NA	NA	29.92	1013.1			
10	07:53	NE 6	10.00	Fair	CLR	72	66	73	71	82%	NA	NA	29.89	1012.0			
10	06:53	NE 6	10.00	Fair	CLR	72	66			82%	NA	NA	29.87	1011.4			
10	05:53	NE 5	10.00	Fair	CLR	71	66			84%	NA	NA	29.86	1011.2			
10	04:53	N 6	10.00	Partly Cloudy	SCT030	72	65			79%	NA	NA	29.86	1010.9			
10	03:53	N 6	10.00	Fair	CLR	72	66			82%	NA	NA	29.86	1010.9			
10	02:53	N 6	10.00	Fair	CLR	73	65			76%	NA	NA	29.86	1011.1			
10	01:53	N 5	10.00	Mostly Cloudy	BKN027	73	65	75	71	76%	NA	NA	29.88	1011.8			
10	00:53	NE 3	10.00	Fair	CLR	71	65			81%	NA	NA	29.89	1012.1			
09	22:53	E 5	10.00	Fair	CLR	72	64			76%	NA	NA	29.91	1012.7			
09	21:53	NE 7	10.00	Fair	CLR	74	64			71%	NA	NA	29.90	1012.5			

09	20:53	N 8	10.00	Fair	CLR	74	64			71%	NA	NA	29.89	1012.1
09	19:53	N 6	10.00	Fair	CLR	75	64	86	75	69%	NA	NA	29.87	1011.5
09	18:53	N 6	10.00	Fair	CLR	77	64			64%	NA	79	29.86	1010.9
09	17:53	N 9	10.00	Overcast	SCT035 OVC060	82	67			60%	NA	84	29.86	1010.9
09	16:53	NE 3	10.00	Overcast	FEW036 BKN050 OVC070	84	68			59%	NA	87	29.85	1010.5
09	15:53	NA	10.00	Fair	CLR	85	68			57%	NA	88	29.85	1010.6
09	14:53	NE 8	10.00	Mostly Cloudy	BKN060	83	66			57%	NA	85	29.86	1011.1
09	13:53	N 7	10.00	Overcast	FEW050 OVC060	81	65	82	72	58%	NA	83	29.89	1011.9
09	12:53	NE 8	10.00	Overcast	FEW029 SCT050 OVC070	79	64			60%	NA	81	29.91	1012.7
09	11:53	NE 12	10.00	Mostly Cloudy	BKN050	77	62			60%	NA	79	29.93	1013.4
09	10:53	NE 12	10.00	Overcast	SCT032 BKN050 OVC080	75	61			62%	NA	NA	29.93	1013.3
09	09:53	N 8 G 18	10.00	Overcast	OVC031	73	62			69%	NA	NA	29.93	1013.2
09	08:53	NE 9	10.00	Overcast	FEW026 OVC050	73	63			71%	NA	NA	29.90	1012.3
09	07:53	NE 8	10.00	Mostly Cloudy	BKN029	72	62	74	71	71%	NA	NA	29.88	1011.8
09	06:53	NE 6	10.00	Overcast	OVC050	72	63			73%	NA	NA	29.88	1011.7
09	05:53	N 7	10.00	Overcast	BKN031 BKN050 OVC085	72	62			71%	NA	NA	29.87	1011.3
09	04:53	N 9	10.00	Mostly Cloudy	SCT065 BKN085	72	61			68%	NA	NA	29.86	1010.9
09	03:53	N 9	10.00	Fair	CLR	72	59			64%	NA	NA	29.86	1010.9
09	02:53	NE 5	10.00	A Few Clouds	FEW090	73	59			62%	NA	NA	29.87	1011.2
09	01:53	N 6	10.00	Overcast	OVC090	74	59	80	74	60%	NA	NA	29.90	1012.2
09	00:53	N 7	10.00	Overcast	OVC100	75	60			60%	NA	NA	29.90	1012.4
08	23:53	NE 8	10.00	Mostly Cloudy	BKN100	75	63			66%	NA	NA	29.91	1012.6
08	22:53	N 9	10.00	Overcast	OVC050	76	64			67%	NA	78	29.90	1012.5
08	21:53	N 8	10.00	Partly Cloudy	SCT050 SCT120	77	65			66%	NA	79	29.89	1012.0
08	20:53	N 6	10.00	Mostly Cloudy	BKN120	78	66			67%	NA	80	29.87	1011.4
08	19:53	N 7	10.00	Overcast	OVC055	80	67	87	80	64%	NA	82	29.85	1010.7
08	18:53	NW 7	10.00	Overcast	OVC075	83	69			63%	NA	87	29.84	1010.5
08	17:53	NW 10	10.00	Mostly Cloudy	BKN075 BKN110	84	71			65%	NA	89	29.83	1010.1
08	16:53	W 13	10.00	Overcast	BKN060 OVC110	84	71			65%	NA	89	29.83	1010.0
08	15:53	W 9	10.00	Overcast	OVC060	83	72			70%	NA	88	29.84	1010.3
08	14:53	W 8	10.00	Mostly Cloudy	BKN070	84	71			65%	NA	89	29.84	1010.5

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air	Dwpt	Max. (6 hour)	Min. (6 hour)	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.)	sea level (mb)	1 hr	3 hr	6 hr
						Temperature (ºF)							Pressure		Precipitation (in.)		
08	13:53	SW 7	10.00	Overcast	OVC070	86	68	88	75	55%	NA	89	29.86	1011.0			
08	12:53	Calm	10.00	Fair	CLR	87	68			53%	NA	90	29.88	1011.7			
08	11:53	Calm	10.00	Partly Cloudy	SCT050	84	71			65%	NA	89	29.91	1012.6			
08	10:53	Calm	10.00	Mostly Cloudy	FEW019 BKN050	83	72			70%	NA	88	29.92	1013.0			
08	09:53	N 6	10.00	Fair	CLR	81	72			74%	NA	85	29.91	1012.7			
08	08:53	N 6	10.00	Fair	CLR	78	71			79%	NA	80	29.89	1012.1			
08	07:53	NE 5	10.00	A Few Clouds	FEW120	75	71	78	75	88%	NA	NA	29.88	1011.6			

ROOST SURVEY DATA FORMS

Roost Survey Data Form

Project	County/State	Observer	Date	Survey Start Time	Survey End Time
US 41 + Bonita	Lee	J. Barhorst, R. Campana	10-4-23	8:14 AM	2:30pm

Weather

	Temp	Relative Humidity	Cloud Cover	Wind Speed	Weather Event
Start:	73° F	95%	clear	6 mph NNE	Fair
End:	90° F	50 %	Cloudy clear	10 mph NE	Mostly Cloudy

Potential Roost Data

Location PRT1 Roost Location Method Visual Structure Type Tree Broad Habitat Forest - Pine

Latitude	Longitude	Exit ID	Roost Type	Exit Direction	Vegetation Obstruction	Emergence Point Height	Opening Width	Opening Height	Structure Height
26.334454	-81.800863	A	Tree cavity	ENE	NO	11 ft	3 in	3 in	25 ft
		B		E	NO	13 ft	4 in	2 in	

Tree Species	Tree Decay	DBH ~~(cm)~~ in	Guano	Species Identified	# Bats	# Pups	Observation Method	Dominant Plant Species
Live Oak	dying	8.2 in	NO	N/A	0	0	Visual GO-Pro	Longleaf pine, live oak, slash pine, Saw palmetto

Potential Roost Data

Location PRT2 Roost Location Method Visual Structure Type Tree Broad Habitat Urban w/ Adjacent Forested habitat

Latitude	Longitude	Exit ID	Roost Type	Exit Direction	Vegetation Obstruction	Emergence Point Height	Opening Width	Opening Height	Structure Height
26.334588	-81.805253	A	Tree cavity	SW	NO	10 ft	3 in	4 in	15 ft

Tree Species	Tree Decay	DBH ~~(cm)~~	Guano	Species Identified	# Bats	# Pups	Observation Method	Dominant Plant Species
Laurel Oak	Dead/Snag	10.5 in	NO	N/A	0	0	Visual GO-Pro	Laurel oak, cabbage palm, Brazilian Pepper

Roost Survey Data Form

Potential Roost Data

Location PRT 3 Roost Location Method Visual Structure Type Tree Broad Habitat Urban w/ Adjacent Forested wetlands

Latitude	Longitude	Exit ID	Roost Type	Exit Direction	Vegetation Obstruction	Emergence Point Height	Opening Width	Opening Height	Structure Height
26.334764	-81.805375	A	Tree basal hollow	W	minimal strangler figs	10 ft.	6 in	8 in	10 ft

Tree Species	Tree Decay	DBH (cm)	Guano	Species Identified	# Bats	# Pups	Observation Method	Dominant Plant Species
Laurel Oak	Split trunk Dead/dying	11.8	ND	N/A	0	0	Visual 60-100	Laurel oak, Brazilian pepper, Cabbage palm

Potential Roost Data

Location PRT 4 Roost Location Method Visual Structure Type Tree Broad Habitat Forest Wetlands

Latitude	Longitude	Exit ID	Roost Type	Exit Direction	Vegetation Obstruction	Emergence Point Height	Opening Width	Opening Height	Structure Height
26.335631	-81.805194	A & E	Cavity	NE	ND	50 ft, 50 ft, 30 ft	2 in, 3 in, 4 in	4 in, 5 in	52 ft

Tree Species	Tree Decay	DBH (cm)	Guano	Species Identified	# Bats	# Pups	Observation Method	Dominant Plant Species
Slash pine	Some dead	Unable to access	ND	N/A	0	0	Visual binoculars	Slash Pine, Brazilian Pepper, Cabbage palm

Potential Roost Data

Location PRT 5 Roost Location Method Visual Structure Type Tree Broad Habitat Urban

Latitude	Longitude	Exit ID	Roost Type	Exit Direction	Vegetation Obstruction	Emergence Point Height	Opening Width	Opening Height	Structure Height
26.337150	-81.803524	A	crevis	S	ND	45 ft	3 in	12 in	40 ft

Tree Species	Tree Decay	DBH (cm)	Guano	Species Identified	# Bats	# Pups	Observation Method	Dominant Plant Species
Melaleuca	Healthy	Unable to access	ND	N/A	0	0	Visual binoculars	Melaleuca, Brazilian Pepper

FLORIDA BONNETED BAT CONSULTATION KEY

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960
October 22, 2019

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

Subject: Consultation Key for the Florida bonneted bat; 04EF2000-2014-I-0320-R001

Dear Mr. Zinszer:

This letter replaces the December 2013, Florida bonneted bat guidelines provided to the U.S. Army Corps of Engineers (Corps) to assist your agency with effect determinations within the range of the Florida bonneted bat (*Eumops floridanus*). This October 2019 revision supersedes all prior versions. The enclosed *Florida Bonneted Bat Consultation Guidelines* and incorporated *Florida Bonneted Bat Consultation Key* (Key) are provided pursuant to the U.S. Fish and Wildlife Service's (Service) authorities under the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C.1531 *et seq.*). This letter, guidelines, and Key have been assigned Service Consultation Code: 41420- 04EF2000-2014-I-0320-R001.

The purpose of the guidelines and Key is to aid the Corps (or other Federal action agency) in making appropriate effect determinations for the Florida bonneted bat under section 7 of the Act, and streamline informal consultation with the Service for the Florida bonneted bat when the proposed action is consistent with the Key. There is no requirement to use the Key. There will be cases when the use of the Key is not appropriate. These include, but are not limited to: where project specific information is outside of the scope of the Key, applicants do not wish to implement the identified survey or best management practices, or if there is new biological information about the species. In these cases, we recommend the Corps (or other Federal action agency) initiate traditional consultation pursuant to section 7 of the Act, and identify that consultation is being requested outside of the Key.

This Key uses type of habitat (*i.e*, roosting or foraging), survey results, and project size as the basis for making determinations of "may affect, but is not likely to adversely affect" (MANLAA) and "may affect, and is likely to adversely affect" (LAA). The Key is structured to focus on the type(s) of habitat that will be affected by a project. When proposed project areas provide features that could support roosting of Florida bonneted bats, it is considered roosting habitat. If evaluation of roosting habitat determines that roosting is not likely, then the area is subsequently evaluated for its value to the species as foraging habitat.

Roosting habitat

The guidelines describe the features of roosting habitat. When a project is proposed in roosting habitat, the likelihood that roosting is occurring is evaluated through surveys (*i.e.*, full acoustic or limited roost). When a roost is expected and the proposed activity will affect that roost, formal consultation is required. This is because the proposed activity is expected to take individuals through the destruction of the roost and the appropriate determination is that the project may affect, and is likely to adversely affect (LAA) the species. When roosting is expected, but all impacts to the roost can be avoided, and only foraging habitat (without roost structure) will be affected, the Service finds that it is reasonable to conclude that the proposed action is not likely to impair feeding, breeding, or sheltering. Thus, the proposed project may affect, but is not likely to affect the Florida bonneted bat (MANLAA).

The exception to this logic path is if the proposed action will affect more than 50 acres of foraging habitat in proximity to the roost. Under this scenario, we anticipate that the loss of the larger amount of foraging habitat near the roost could significantly impair feeding of young and overall breeding (*i.e.*, LAA). Consequently, these projects would require formal consultation to analyze the effect of the incidental take.

If the roost surveys demonstrate that roosting is not likely, the project is then evaluated for its effects to foraging habitat. Our evaluation of these actions is described below. The exception is for projects less than or equal to 5 acres if a limited roost survey is conducted. Limited roost surveys rely on peeping and visual surveys to determine whether roosting is likely. On these small projects, this survey strategy is believed to be more economical and is considered a reasonable effort to evaluate the potential for roosting. The Service acknowledges that this approach is less reliable in evaluating the likelihood of roosting when it is not combined with acoustic surveys. Therefore, when limited roost surveys are conducted for projects that are less than or equal to 5 acres in size and the determination is that roosting is not likely, we conclude that the proposed project may affect, but is not likely to adversely affect the species (MANLAA).

Foraging habitat

The guidelines describe the features of foraging habitat. Data informing the home range size of the Florida bonneted bats is limited. Global Positioning System (GPS) and radio-telemetry data for Florida bonneted bats documents that they 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 (BWWMA) 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). At BWWMA, researchers found that most individual locations were within one mile of the roost (point of capture) (Ober 2015). Additional data collected during the month of December documented the mean maximum distance 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 (BWWMA 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. Regardless, we use these studies as our best available information to evaluate when changes to foraging habitat may have an effect on the species ability to feed, breed, and shelter and subsequently result in incidental take. When considering where most of the nightly activity was observed, we calculate a foraging area centered on a roost with a 1 mile radius would include approximately 2,000 acres, and a foraging area centered on a 9.5 mile radius would encompass approximately 181,000 acres, on any given night.

Given the Service's limited understanding of how the Florida bonneted bat moves throughout its home range and selects foraging areas, we choose to use 50 acres of habitat as a conservative estimate to when loss of foraging habitat may affect the fitness of an individual to the extent that it would impair feeding and breeding. Projects that would remove, destroy or convert less than 50 acres of Florida bonneted bat foraging habitat are expected to result in a loss of foraging opportunities; however, this decrease is not expected to significantly impair the ability of the individual to feed and breed. Consequently, projects impacting less than 50 acres of foraging habitat that implement the identified best management practices in the Key would be expected to avoid take, and the appropriate determination is that the project may affect, but is not likely to adversely affect the species (MANLAA).

Next, the Service incorporated the level of bat activity into our Key to evaluate when a foraging area may have greater value to the species. When surveys document high bat activity, we deduce that this area has increased value and importance to the species. Thus, when high bat activity is detected in parcels with greater than 50 acres of foraging habitat, we anticipate that the loss, destruction, or conversion of this habitat could significantly impair the ability of an individual to feed and breed (*i.e.*, LAA); thus formal consultation is warranted.

If surveys do not indicate high bat activity, we anticipate that loss of this additional foraging habitat may affect, but is not likely to adversely affect the species (MANLAA). This is because although the acreage is large, the area does not appear to be important at the landscape scale of nightly foraging. Therefore, its loss is not anticipated to significantly impair the ability of an individual to feed or breed.

The exception to this approach is for projects greater than 50 acres when they occur in potential roosting habitat that is not found to support roosting or high bat activity. Under this scenario, the Service concludes that the loss of the large acreage of suitable roosting habitat has the potential to significantly impair the ability of an individual to breed or shelter (*i.e.*, LAA) because the species is cavities for roosting are expected to be limited range wide and the project will impair these limited opportunities for roosting.

Determinations

The Corps (or other Federal action agency) may reach one of several determinations when using this Key. Regardless of the determination, when acoustic bat surveys have been conducted, the Service requests that these survey results are provided to our office to increase our knowledge of

the species and improve our consultation process. Surveys results and reports should be transmitted to the Service at 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. When formal consultation is requested, survey results and reports should be submitted with the consultation request to verobeach@fws.gov.

No effect: If the use of the Key results in a determination of "no effect," no further consultation is necessary with the Service. The Service recommends that the Corps (or other Federal action agency) documents the pathway used to reach the determination in the project record and proceeds with other species analyses as warranted.

May Affect, Not Likely to Adversely Affect (MANLAA): In this Key we have identified two ways that consultation can conclude informally, MANLAA-P and MANLAA-C.

> **MANLAA-P**: If the use of the Key results in a determination of "MANLAA- P," the Service concurs with this determination based on the rationale provide above, and no further consultation is necessary for the effects of the proposed action on the Florida bonneted bat. The Service recommends that the Corps (or other Federal action agency) documents the pathway used to reach the determination in the project record and proceeds with other species analyses as warranted.
>
> **MANLAA-C**: If the use of the Key results in a determination of MANLAA-C, further consultation with the Service is required to confirm that the Key has been used properly, and the Service concurs with the evaluation of the survey results. Survey results should be submitted with the consultation request.

May Affect, Likely to Adversely Affect (LAA) - When the determination in the Key is "LAA" technical assistance with the Service and modifications to the proposed action may enable the project to be reevaluated and conclude with a MANLAA-C determination. Under other circumstance, "LAA" determinations will require formal consultation.

Working with the Fish and Wildlife Foundation of Florida, the Service has established a fund to support conservation and recovery for the Florida bonneted bat. Any project that has the potential to affect the Florida bonneted bat and/or its habitat is encouraged to make a voluntary contribution to this fund. If you would like additional information about how to make a contribution and how these monies are used to support Florida bonneted bat recovery please contact Ashleigh Blackford, Connie Cassler, or José Rivera at 772-562-3909.

This revised Key is effective immediately upon receipt by the Corps. Should circumstances change or new information become available regarding the Florida bonneted bat and/or implementation of the Key, the determinations herein may be reconsidered and this Key further revised or amended. We have established an email address to collect comments on the Key and the survey protocols at: FBBguidelines@fws.gov.

Thank you for your continued cooperation in the effort to conserve fish and wildlife resources. If you have any questions regarding this Key, please contact the South Florida Ecological Services Office at 772-562-3909.

Sincerely,

Roxanna Hinzman
Field Supervisor
South Florida Ecological Services

Enclosure

Cc: electronic only
Corps, Jacksonville, Florida (Dale Beter, Muriel Blaisdell, Ingrid Gilbert, Alisa Zarbo, Melinda Charles-Hogan, Susan Kaynor, Krista Sabin, John Fellows)

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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.

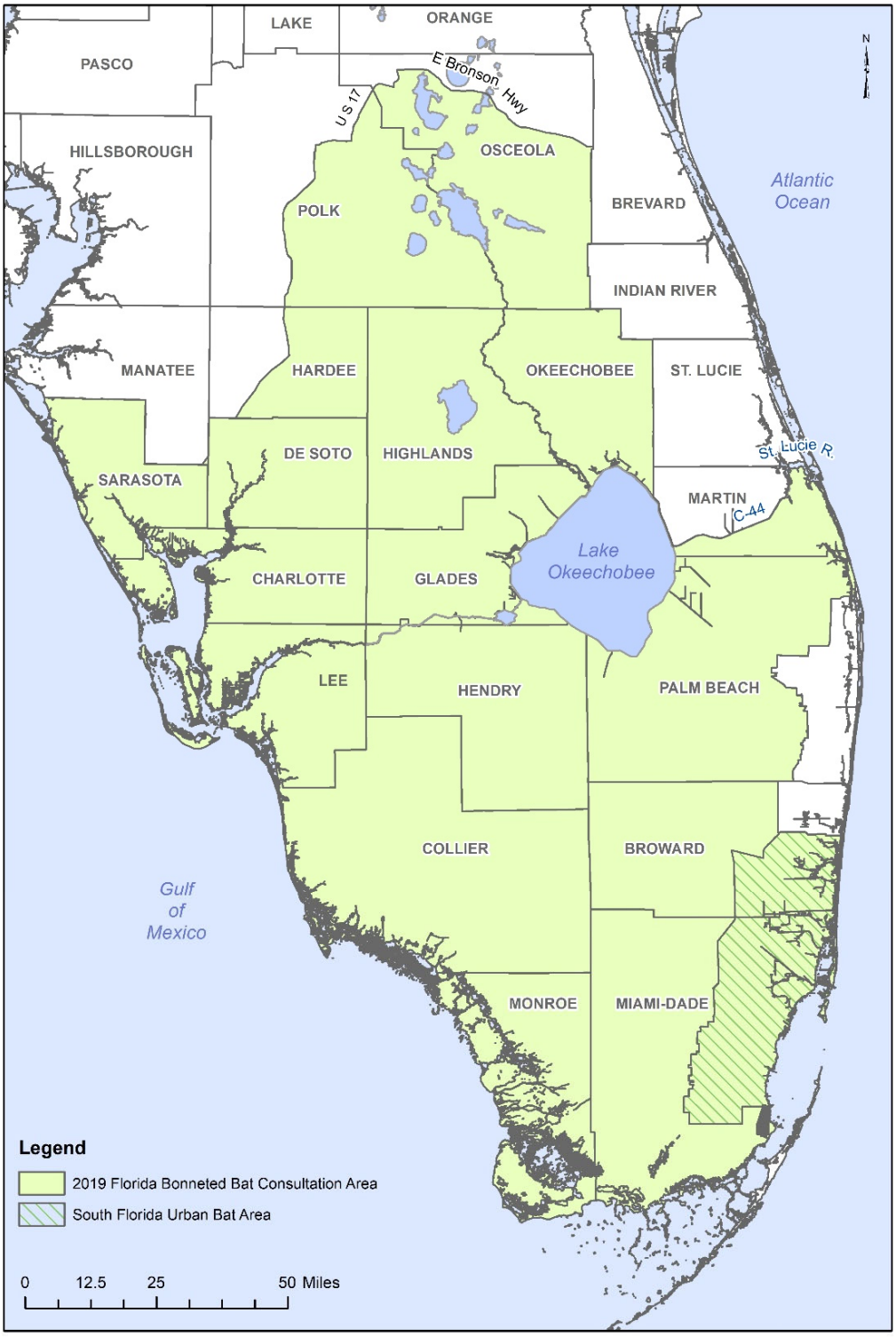

Figure 1. Florida Bonneted Bat Consultation Area. Hatched area (Figure 2) identifies the urban development boundary in Miami-Dade and Broward County. Applicants with projects in this area should contact the Service for specific guidance addressing this area and individual consultation. The Consultation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

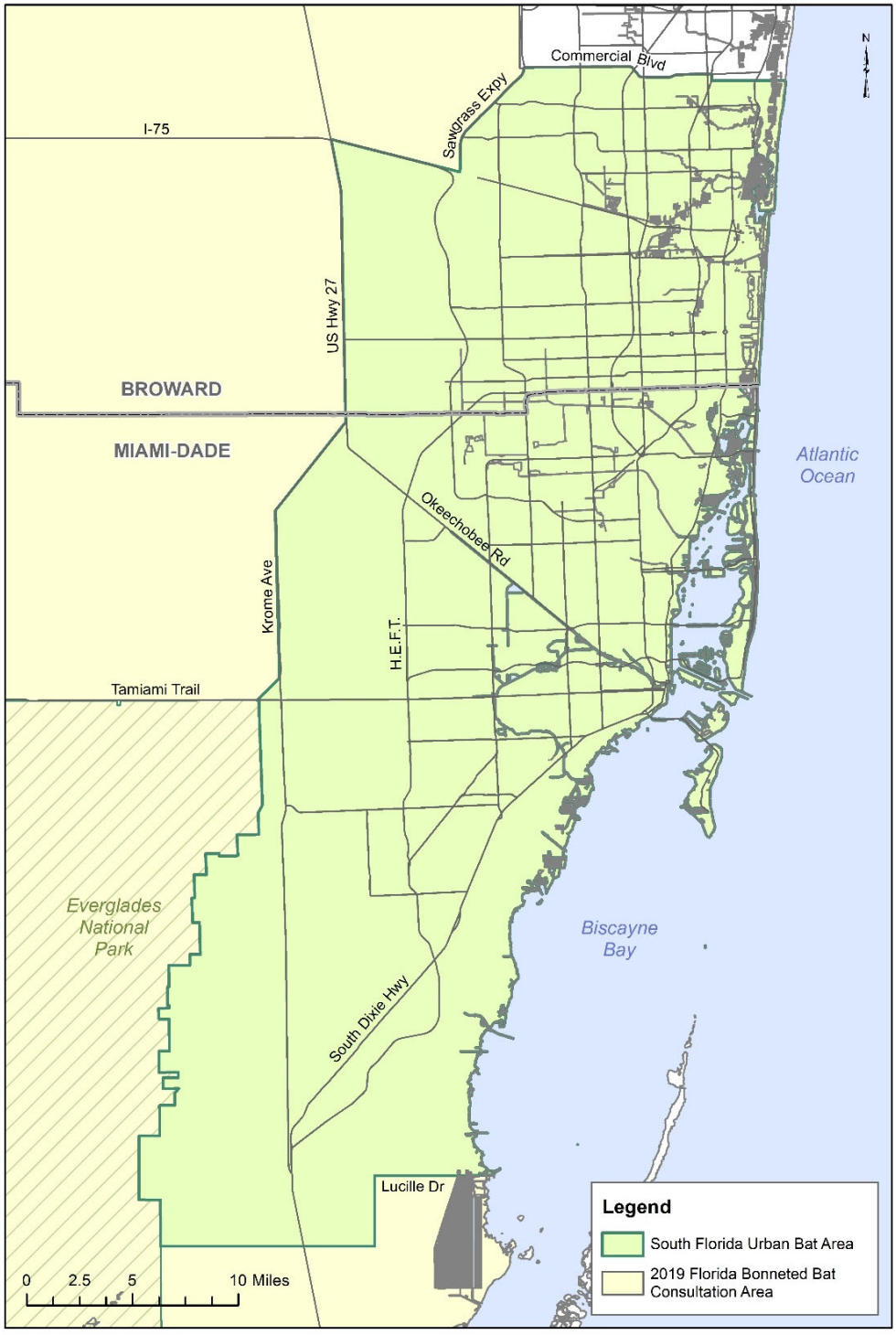

Figure 2. Urban development boundary in Miami-Dade and Broward County. The Consultation Key should not be used for projects in this area. Applicants with projects in this South Florida Urban Bat Area should contact the Service for specific guidance addressing this area and individual consultation.

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.

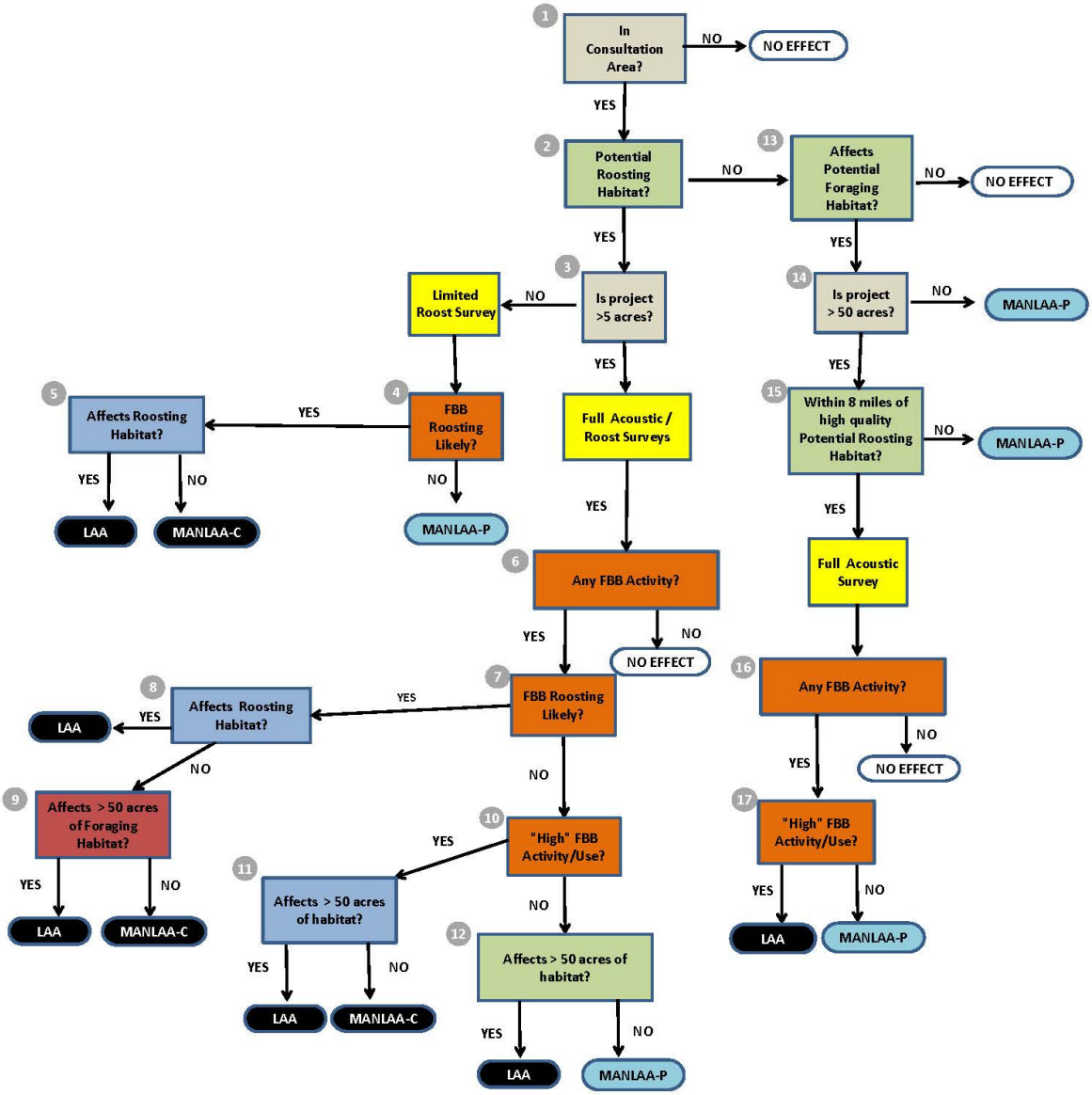

Figure 3. Florida bonneted bat Consultation Flowchart. "**No effect**" determinations do not need Service concurrence. "May affect, but not likely to adversely affect", **MANLAA-P,** in blue have programmatic concurrence through the transmittal letter of these Guidelines, and therefore no further consultation 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].

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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.

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Appendix B: Full Acoustic / Roost Survey Framework

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

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

General Survey Protocol:

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

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

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

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

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

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

Literature Cited – Appendix B

Bailey, A.M., H.K. Ober, A.R. Sovie, and R.A. McCleery. 2017. Impact of land use and climate on the distribution of the endangered Florida bonneted bat. Journal of Mammalogy. 98:1586-1593.

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Appendix C: Limited Roost Survey Framework

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

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

General Survey Protocol:

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

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

Identification of potential roost structures

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

Visual Inspection of trees and snags with tree-top cameras

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

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

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

Emergence Surveys

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

Acoustic surveys

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

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

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

Reporting

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

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

Literature Cited – Appendix C

Bailey, A.M., H.K. Ober, A.R. Sovie, and R.A. McCleery. 2017. Impact of land use and climate on the distribution of the endangered Florida bonneted bat. Journal of Mammalogy. 98:1586-1593.

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Appendix D: Best Management Practices (BMPs) for Development Projects

Ongoing research and monitoring will continue to increase the understanding of the Florida bonneted bat and its habitat needs and will continue to inform habitat and species management recommendations. These BMPs incorporate what is known about the species and also include recommendations that are beneficial to all bat species in Florida. These BMPs are intended to provide recommendations for improving conditions for use by Florida bonneted bats, and to help conserve Florida bonneted bats that may be foraging or roosting in an area.

The BMPs required to reach a "may affect, but is not likely to adversely affect" (MANLAA) determination vary depending on the couplet from the Consultation Key used to reach that particular MANLAA. The requirements for each couplet are provided below followed by the list of BMPs. If the applicant is unable or does not want to do the required BMPs, then the Corps (or other Action Agency) will not be able to use this Guidance and formal consultation with the Service is required.

Couplet Number for MANLAA from Consultation Key	Required BMPs
4b	BMP number 1 if more than 3 months has occurred between the survey and start of the project, and any 3 BMPs out of BMPs 4 through 13
5b	BMP number 2, and any 3 BMPs out of BMPs 3 through 13
9b	BMPs number 2 and 3, and any 4 BMPs out of BMPs 5 through 13
11b	BMPs number 1 and 4, and any 4 BMPs out of BMPs 5 through 13
12b	BMP number 1, and any 3 BMPs out of BMPs 3 through 13
14b	Any 2 BMPs out of BMPs 3 through 13
15b	Any 3 BMPs out of BMPs 3 through 13
17b	Any 4 BMPs out of BMPs 3 through 13

BMPs for development, construction, and other general activities:

1. If potential roost trees or structures need to be removed, check cavities for bats within 30 days prior to removal of trees, snags, or structures. When possible, remove structure outside of breeding season (*e.g.*, January 1 – April 15). If evidence of use by any bat species is observed, discontinue removal efforts in that area and coordinate with the Service on how to proceed.
2. When using heavy equipment, establish a 250 foot (76 m) buffer around known or suspected roosts to limit disturbance to roosting bats.
3. For every 5 acres of impact, retain a minimum of 1.0 acre of native vegetation. If upland habitat is impacted, then upland habitat with native vegetation should be retained.
4. For every 5 acres of impact, retain a minimum of 0.25 acre of native vegetation. If upland habitat is impacted, then upland habitat with native vegetation should be retained..
5. Conserve open freshwater and wetland habitats to promote foraging opportunities and avoid impacting water quality. Created/restored habitat should be designed to replace the function of native habitat.

6. Conserve and/or enhance riparian habitat. A 50-ft (15.2 m) buffer is recommended around water bodies and stream edges. In cases where artificial water bodies (*i.e.,* stormwater ponds) are created, enhance edges with native plantings especially in cases in which wetland habitat was affected.
7. Avoid or limit widespread application of insecticides (*e.g.,* mosquito control, agricultural pest control) in areas where Florida bonneted bats are known or expected to forage or roost.
8. Conserve natural vegetation to promote insect diversity, availability, and abundance. For example, retain or restore 25% of the parcel in native contiguous vegetation.
9. Retain mature trees and snags that could provide roosting habitat. These may include live trees of various sizes and dead or dying trees with cavities, hollows, crevices, and loose bark. See "Roosting Habitat" in "Background" above.
10. Protect known Florida bonneted bat roost trees, snags or structures and trees or snags that have been historically used by Florida bonneted bats for roosting, even if not currently occupied, by retaining a 250 foot (76 m) disturbance buffer around the roost tree, snag, or structure to ensure that roost sites remain suitable for use in the future.
11. Avoid and minimize the use of artificial lighting, retain natural light conditions, and install wildlife friendly lighting (*i.e*., downward facing and lowest lumens possible). Avoid permanent night-time lighting to the greatest extent practicable.
12. Incorporate engineering designs that discourage bats from using buildings or structures. If Florida bonneted bats take residence within a structure, contact the Service and Florida Fish and Wildlife Conservation Commission prior to attempting removal or when conducting maintenance activities on the structure.
13. Use or allow prescribed fire to promote foraging habitat.

Appendix E: Additional Best Management Practices (BMPs) for Land Management Projects

Ecological Land Management

The Service reviews and develops Ecological Land Management projects that use land management activities to restore and maintain native, natural communities that are beneficial to bats. These activities include prescribed fire, mechanical treatments to reduce vegetation densities, timber thinning to promote forest health, trail maintenance, and the treatment of exotic vegetation. The following BMPs provide recommendations for conserving Florida bonneted bat roosting and foraging habitat during ecological land management activities. The Service recommends incorporating these BMP into ecological land management plans.

If potential roost trees need to be removed, check cavities for bats prior to removal of trees or snags. If evidence of use by any bat species is observed, discontinue removal efforts in that area and coordinate with the Service on how to proceed.

Ecological Land Management BMPs:

- Protect potential roosting habitat during ecological land management activities, if feasible. Avoid removing trees or snags with cavities.
- Rake and/or manually clear vegetation around the base of known or suspected roost trees to remove fuel prior to prescribed burning.
- If possible, use ignition techniques such as spot fires or backing fire to limit the intensity of fire around the base of the tree or snag containing the roost. The purpose of this action is to prevent the known or suspected roost tree or snag from catching fire and also to attempt to limit the exposure of the roosting bats to heat and smoke. A 250-ft (76 m) buffer is recommended.
- If prescribed fire is being implemented to benefit Florida bonneted bats, Braun de Torrez et al. (2018) noted that fire in the dry/spring season could be most beneficial.
- When creating firebreaks or conducting fire-related mechanical treatment, mark and avoid any known or suspected bat roosts.
- When using heavy equipment, establish a buffer of 250 feet (76 m) around known roosts to limit disturbance to roosting bats.
- Establish forest management efforts to maintain tree species and size class diversity to ensure long-term supply of potential roost sites.
- For every 5 acres (2 hectares) of timber that is harvested, retain a clump of trees 1-2 acres (0.4 - 0.8 hectare) in size containing potential roost trees, especially pines and royal palms (live or dead). Additionally, large snags in open canopy should be preserved.

Literature Cited – Appendix E

Braun de Torrez, E.C., H.K. Ober, and R.A. McCleery. 2018. Activity of an Endangered Bat Increases Immediately Following Prescribed Fire. The Journal of Wildlife Management.

Appendix H

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"

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Monitoring and Reporting Effects

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

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

Sincerely yours,

Paul Souza
Field Supervisor
South Florida Ecological Services Office

Enclosures

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

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HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

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HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Introduction

A number of Federal and state laws and/or regulations prohibit, cumulatively, such acts as harrassing, disturbing, harming, molesting, pursuing, etc., wood storks, or destroying their nests (see Section VII). Although advisory in nature, these guidelines represent a biological interpretation of what would constitute violations of one or more of such prohibited acts. Their purpose is to 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:

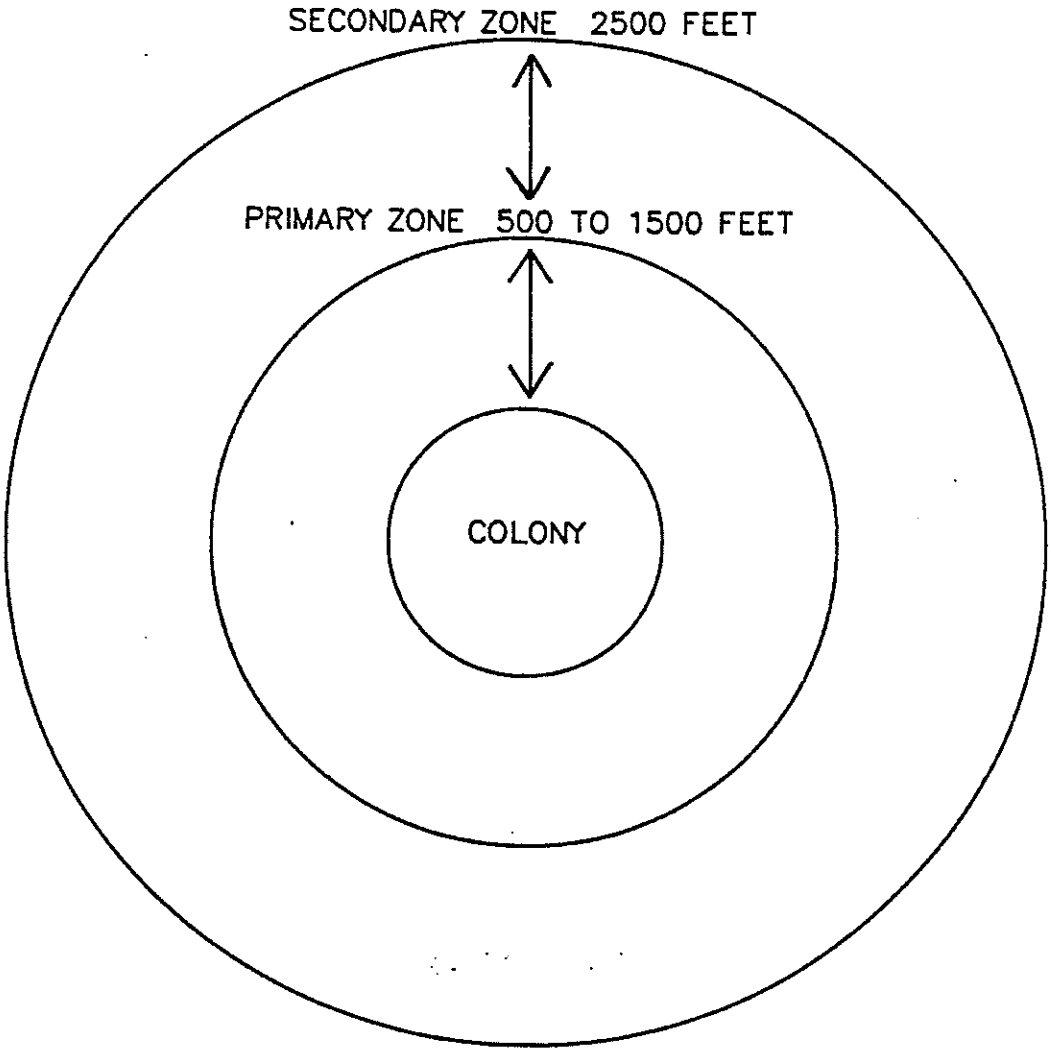
(1) Any lumbering or other removal of vegetation, and

(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...".

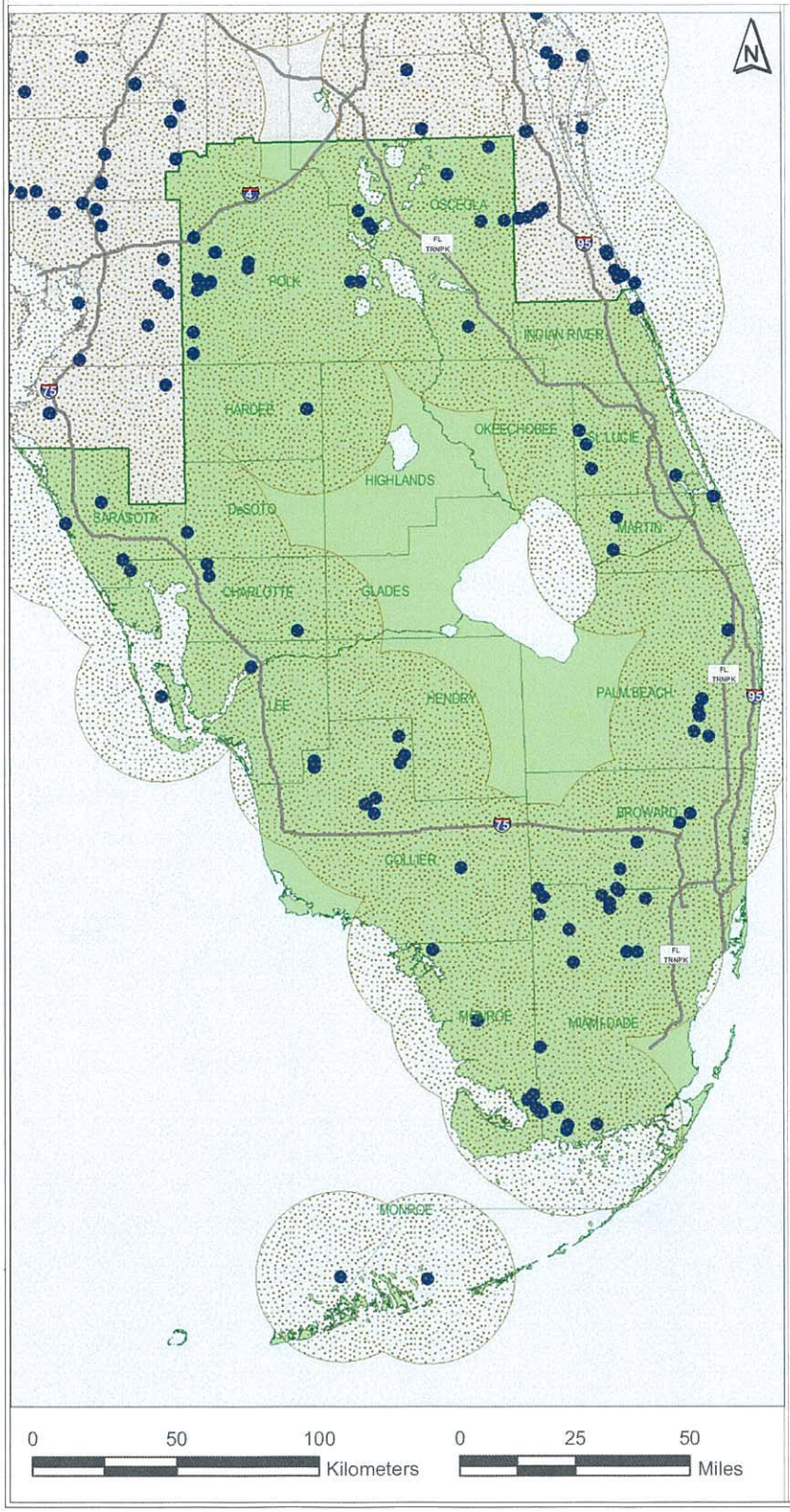
The wood stork is listed as endangered pursuant to the Endangered Wildlife Act of 1973 (Section 27-3-130 of the Code). Section 391-4-13-.06 of the Rules and Regulations of the Georgia Department of Natural Resources prohibits harassment, capture, sale, killing, or other actions which directly cause the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

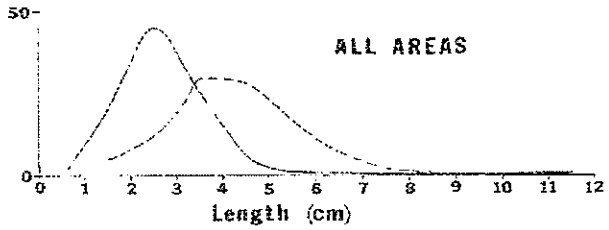

FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

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.

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Appendix I

UMAM Summary Sheets

MODIFIABLE SUMMARY TABLE

Site/Project Name:	Application Number:	Date:
US 41 Intersection at Bonita Beach Road PD&E Study		October 12, 2023

Impact Summary

	Assessment Area	Impact Type	Location and Landscape Support		Water Environment		Community Structure		Impact Delta	Acres	Functional Loss
			Current	w/Impact	Current	w/Impact	Current	w/Impact			
1	WL 1	Direct Impact	5	0	5	0	4	0	0.47	3.21	1.498
2	SW 8	Direct	3	0	3	0	3	0	0.30	0.02	0.006
3	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-	-	-	-
								TOTAL		3.23	1.504

Mitigation Summary

	Assessment Area	Mitigation Type	Location and Landscape Support		Water Environment		Community Structure		Mitigation Delta	Time Lag	Risk	PAF	RFG	Acres	Functional Gain
			w/o Mit	w/Mit	w/o Mit	w/Mit	w/o Mit	w/Mit							
1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
													TOTAL	0.00	0.000

TEMPORAL LAG TABLE

YEAR	T-factor	YEAR	T-factor	YEAR	T-factor
< or = 1	1	11-15	1.46	41-45	3.03
2	1.03	16-20	1.68	46-50	3.34
3	1.07	21-25	1.92	51-55	3.65
4	1.10	26-30	2.18	>55	3.91
5	1.14	31-35	2.45		
6-10	1.25	36-40	2.73		

TOTALS

Impacts	Acres	Mitigation - Upland	Acres	Mitigation - Wetland	Acres
				Creation	0.00
		Restoration	0.00	Restoration	0.00
Direct Impacts	3.21	Enhancement	0.00	Enhancement	0.00
Secondary Impacts	0.00	Preservation	0.00	Preservation	0.00
Total Impacts	**3.21**	**Total Upland Mitigation**	**0.00**	**Total Wetland Mitigation**	**0.00**

Total Functional Loss	**1.504**
Total Functional Gain	**0.000**
Mitigation Deficit	**-1.504**

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART I - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.400 F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
US 41 Intersection at Bonita Beach Road PD&E Study		**WL 1**

FLUCCs code	Further classification (optional)	Impact Type	Assessment Area Size
630	**Wetland Forested Mixed**	**Direct Impact**	**3.21** Acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Estero Bay	**Class III**	**N/A**

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

WL 1 is located along the north US 41 ROW, just north of Bonita Beach Road. This wetland is surrounded by commercial developments to the north and south, bound by US 41 on the west, and adjacent to the existing FDOT pond to the east. It is hydrologically connected to drainage ditches that ultimately outfall to the Imperial River.

Assessment area description

WL 1 is located near the northern terminus of the project. This wetland has been severed and disturbed by the adjacent roadway and surrounding developments. This wetland has been ditched and appears to be stressed. This system is dominated by invasive species including melaleuca, Brazilian pepper, Australian pine, earleaf acacia, and Peruvian waterprimrose.

Significant Nearby Features	Uniqueness (considering the relative rarity in relation to the regional landscape.)
US 41, Imperial River	**N/A**
Functions **Natural water storage, refuge and cover for wildlife**	Mitigation for previous permit/other historic use **N/A**
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found) **Herptiles (snakes, frogs, toads, turtles), owls, hawks, songbirds, small to medium mammals (raccoon, otter, deer)**	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area) **Eastern indigo snake (FT)**

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Gopher tortoise shell, gray catbird, mockingbird, green iguana

Additional relevant factors:

Assessment conducted by:	Assessment date(s):
J. Barhorst, R. Campana	**10/04/23**

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART II - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name:	Application Number:	Assessment Area Name or Number:
US 41 Intersection at Bonita Beach Road PD&E Study	**-**	**WL 1**
Impact or Mitigation:	Assessment Conducted by:	Assessment Date:
Impact	**J. Barhorst, R. Campana**	**10/04/23**

Scoring Guidance	**Optimal (10)**	**Moderate(7)**	**Minimal (4)**	**Not Present (0)**
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Enter Notes below (do NOT score each subcategory individually)

.500(6)(a) Location and Landscape Support

a. Quality and quantity **of habitat support** outside of AA.	low - commercial development
b. **Invasive plant species** in proximity to AA**.**	high
c. **Wildlife access** to and from AA (proximity and barriers).	low access - roadway and development and fencing as barriers
d. **Downstream benefits** provided to fish and wildlife.	moderate
e. Adverse impacts to wildlife in AA from **land uses** outside of AA.	moderate to high - runoff and trash from roadway and developments
f. **Hydrologic impediments and flow restrictions.**	ditched with adjacent stormwater system
g. **Dependency** of downstream habitats on quantity or quality of discharges.	moderate
h. Protection of wetland functions provided by uplands (**upland** AAs only).	N/A

Current	**With Impact**
5	**0**

Additional Notes: System is mostly surrounded by development, is largely comprised of invasive plant species, trash was observed within the wetland.

.500(6)(b) Water Environment (n/a for uplands)

a. Appropriateness of **water levels and flows**.	diminished
b. Reliability of **water level indicators**.	diminished
c. Appropriateness of **soil moisture**.	diminished
d. **Soil erosion** or **depositional patterns, flow rates/points of discharge.**	
e. **Fire history** (frequency/severity).	none
f. **Appropriate vegetative and/or benthic zonation**.	invasives with FAC and upland species
g. **Hydrologic stress** on vegetation.	
h. **Use by animal**s with hydrologic requirements.	none observed
i. **Plant community composition** associated with water quality (i.e., plants tolerant of poor WQ).	
j. **Water quality of standing water by observation** (I.e., discoloration, turbidity).	appropriate
k. **Water quality data** for the type of community.	appropriate
l. Water depth, wave energy, currents, and light penetration.	

Current	**With Impact**
5	**0**

Additional Notes: The wetland is ditched with areas that appear dryer than expected.

.500(6)(c) Community Structure

X Vegetation

_____ Benthic

_____ Both

I. Appropriate/desirable species	High invasives
II. Invasive/exotic plant species	Brazilian pepper, melaleuca, Australian pine, acacia
III. Regeneration/recruitment	mostly opporunistic
IV. Age, size distribution.	fair
V. Snags, dens, cavity, etc.	moderate snags
VI. Plants' condition.	fair
VII. Land management practices.	N/A
VIII. Topographic features (refugia, channels, hummocks).	N/A
IX. Submerged vegetation (only score if present).	N/A
X. Upland assessment area	N/A

Current	**With Impact**
4	**0**

Additional Notes: High occurrence of invasive exotic species. Most recruitment is invasive and opportunistic species

Raw Score = Sum of above scores/30 (if uplands, divide by 20)	
Current	**With Impact**
0.4666667	0

Impact Delta (ID)	
Current - w/Impact	0.466666667

Impact Acres =	3.21

Functional Loss (FL) [For Impact Assessment Areas]:	
FL = ID x Impact Acres =	1.498

NOTE: If impact is proposed to be mitigated at a mitigation bank that was assessed using UMAM, then the credits required for mitigation is equal to Functional Loss (FL). If impact mitigation is proposed at a mitigation bank that was not assessed using UMAM, then UMAM cannot be used to assess impacts; use the assessment method of the mitigaiton bank.

Additional Notes:

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART I - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.400 F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
US 41 Intersection at Bonita Beach Road PD&E Study		**SW 8**

FLUCCs code	Further classification (optional)	Impact Type	Assessment Area Size
510	**Surface Water**	**Direct**	**0.02** Acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Estero Bay	**Class III**	**N/A**

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

SW 8 is a roadside ditch adjacent to the existing US 41. This portion of the SW is adjacent to WL 1.

Assessment area description

SW is eroded out and has not been maintained. Vegetation includes cattail and Brazilian pepper.

Significant Nearby Features	Uniqueness (considering the relative rarity in relation to the regional landscape.)
US 41 and the Imperial River	**N/A**

Functions	Mitigation for previous permit/other historic use
water conveyance	**N/A**

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Wading birds, frogs	**Wood Stork (FT), state listed wading birds**

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

N/A

Additional relevant factors:

Assessment conducted by:	Assessment date(s):
J. Barhorst, R. Campana	**10/04/23**

UNIFORM WETLAND MITIGATION ASSESSMENT WORKSHEET - PART II - IMPACT
Form 62-345.900(2), F.A.C. (See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name:	Application Number:	Assessment Area Name or Number:
US 41 Intersection at Bonita Beach Road PD&E Study	**-**	**SW 8**
Impact or Mitigation:	Assessment Conducted by:	Assessment Date:
Impact	**J. Barhorst, R. Campana**	**10/04/23**

Scoring Guidance	**Optimal (10)**	**Moderate(7)**	**Minimal (4)**	**Not Present (0)**
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

Enter Notes below (do NOT score each subcategory individually)

.500(6)(a) Location and Landscape Support

a. Quality and quantity **of habitat support** outside of AA.	
b. **Invasive plant species** in proximity to AA**.**	
c. **Wildlife access** to and from AA (proximity and barriers).	
d. **Downstream benefits** provided to fish and wildlife.	
e. Adverse impacts to wildlife in AA from **land uses** outside of AA.	
f. **Hydrologic impediments and flow restrictions.**	
g. **Dependency** of downstream habitats on quantity or quality of discharges.	
h. Protection of wetland functions provided by uplands (**upland** AAs only).	

Current	**With Impact**
3	**0**

Additional Notes:

.500(6)(b) Water Environment (n/a for uplands)

a. Appropriateness of **water levels and flows**.	
b. Reliability of **water level indicators**.	
c. Appropriateness of **soil moisture**.	
d. **Soil erosion** or **depositional patterns, flow rates/points of discharge.**	
e. **Fire history** (frequency/severity).	
f. **Appropriate vegetative and/or benthic zonation**.	
g. **Hydrologic stress** on vegetation.	
h. **Use by animal**s with hydrologic requirements.	
i. **Plant community composition** associated with water quality (i.e., plants tolerant of poor WQ).	
j. **Water quality of standing water by observation** (I.e., discoloration, turbidity).	
k. **Water quality data** for the type of community.	
l. Water depth, wave energy, currents, and light penetration.	

Current	**With Impact**
3	**0**

Additional Notes:

.500(6)(c) Community Structure

X Vegetation

_____ Benthic

_____ Both

I. Appropriate/desirable species	
II. Invasive/exotic plant species	
III. Regeneration/recruitment	
IV. Age, size distribution.	
V. Snags, dens, cavity, etc.	
VI. Plants' condition.	
VII. Land management practices.	
VIII. Topographic features (refugia, channels, hummocks).	
IX. Submerged vegetation (only score if present).	
X. Upland assessment area	

Current	**With Impact**
3	**0**

Additional Notes:

Raw Score = Sum of above scores/30 (if uplands, divide by 20)

Current	**With Impact**
0.3	0

Impact Delta (ID)	
Current - w/Impact	0.3

Impact Acres =	0.02

Functional Loss (FL) [For Impact Assessment Areas]:	
FL = ID x Impact Acres =	0.006

NOTE: If impact is proposed to be mitigated at a mitigation bank that was assessed using UMAM, then the credits required for mitigation is equal to Functional Loss (FL). If impact mitigation is proposed at a mitigation bank that was not assessed using UMAM, then UMAM cannot be used to assess impacts; use the assessment method of the mitigaiton bank.

Additional Notes: