APPENDIX G
ENDANGERED SPECIES ACT COORDINATION AND CONSULTATION

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G.1 Introduction

This appendix outlines coordination and consultation undertaken for the Central and Southern Florida (C&SF) Flood Resiliency (Section 203) Study for Broward Basins under the Endangered Species Act (ESA).

G.1.1 U.S. Fish and Wildlife Service Informal Consultation Letter

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BOULEVARD
JACKSONVILLE, FLORIDA 32207

November 21, 2025

Planning and Policy Division
Environmental Branch

Mr. Jose Rivera
Supervisor, Environmental Review and Consultation
Florida Ecological Services Field Office
777 37th Street, Suite D-101
Vero Beach, Florida 32960

Dear Mr. Rivera:

In accordance with provisions of Section 7 of the Endangered Species Act (ESA) of 1973, as amended, the Jacksonville District, U.S. Army Corps of Engineers, (USACE), is hereby initiating informal consultation with the U.S. Fish and Wildlife Service (USFWS) concerning the Central and Southern Florida (C&SF) Flood Resiliency (Section 203) Study for Broward Basins (Section 203 Study) and the resulting Tentatively Selected Plan (TSP). The South Florida Water Management District (SFWMD) is undertaking a Section 203 Study pursuant to Section 203 of the Water Resources Development Act (WRDA) of 1986, as amended, and is preparing a feasibility report for a C&SF Flood Resiliency (Section 203) Broward Basins project. The Section 203 Study for Broward Basins is located within the Broward and Palm Beach Counties, Florida.

The purpose of the SFWMD Section 203 Study is to develop and evaluate continued and improved flood risk management and resiliency solutions that align with the Federal Objective, as described in Section 2031 of the WRDA of 2007. The need for the SFWMD Section 203 Study is driven by several factors: significant physical, hydrological, climatological, demographic, and economic changes; and increasing flood risks in the 420-square-mile Section 203 Study Area. The enclosed document contains additional information about the SFWMD 203 Study for Broward Basins and supporting information for ESA effects determinations for threatened and endangered species and critical habitats within the action area.

The USACE has determined that the proposed action “may affect, but is not likely to adversely affect” Florida bonneted bat (*Eumops floridanus*), West Indian manatee (*Trichechus manatus latirostris*; manatee), Eastern black rail (*Laterallus jamaicensis jamaicensis*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*; snail kite), wood stork (*Mycteria americana*), Eastern indigo snake (*Drymarchon corais couperi*), monarch butterfly (*Danaus plexippus*), American crocodile (*Crocodylus acutus*), and tricolored bat (*Perimyotis subflavus*; proposed endangered). The USACE has also

determined that the proposed action will not result in adverse modification of proposed critical habitat for the manatee. The USACE requests concurrence from the USFWS on the effects determinations for listed species and critical habitat within 30 days of receipt of this letter If you have any questions or concerns, please contact Mr. Jacob Thompson by email at Jacob.s.thompson@usace.army.mil or by telephone at 904-232-1893 regarding this letter.

Sincerely,

EHLINGER.GRETCHEN.SARAH.1286927234

Digitally signed by EHLINGER.GRETCHEN.SARAH.1286927234
Date: 2025.11.21 08:34:47 -05'00'

Gretchen S. Ehlinger, Ph.D.
Chief, Environmental Branch

Enclosure

cc:
FW4FLESRegs@fws.gov

G.1.2 U.S. Fish and Wildlife Service Informal Consultation Enclosure

ENCLOSURE: SUPPORTING INFORMATION FOR ESA EFFECTS DETERMINATIONS

CENTRAL AND SOUTHERN FLORIDA FLOOD RESILIENCY (SECTION 203) STUDY FOR BROWARD BASINS

BROWARD AND PALM BEACH COUNTIES, FLORIDA

Prepared by:
U.S. Army Corps of Engineers, Jacksonville District

Prepared for:
U.S. Fish and Wildlife Service

November 2025

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ACRONYMS AND ABBREVIATIONS

Action Area	The region of direct and indirect effects resulting from the Section 203 Study's Tentatively Selected Plan
C&SF Project	Central and Southern Florida Project
CFR	Code of Federal Regulations
cfs	cubic foot/feet per second
ESA	Endangered Species Act
FR	Federal Register
IPaC	Information for Planning and Consultation
MANLAA	May Affect, Not Likely to Adversely Affect
Section 203 Study	C&SF Flood Resiliency (Section 203) Study for Broward Basins
Study Area	Approximately 420 square miles in eastern Broward County and southern Palm Beach County, encompassing 15 watershed basins, 7 primary canals, and 9 water control structures
SFWMD	South Florida Water Management District
TSP	Tentatively Selected Plan
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WCS	water control structure(s)

1.0 INTRODUCTION

The Endangered Species Act (ESA; 16 United States Code [U.S.C.] § 1531 et seq. [1973]), as amended, protects species at risk of extinction and conserves the ecosystems they depend on. The U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) administer the ESA, which authorizes the listing of species as "endangered" or "threatened" and the designation of "critical habitat" under 50 Code of Federal Regulations (CFR) Part 424. The ESA also prohibits unauthorized "take" of any listed species.

The purpose of this document is to evaluate the potential effects of a proposed federal action on both listed species and those proposed for listing, and designated and proposed critical habitat, and determine whether the continued existence of any such species or critical habitat is likely to be adversely affected by the federal action. The federal action analyzed in this document is the Central and Southern Florida (C&SF) Flood Resiliency (Section 203) Study for Broward Basins (Section 203 Study) and the resulting Tentatively Selected Plan (TSP).

2.0 STUDY BACKGROUND

The South Florida Water Management District (SFWMD) is undertaking a Section 203 Study pursuant to Section 203 of the Water Resources Development Act (WRDA) of 1986, as amended, and is preparing a feasibility report for a C&SF Flood Resiliency (Section 203) Broward Basins project. The Section 203 Study evaluates continued and improved flood risk management and resiliency solutions for the existing federally authorized and constructed C&SF Project throughout the period of analysis from 2035 to 2085. The federally authorized and constructed C&SF Project is a large multipurpose water resource project authorized under the Flood Control Act of 1948 that is operated and maintained by the SFWMD.

The purpose of the SFWMD Section 203 Study is to develop and evaluate continued and improved flood risk management and resiliency solutions that align with the Federal Objective, as described in Section 2031 of the WRDA of 2007. The Federal Objective specifies that water resources planning shall reflect national priorities, encourage economic development, and protect the environment by seeking to maximize sustainable economic development, avoiding the unwise use of floodplains, and protecting and restoring natural ecosystems. The planning process informs an implementable suite of measures to address flood risk damages and involves parallel efforts across managed watershed basins, primary canals, and water control structures (WCS).

The need for the SFWMD Section 203 Study is driven by several factors: significant physical, hydrological, climatological, demographic, and economic changes; and increasing flood risks in the 420-square-mile Section 203 Study Area (Study Area). There is a critical need to improve upon the existing USACE federally authorized and constructed C&SF Project.

The SFWMD Section 203 Study examines several problems in the Study Area that are expected to occur within the period of analysis from 2035 to 2085, which include:

- **Compound Flooding:** Combination of inland and coastal flood drivers exacerbate flooding.

- **Limitations of Existing Infrastructure:** The existing flood control infrastructure was designed for conditions that have changed profoundly since construction.
- **Changing Conditions:** Conditions are expected to worsen over the 50-year period of analysis:
    - Urbanization (land development and projected population in the Study Area);
    - Sea level rise (low, intermediate, and high scenarios);
    - Increased total flood water depths and surface area inundation due to extreme rainfall intensification (frequency and intensity) compounded with storm surge and sea level rise and its effects on flooding;
    - Increased total flood water depths and surface area inundation due to the highest tidal cycles compounded with sea level rise; and
    - Increased total flood water depths and surface area inundation due to higher groundwater tables compounded with sea level rise.
- **Flood Damages to Communities:** Flood damage attributable to ongoing C&SF Project reduction in capacity, diminished water conveyance, and changed conditions at the WCS exacerbated by sea level rise and extreme rainfall events compounded with storm surge and/or high tides.
- **Public Safety Risks:** Public safety risks attributable to diminished water conveyance near C&SF Project WCS caused by flooding during extreme rainfall events compounded with storm surge, sea level rise, and/or high tides.

Regarding flood damages to communities, the drainage capacity has been reduced in the overall C&SF System (structures and canal conveyance) due to the rise in sea level lessening the amount of water that can be discharged through the structure as originally designed. The capacity has been reduced due to the rise in sea level reducing the freshwater head (difference between headwater and tailwater elevations) design conditions of the structures. With the increase in downstream water surface elevation due to sea level rise, and without this project, the gravity structures will deliver less discharge or operate at higher upstream water elevations which contribute to worsening flood damage within the respective drainage basins.

The SFWMD Section 203 Study includes a TSP that maximizes flood resiliency and flood risk management benefits for the population, property, and critical infrastructure within the Study Area. Specifically, the Section 203 Study advances the feasibility assessment and initial engineering designs for adapting water/flood control structures in areas of Broward County and a small portion of southern Palm Beach County most vulnerable to flood risk. The SFWMD Section 203 Study TSP, which is the subject of this document, uses a combination of structural measures, which are outlined in more detail in **Section 4** of this document.

3.0 STUDY AREA AND ACTION AREA

3.1 Study Area

The SFWMD Section 203 Study Area consists of approximately 420 square miles within the eastern portion of Broward County and a small portion of southern Palm Beach County (**Figure 1**). The Study Area encompasses nine managed watersheds that are upstream of nine C&SF Project WCS operated by

the SFWMD. The Study Area also includes six watershed basins downstream of the WCS and a network of seven primary canals (**Table 1**).

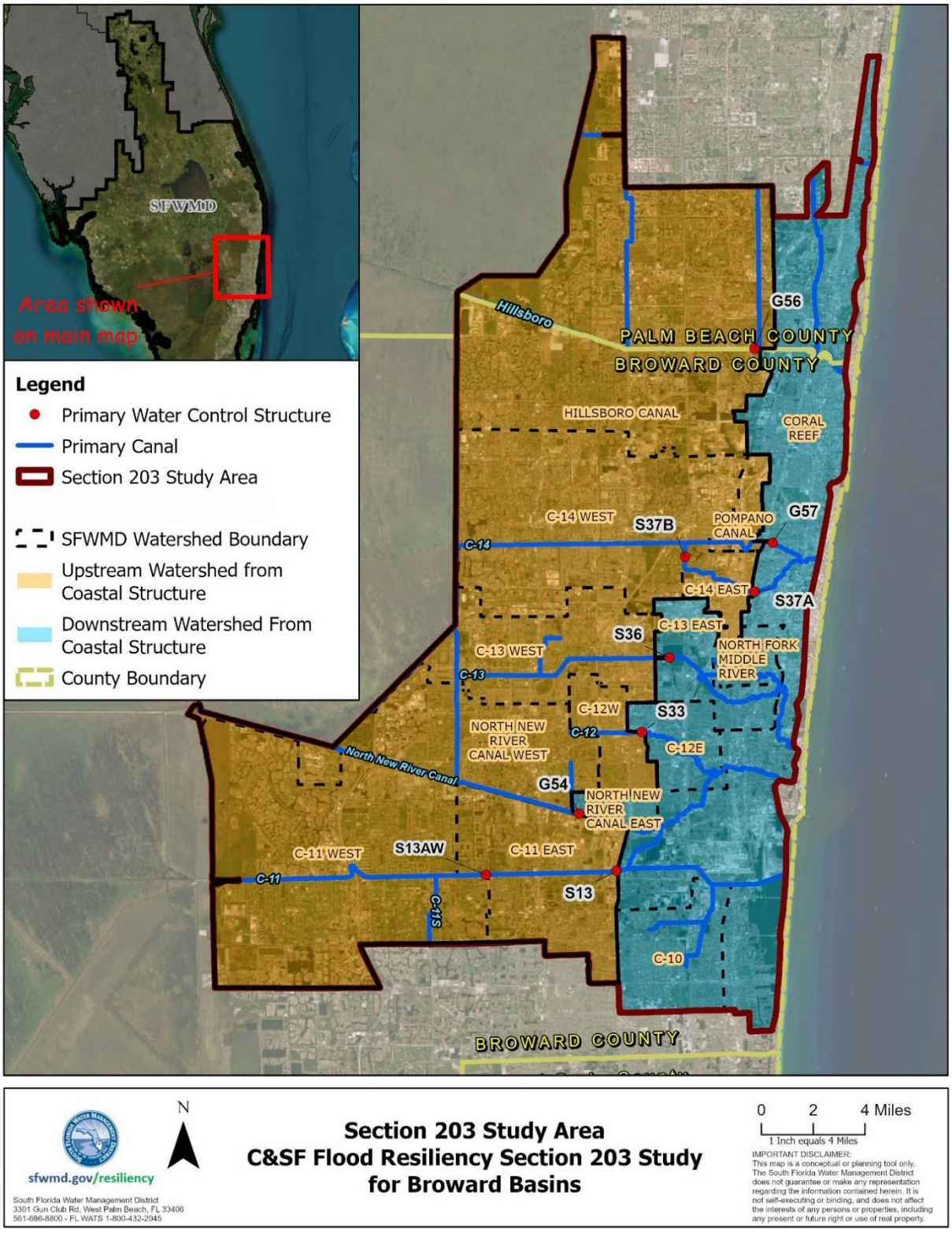

Figure 1. SFWMD Section 203 Study Area.

Table 1. Section 203 Study Area—Managed Watershed Basins, Primary Canals, and Water Control Structures.

Managed Upstream Watershed Basin	Primary Canal	Primary Water Control Structure	Downstream Watershed Basin
Hillsboro Canal Basin	G-08 (Hillsboro) Canal	G-56 Gated Spillway	Coral Reef Basin
Pompano Canal Basin	G-16 (Pompano) Canal	G-57 Gated Spillway	Coral Reef Basin
C-14 West Basin	C-14 (Cypress Creek) Canal	S-37B Gated Spillway[a/]	C-14 East Basin
C-14 East Basin	C-14 (Cypress Creek) Canal	S-37A Gated Spillway	Coral Reef Basin
C-13 West Basin	C-13 (West Middle River) Canal	S-36 Gated Spillway	C-13 East, North Fork Middle River, and Coral Reef Basins
C-12 West Basin	C-12 (Plantation) Canal	S-33 Gated Spillway	C-12 East and Coral Reef Basins
North New River Canal West Basin	G-15 (North New River) Canal	G-54 Gated Spillway	North New River Canal East and Coral Reef Basins
C-11 West Basin	C-11 (South New River) Canal	S-13AW Gated Culvert[a/]	C-11 East Basin
C-11 East Basin	C-11 (South New River) Canal	S-13 Pump Station and Gated Spillway	Coral Reef and C-10 Basins

Note: C = canal, G = gate, S = structure
a/ The S-37B Gated Spillway and S-13AW Gated Culvert are non-coastal structures; all others are coastal structures.

The SFWMD Section 203 Study focused on urban areas within the Section 203 Study Area's inland watersheds that are exposed or vulnerable to flooding. This area includes flood-prone urbanized areas upstream of the coastal WCS located between the eastern side of the East Coast Protective Levee and coastal WCS. The Section 203 Study Area delineation is based on existing watersheds, contiguous urban areas, and previous studies (SFWMD's Flood Protection Level of Service [SFWMD 2021a] and USACE's South Atlantic Coastal Study [USACE 2021]).

3.2 Action Area

The ESA defines "Action Area" as all areas that will be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR § 402.02). In this document, the Action Area includes the entire Study Area (420 square miles, **Figure 1**) as the region where both direct and indirect effects resulting from the SFWMD Section 203 Study's TSP may occur. Subsequently, this document will refer to the Action Area.

4.0 PROJECT DESCRIPTION (TENTATIVELY SELECTED PLAN)

As explained above, the SFWMD Section 203 Study advances initial engineering designs and formulates and evaluates alternatives for adapting water control structures that are part of the C&SF Project. To achieve improved flood risk management and resilience solutions, the SFWMD Section 203 Study TSP includes a combination of structural measures, described below. An overview of the SFWMD Section 203 Study TSP features is shown in **Figure 2**.

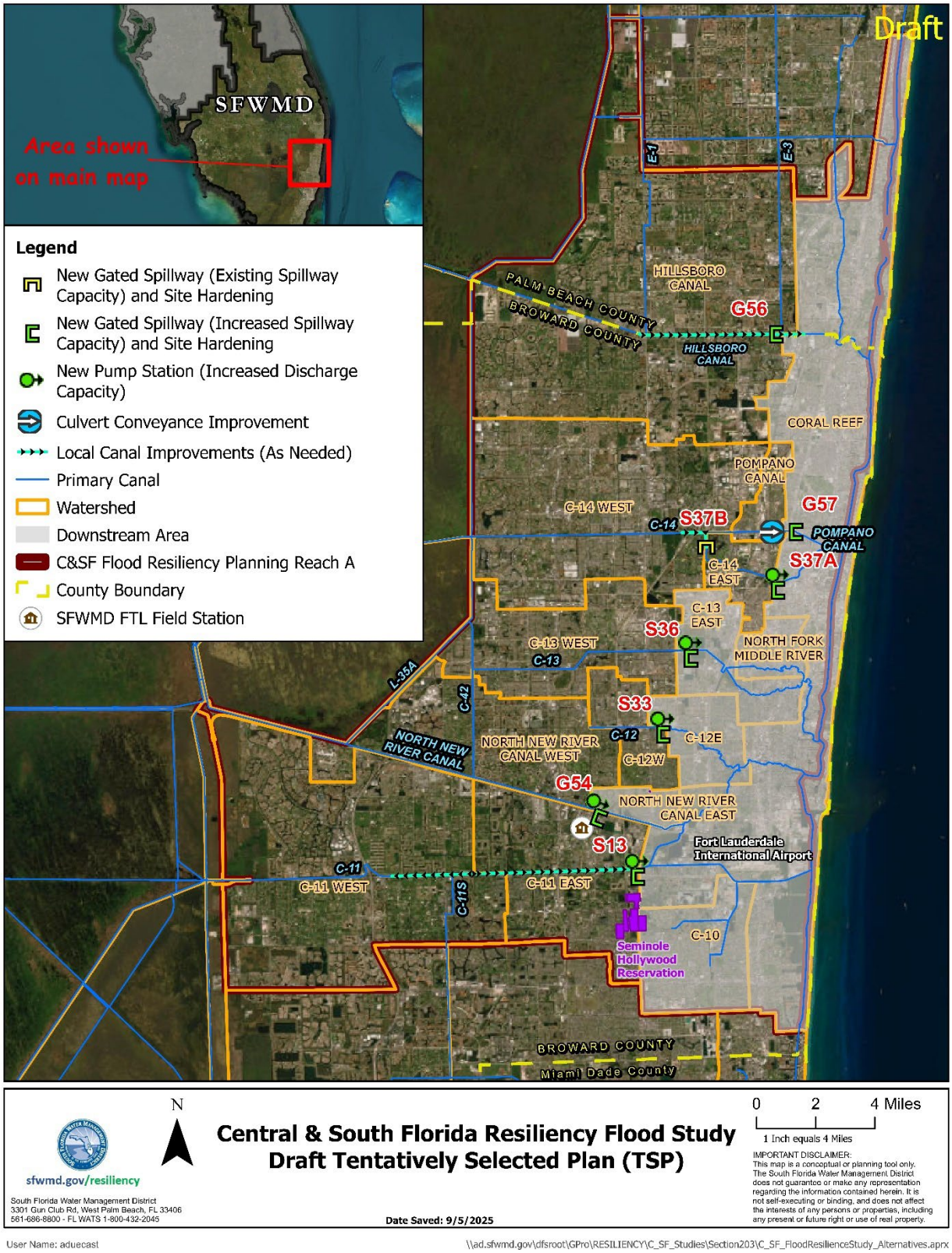

Figure 2. SFWMD Section 203 Study Tentatively Selected Plan.

4.1 Project Structural Measures

4.1.1 Canal Conveyance Improvements

Canal conveyance improvements include excavating segments of C&SF canals (i.e., increasing depth and/or width via dredging or similar means) where flow is currently restricted to increase flow capacity. In addition, new culverts would be constructed parallel to an existing 10-foot-diameter culvert upstream of the G-57 Gated Spillway to increase flow capacity in this area.

4.1.2 Pumps and Gates at Structures

The pumps and gates at structures structural measures include adding pumps where none currently exist, deploying additional pumps, and/or upgrading pumps to higher capacity at a WCS. Constructing additional gates or expanding the width of existing gates at a WCS to increase the volume of water that can pass through them may also occur. These structural measures will typically involve demolishing the existing WCS and rebuilding a new one with upgraded gates.

4.1.3 Operational Activities

Operational activities include drawing down water in the SFWMD-managed primary C&SF canals upstream of the WCS prior to a storm by pumping water in these canals from the upstream side of the WCS to the downstream side of the WCS, resulting in water from the canals being moved downstream to the Intracoastal Waterway prior to the storm. Additionally, local water management entities would likely drawdown water in secondary managed canals and move it into SFWMD-managed primary canals prior to storm events. This additional volume of water would be moved downstream to the Intracoastal Waterway through operation of the WCS. Pre-storm drawdowns are already part of regular SFWMD operations, but with implementation of the SFWMD Section 203 Study TSP, these drawdown events will be more efficient, allowing for improved water conveyance and thus reducing the time it takes to move water through the system.

4.2 Tentatively Selected Plan Description

A detailed description of the TSP is found below. All replacement spillway structures included in the TSP have increased capacity relative to the current capacity (for an assumed design headwater and tailwater) except for S-37B, which has the same capacity as the current structure.

4.2.1 Hillsboro Canal Basin

The Hillsboro Canal Basin watershed is primarily controlled by the G-56 Gated Spillway (26.327972°N, 80.131583°W) on the G-08 (Hillsboro) Canal. The G-56 Gated Spillway consists of three 20-foot-wide gates.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new, replacement gated spillway with greater capacity with four 25-foot-wide roller gates approximately 75 feet west (upstream) of the current G-56 Gated Spillway and demolition of the old spillway.

Additionally, an approximately 5.5-linear-mile section of the G-08 (Hillsboro) Canal would be excavated (i.e., dredged) to enlarge the canal cross section, improving water conveyance. **Figure 3.** illustrates the proposed TSP measures in the Hillsboro Canal Basin.

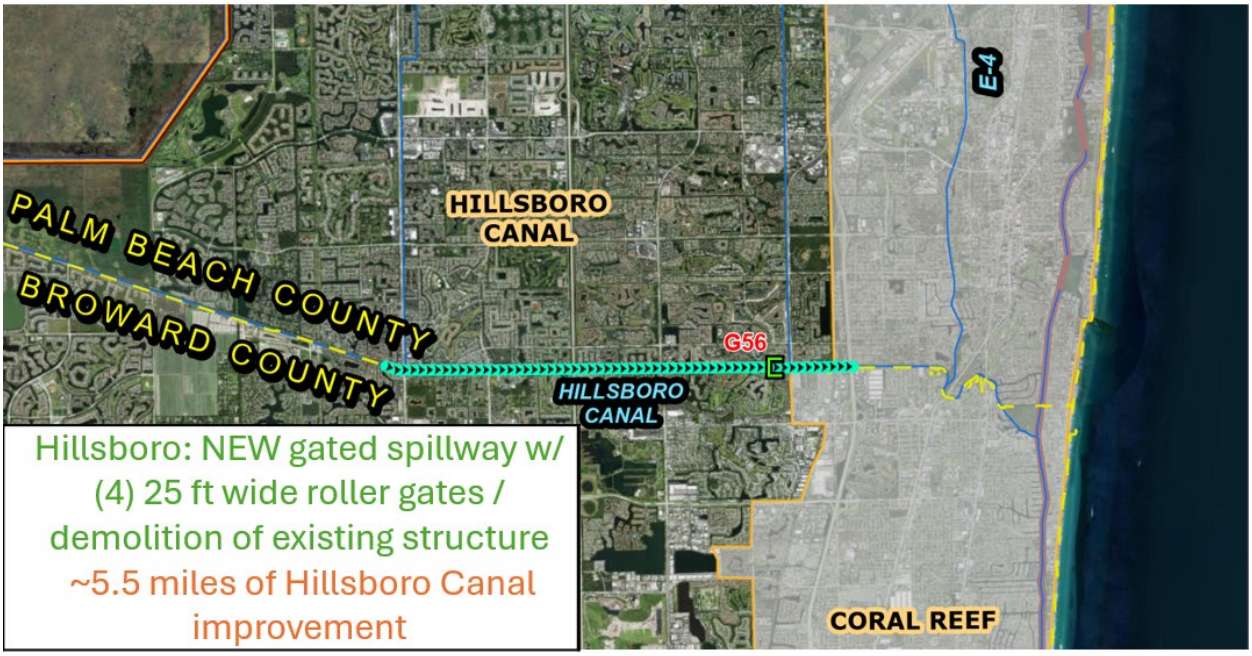

Figure 3. Proposed Tentatively Selected Plan Features: Hillsboro Canal Basin.

4.2.2 Pompano Canal Basin

The Pompano Canal Basin watershed is primarily controlled by the G-57 Gated Spillway (26.230850°N, 80.121525°W) on the G-16 (Pompano) Canal. The G-57 Gated Spillway consists of two 14-foot-wide gates. A 1,400-foot long, 10-foot diameter culvert is located approximately 350 feet northwest (upstream) of the existing structure, parallel to Atlantic Boulevard (State Road 814), between South Dixie Highway (State Road 811) and Cypress Road, for the purposes of stormwater conveyance.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new replacement gated spillway with greater capacity with two 21-foot-wide roller gates approximately 250 feet northwest (upstream) of the current G-57 Gated Spillway and demolition of the old spillway.

In addition, two new 10-foot diameter culverts (or a double 10-foot-span by 9-foot-rise concrete box culvert) would be constructed parallel to and on the south side of the existing 10-foot-diameter culvert. The existing culvert would remain to maintain flow during construction of the new culvert(s). New concrete support walls would be built at both ends of the site to support installation of the new parallel culverts. Construction of the new culverts would occur by jack and bore or similar trenchless installation methods under South Dixie Highway (State Road 811), the Florida East Coast Railroad, and SW 1st Avenue and Cypress Road, and via trenching in the remaining areas.

4.2.3 C-14 West Basin

The C-14 West Basin watershed is primarily controlled by the S-37B Gated Spillway (26.223689°N, 80.170163°W) located on the C-14 (Cypress Creek) Canal. The S-37B Gated Spillway consists of two 25-foot-wide gates.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new replacement gated spillway with wo 25-foot-wide roller gates approximately 215 feet north (upstream) of the current S-37B Gated Spillway and demolition of the old spillway. The SFWMD Section 203 Study proposed TSP also includes conveyance improvements by excavating and enlarging the canal cross section of 1.3 linear miles of the C-14 (Cypress Creek) Canal, extending upstream north and then west of the S-37B Gated Spillway.

4.2.4 C-14 East Basin

The C-14 East Basin watershed is primarily controlled by the S-37A Gated Spillway (26.206246°N, 80.131641°W) located on the C-14 (Cypress Creek) Canal. The S-37A Gated Spillway consists of two 25-foot-wide gates.

The SFWMD Section 203 Study proposed TSP structural measures would include construction ofa new gated spillway with greater capacity with three 25-foot-wide roller gates and demolition of the old spillway. A new pump station would be constructed adjacent to the new gated spillway, which would house three 400-cubic-foot-per-second (cfs) pumps and one 400-cfs auxiliary pump, for a total design discharge capacity of 1,200 cfs. Although the new WCS would be in the same location as the existing one, it would encompass a larger footprint to accommodate the new pump station.

Figure 4 shows the proposed TSP measures in the Pompano Canal Basin, C-14 West Basin, and C-14 East Basin.

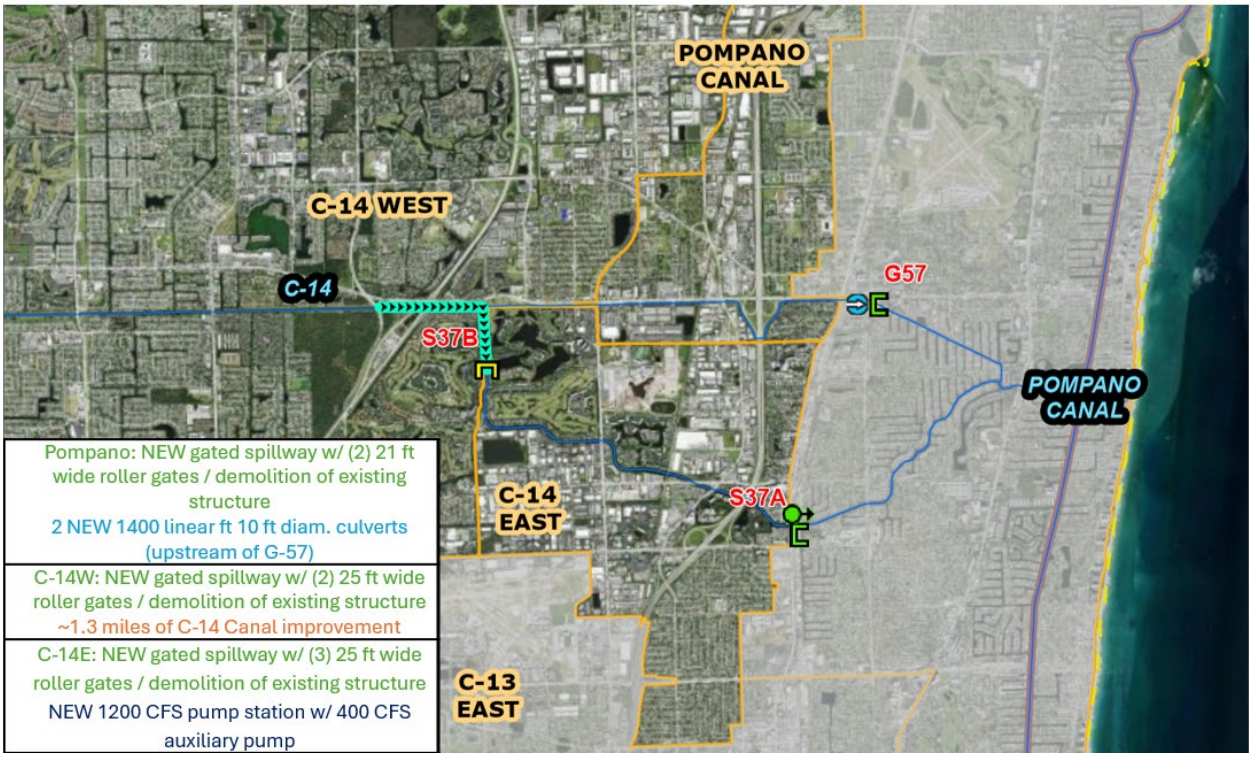

Figure 4. Proposed Tentatively Selected Plan Features: Pompano Canal Basin, C-14 West Basin, and C-14 East Basin.

4.2.5 C-13 West Basin

The C-13 West Basin watershed is primarily controlled by the S-36 Gated Spillway (26.173183°N, 80.179122°W) located on the C-13 (West Middle River) Canal. The S-36 Gated Spillway consists of one 25-foot-wide gate.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new gated spillway with greater capacity with two 16-foot-wide roller gates to replace the current S-36 Gated Spillway and demolition of the old spillway. Although the new WCS would be in the same location as the existing WCS, it would encompass a larger footprint to accommodate the new gates and would meet current SFWMD design standards. A new pump station would be constructed adjacent to the new gated spillway, which would house three 170-cfs pumps for a total design discharge capacity of 510 cfs. **Figure 5** shows the proposed TSP measures in the C-13 West Basin.

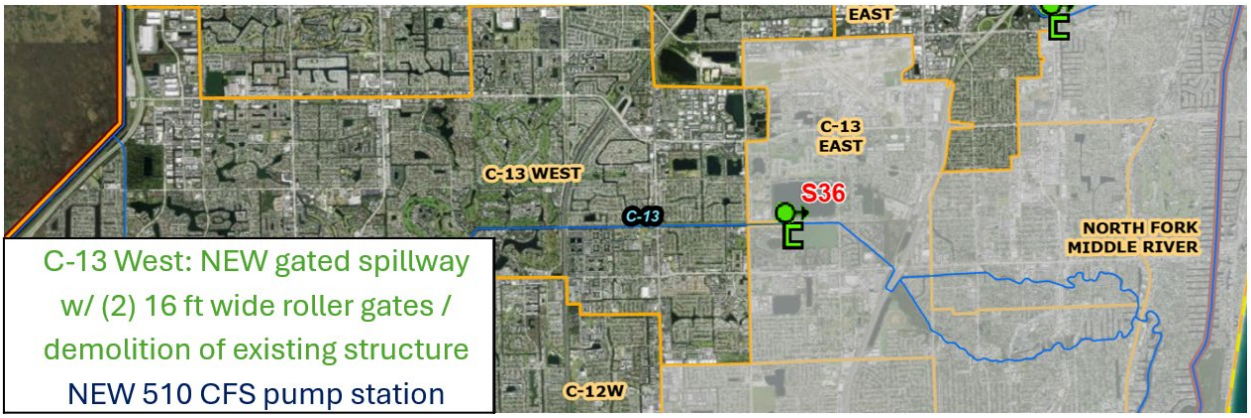

Figure 5. Proposed Tentatively Selected Plan Features: C-13 West Basin.

4.2.6 C-12 West Basin

The C-12 West Basin watershed is primarily controlled by the S-33 Gated Spillway (26.135942°N, 80.194494°W) located on the C-12 (Plantation) Canal. The S-33 Gated Spillway consists of one 20-foot-wide gate.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new gated spillway with greater capacity with two 20-foot-wide roller gates and demolition of the old spillway. A new pump station would also be constructed, which would house three 170-cfs pumps and one 170-cfs auxiliary pump for a total design pump discharge capacity of 510 cfs. The width of the new WCS would necessitate excavation of the south canal bank and the existing box culvert downstream of the current WCS. A new headwall would be constructed to tie the new WCS into the existing canal sidewalls. **Figure 6** shows the proposed TSP measures in the C-12 West Basin.

Figure 6. Proposed Tentatively Selected Plan Features: C-12 West Basin.

4.2.7 North New River Canal West Basin

The North New River Canal West Basin watershed is primarily controlled by the G-54 Gated Spillway (26.095082°N, 80.229682°W) located on the G-15 (North New River) Canal. The G-54 Gated Spillway consists of three 16-foot-wide gates.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new gated spillway with greater capacity with four 20-foot-wide roller gates approximately 30 feet west northwest (upstream) of the current G-54 Gated Spillway and demolition of the old spillway. A new pump station would be constructed adjacent to the new gated spillway. The pump station would house three 270-cfs pumps for a total design pumping capacity of 810 cfs. The abandoned boat lock downstream of the existing WCS would be demolished.

4.2.8 C-11 West Basin

The C-11 West Basin watershed is primarily controlled by the S-13AW Gated Culvert (26.064633°N, 80.281512°W) located on the C-11 (South New River) Canal. The S-13AW Gated Culvert consists of two 10-foot-wide gates. The SFWMD Section 203 Study proposed TSP structural measures include excavation of an 8.4-linear-mile section of the C-11 (South New River) Canal between the Winkopp Bridge and the S-13 Pump Station and Gated Spillway (in both the C-11 West Basin and C-11 East Basin) to improve conveyance.

4.2.9 C-11 East Basin

The C-11 East Basin watershed is primarily controlled by the S-13 Pump Station and Gated Spillway (26.066360°N, 80.208858°W) located on the C-11 (South New River) Canal. The S-13 Pump Station and Gated Spillway consists of a single 16-foot-wide spillway gate with a pump station with three 180-cfs pumps for a total design discharge capacity of 540 cfs.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new gated spillway with greater capacity approximately 200 feet west (upstream) of the current S-13 Pump Station and Gated Spillway and demolition of the old spillway. A new gated spillway with two 14-foot-wide roller gates would be constructed. A new pump station with four main pumps (including two 180-cfs pumps and two 360-cfs pumps) and one 360-cfs auxiliary pump would be constructed, which would increase the total design discharge capacity to 1,080 cfs. An approximately 13,000-square-foot portion of the remnant bypass channel located southeast of the existing WCS would be filled, and a smaller channel would be left in place to maintain existing drainage flows from State Road 7 (US 441) and the residential community south of the S-13 site's stormwater system.

In addition, an 8.4-linear-mile section of the C-11 (South New River) Canal in both the C-11 West Basin and C-11 East Basin would be excavated, between the Winkopp Bridge and the S-13 Pump Station and Gated Spillway, to improve conveyance.

Figure 7 shows the proposed TSP measures in the North New River Canal West Basin, C-11 West Basin, and C-11 East Basin.

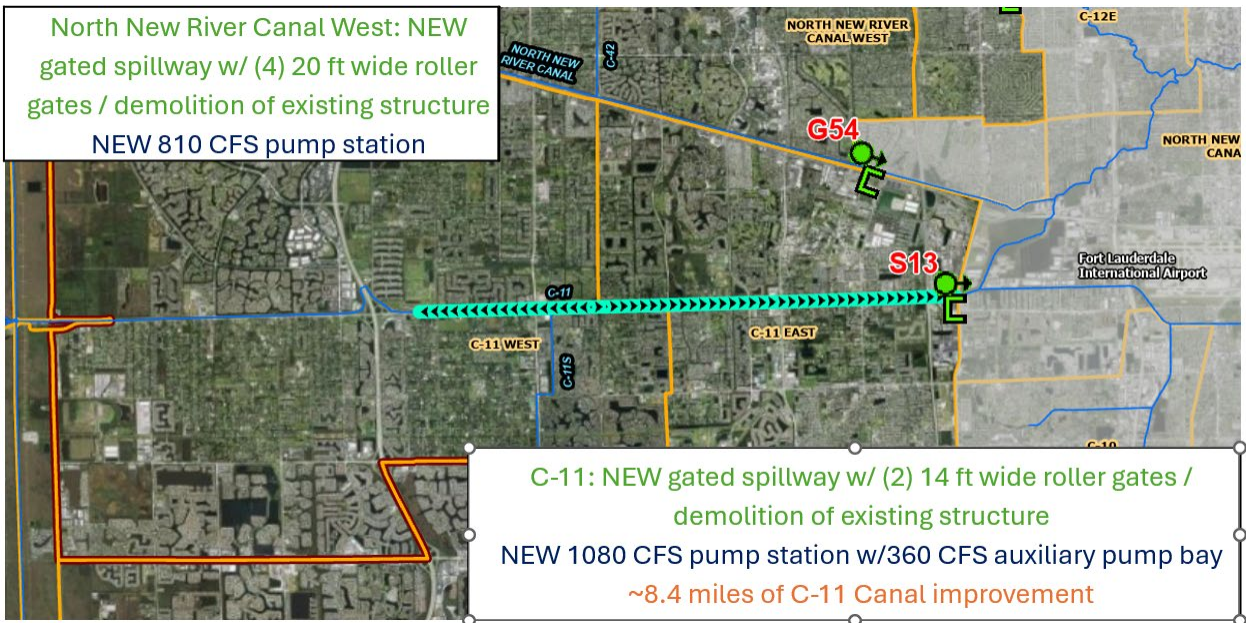

Figure 7. Proposed Tentatively Selected Plan Features: North New River Canal West Basin, C-11 West Basin, and C-11 East Basin.

4.3 Implementation Schedule

The SFWMD is preparing the Section 203 feasibility report for submission to the Assistant Secretary of the Army (Civil Works). The Assistant Secretary of the Army (Civil Works) will review and determine recommendations for Congress for authorization of the SFWMD Section 203 Study TSP under the authority of Section 216 of the Flood Control Act of 1970. Assuming the SFWMD Section 203 Study TSP is authorized, construction would occur across several years. The total construction timeline is estimated to be 7 years.

5.0 DESCRIPTION OF EXISTING CONDITIONS

The Action Area is characterized by densely populated urban development with a mix of land uses, including residential, commercial, and industrial. WCS in the Action Area were constructed by the USACE as part of the C&SF Project from 1950 through the 1970s (SFWMD 2021b). These structures include canals and pumps that provide flood control and water supply to the region (**Table 1**). The aging infrastructure is now vulnerable to the effects of more frequent and more extreme weather events including higher tides; rising sea levels; frequent high-intensity, short-duration rain events; and increased hurricane intensity. The increased likelihood of compound flooding, where heavy rainfall combines with high tides or storm surges, exacerbates the potential for flooding and saltwater intrusion into freshwater canals and water supply infrastructure.

Below is a description of vegetation and land use within the Action Area to provide understanding of vegetation and landcover types that could provide potentially suitable habitat for federally listed species.

5.1 Vegetation and Land Use

The vegetation communities within the Action Area have been greatly altered during the last century. Agriculture is Florida's second largest industry behind tourism, and it has influenced land use patterns and altered the natural landscape (Volk et al. 2017). Sugarcane crops and orange groves were originally planted predominantly in northeast and central Florida in the sixteenth century, but the industry began moving south in the twentieth century due to freezes and soil conditions (Volk et al. 2017). In addition to conversion of land for agricultural purposes, large areas of wetlands were drained and converted for other land uses such as residential, transportation, commercial, and recreational uses. Except for the historic coastal ridge, which runs along Dixie Highway and U.S. Federal Highway 1, most of Florida's southern peninsula was once part of the Everglades ecosystem (Broward County 2021). Although some of these natural areas still exist within the Action Area, the introduction of controlled drainage for land development has resulted in a significantly different set of land cover types. Currently, disturbed lands occupy the majority of the Action Area (95 percent). A list of land cover types occurring within the Action Area, along with acreage and relative percent cover, is presented in **Table 2**. Maps depicting the vegetation communities in the Action Area are presented in **Figure 8** through **Figure 11**. The National Wetland Inventory wetland types within the Action Area are presented in **Figure 12**.

Table 2. Vegetative Communities in the Action Area.

Land Cover Type	Area (acres)	Relative Percent Cover in the Action Area (%)
Disturbed Lands	**255,675**	**95.0**
Urban (Residential, Commercial, Industrial, Parks, Community)	157,141	58.5
Extractive (Transportation, Utilities, Communications)	60,275	22.3
Cultural – Lacustrine (Developed Ponds, Lakes, Stormwater Facilities, Cooling Ponds, etc.)	16,620	6.2
Agricultural (Crops, Pasture, Orchards, Nurseries)	6,114	2.3
Cultural – Riverine (Canals)	4,544	1.7
Rural (Rural Structures, Rural Open, and Oak-Cabbage Palm Forests)	3,578	1.3
Exotic Plants (Landscaped Areas with Exotic Plants)	3,074	1.1
Cultural – Estuarine (including Ditches/Canals)	2,836	1.1
Cultural - Palustrine	764	0.3
Cultural - Terrestrial	391	0.1
Mowed	338	0.1
Natural Vegetative Communities	**12,415**	**4.9**
Hardwood Forested Uplands (Mesic Hammock, Prairie Mesic Hammock, and Rockland Hammock)	1,122	0.4
Non-Forested Wetlands (Mixed Scrub-Shrub, Marshes, Basin Marsh, Glades Marsh, and Floating/Emergent Aquatic Vegetation)	5,282	2.0
Freshwater Forested Wetlands (Cypress/Tupelo, Cypress, Wet Flatwoods, Hydric Pine Flatwoods, Other Hardwoods, Bay Swamp, Hydric Hammock, Cabbage Palm Hammock, Mixed Wetland Hardwoods, and Mixed Hardwood-Coniferous Swamps)	2,289	0.9
Estuarine (Estuarine and Mangrove Swamp)	1,510	0.8
Pine Flatwoods and Dry Prairie (Mesic Flatwoods, Scrubby Flatwoods, and Palmetto Prairie)	765	0.3
Shrub and Brushlands	719	0.3
High Pine and Scrub (Scrub and Sand Pine Scrub)	607	0.2
Mixed Hardwood Coniferous	111	<0.1
Lacustrine	10	<0.1

Land Cover Type	Area (acres)	Relative Percent Cover in the Action Area (%)
Other	**7**	**<0.1**
Bare Soil	7	<0.1
Total	**268,097**	**100**

Source: FWC 2023

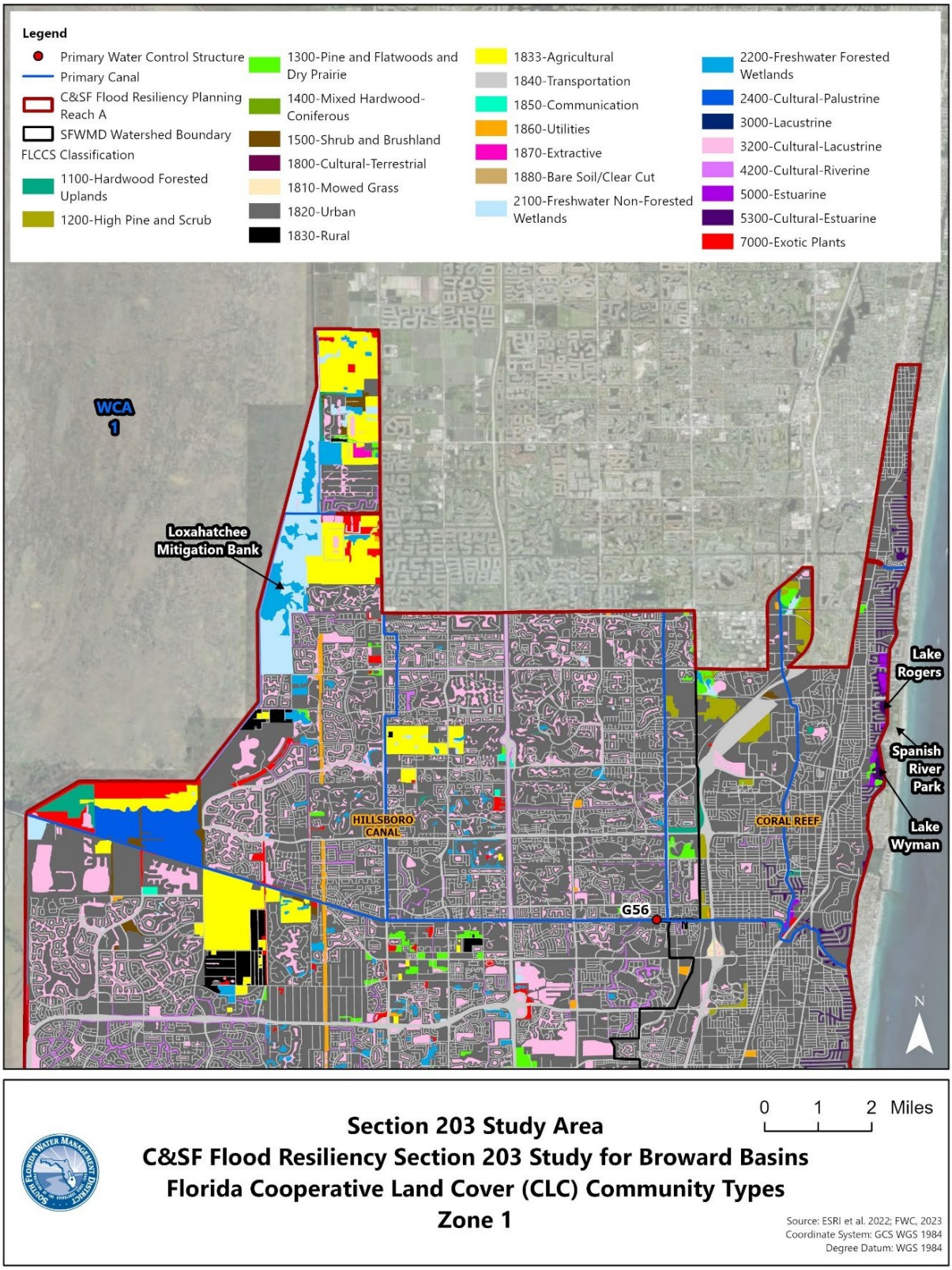

Figure 8. Florida CLC Types within the Action Area (Northern).

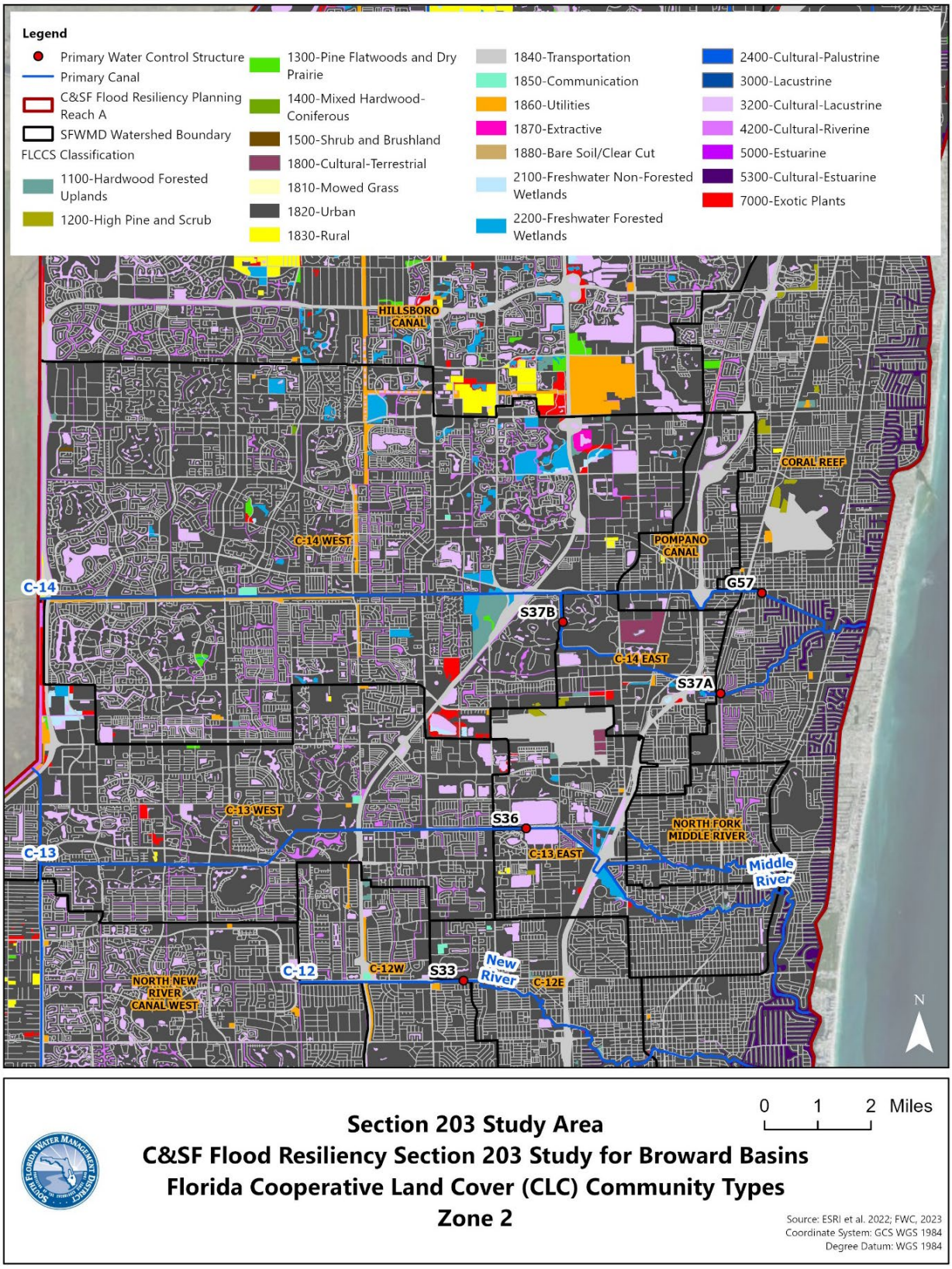

Figure 9. Florida CLC Types within the Action Area (Central).

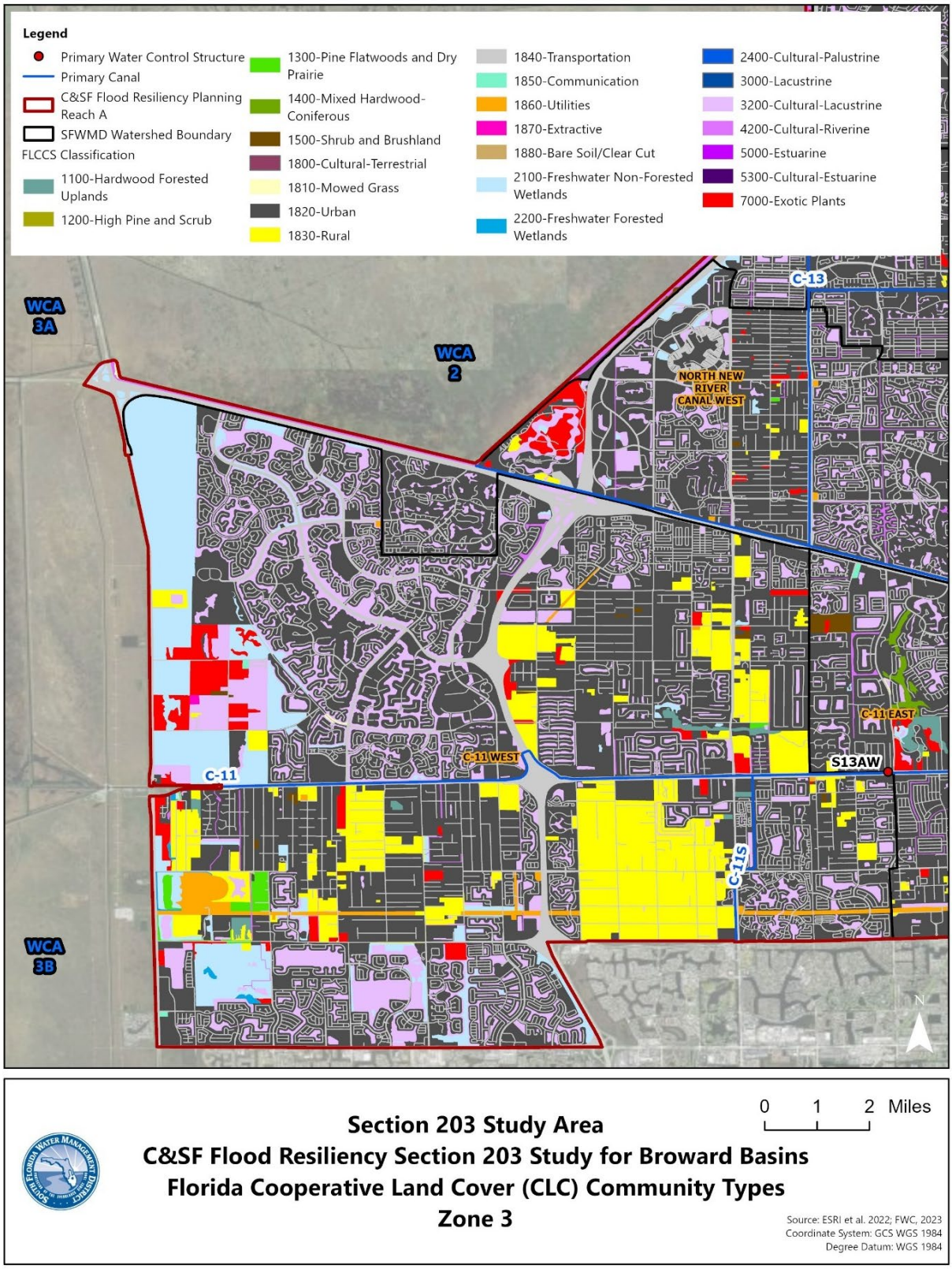

Figure 10. Florida CLC types within the Action Area (Western).

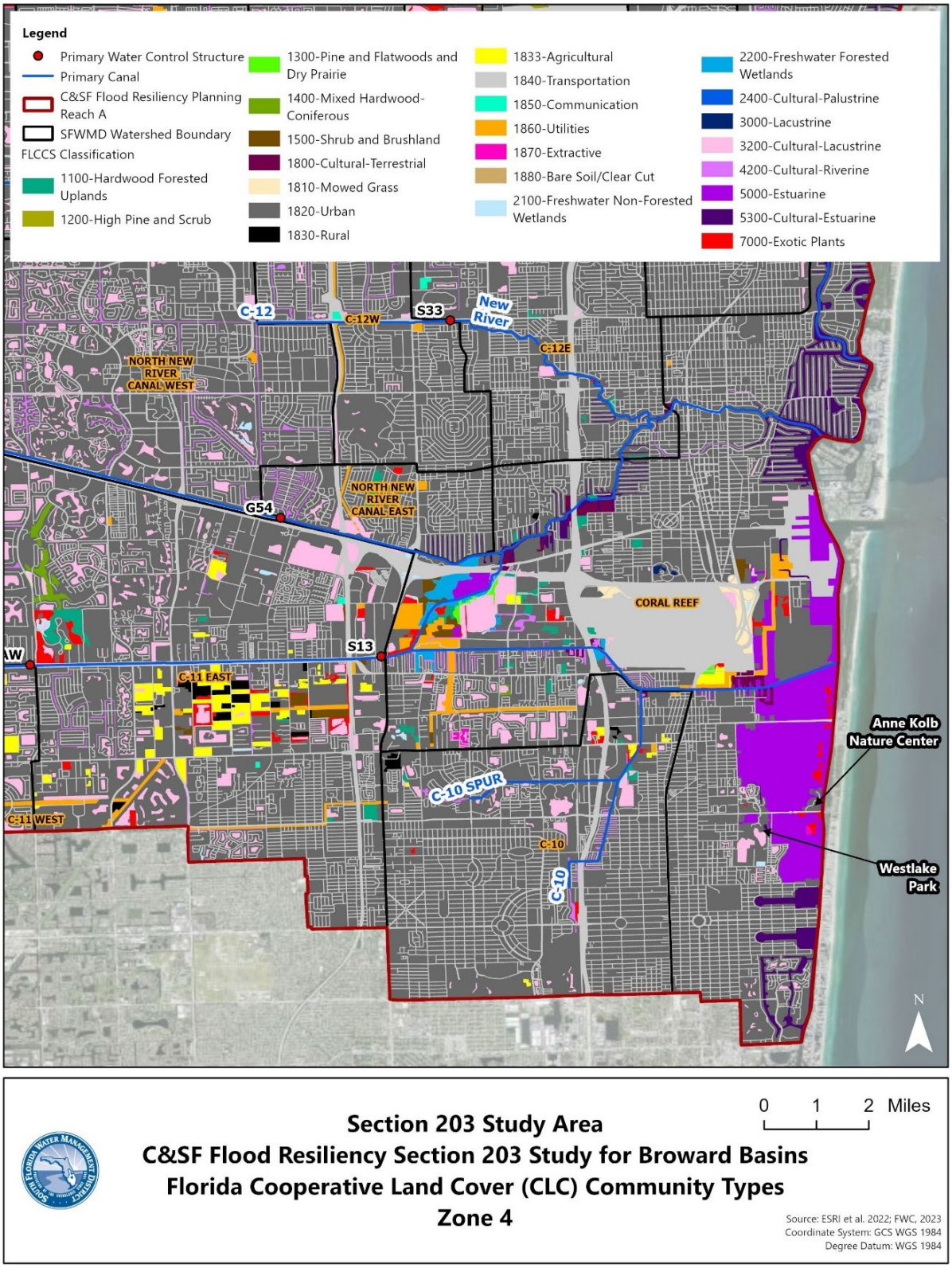

Figure 11. Florida CLC types within the Action Area (Southern).

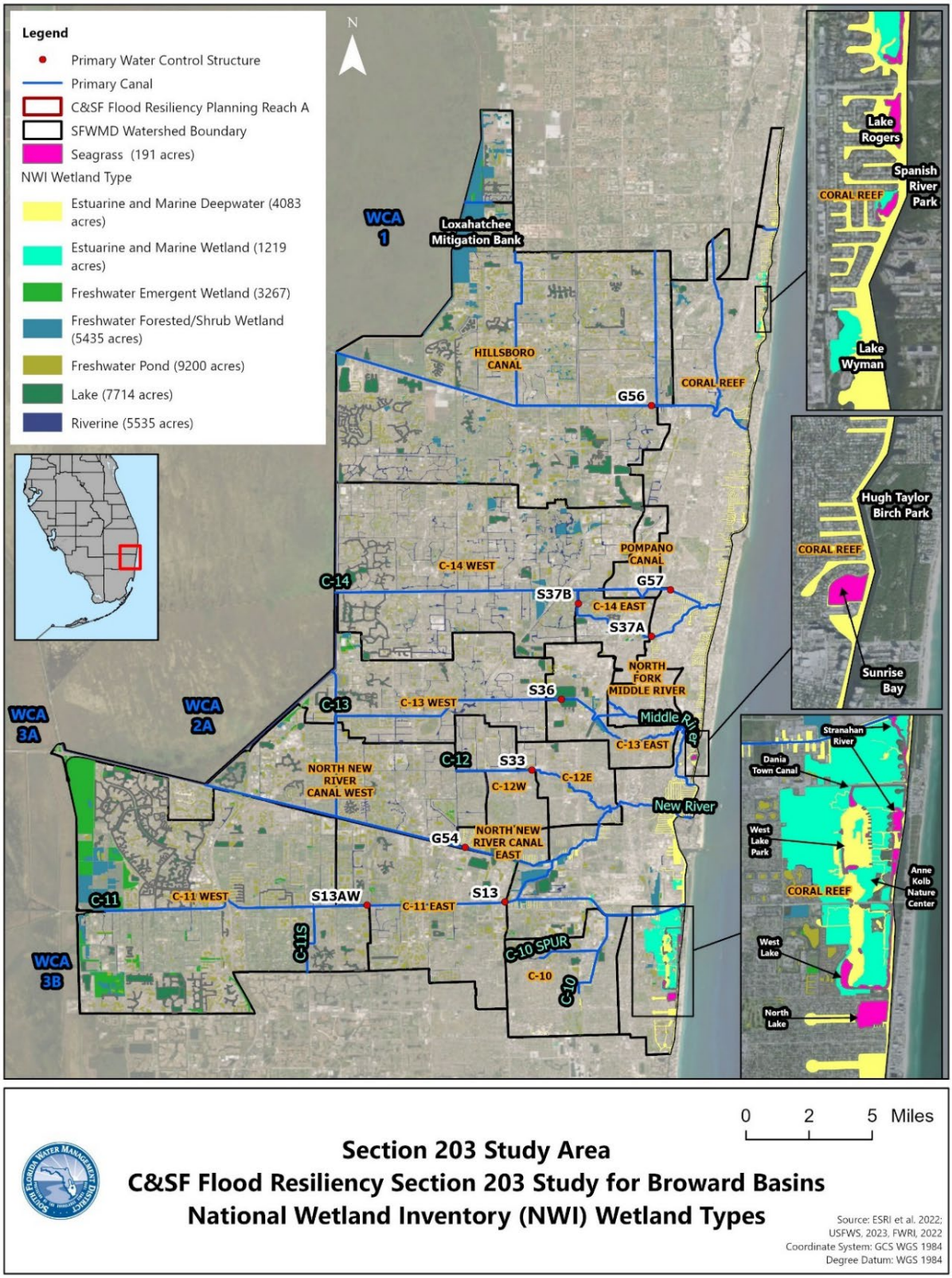

Figure 12. National Wetland Inventory Wetland Types within the Action Area.

6.0 FEDERALLY LISTED SPECIES

A list of federally listed species (e.g., threatened and endangered), candidate species, and species proposed for listing under ESA that could potentially be present in the Action Area was requested through the USFWS Information for Planning and Consultation (IPaC) online database (**Appendix A**, USFWS 2024a). **Table 3** includes federally listed species with the potential to occur in the Action Area and that could be affected by the SFWMD Section 203 Study TSP and are therefore considered in this document.

If a federally listed species found within the Action Area is not carried forward for further analysis, rationale is provided in **Table 3**, below, and the species is not discussed further in this document. For these species, we have made a "No Effect" determination.

Table 3. Federally Listed Species with the Potential to Occur in the Action Area.

Scientific Name	Common Name	Federal Status	USFWS Consultation Area[a/]	Carried Forward for Further Analysis	Rationale
Mammals					
Eumops floridanus	Florida bonneted bat	Endangered	Yes	Yes	USFWS Consultation Area overlaps Action Area, and potentially suitable habitat is present in the Action Area in the form of individual or small groups of trees.
Peromyscus polionotus niveiventris	Southeastern beach mouse	Threatened	N/A	No	There is no potentially suitable habitat located in the Action Area.
Perimyotis subflavus	Tricolored bat	Proposed Endangered	N/A	Yes	Potentially suitable habitat is present in the Action Area in the form of individual or small groups of trees.
Puma (=Felis) concolor coryi	Florida panther	Endangered	No	No	The heavily urbanized Action Area is not likely to support the species. Review of the USFWS Effects Determination Key for Florida panther results in a "No Effect" determination (USFWS 2007a).
Trichechus manatus	West Indian (Florida) manatee	Threatened	Yes	Yes	The USFWS Consultation Area and proposed USFWS critical habitat overlap the Action Area, and potentially suitable habitat is present in the Action Area. The USFWS Effects Determination Key for West Indian manatee is not applicable because this is a USACE Civil Works Project (USFWS 2013; 2024e).
Birds					
Ammodramus savannarum floridanus	Florida grasshopper sparrow	Endangered	No	No	While habitat is present in the Action Area, there are no large patches of contiguous habitat and what habitat is present is surrounded by a heavily urbanized environment. The only USFWS tracked populations do not occur in Broward or Palm Beach counties. Additionally, the USFWS IPaC did not include this species.

Scientific Name	Common Name	Federal Status	USFWS Consultation Area[a/]	Carried Forward for Further Analysis	Rationale
Aphelocoma coerulescens	Florida scrub-jay	Threatened	Yes	No	The USFWS Consultation Area overlaps the Action Area and there is suitable habitat present in the Action Area. There are known occurrences of the species at the Yamato Scrub Natural Area in Palm Beach County, which is within the Action Area. However, there is no suitable habitat in the vicinity of the structural measures proposed under the TSP. Furthermore, this species occurs in upland areas east of the WCS where the structural improvements would take place, so such improvements would not result in any direct or indirect effects to this species.
Charadrius melodus	Piping plover	Threatened	Yes	No	While the Action Area is located near beaches where the species occurs, the Section 203 Study would not impact beaches or sea level in intertidal areas where the species would be found.
Laterallus jamaicensis ssp. *jamaicensis*	Eastern black rail	Threatened	N/A	Yes	Potentially suitable habitat is present in the Action Area, and there are known occurrences of the species in the Action Area.
Mycteria americana	Wood stork	Threatened	Yes	Yes	The Action Area is within the USFWS core foraging area for the species. Additionally, a known nesting colony is located in the Action Area and suitable habitat is present throughout the Action Area.
Polyborus plancus audubonii	Audubon's crested caracara	Threatened	Yes	No	The USFWS Consultation Area overlaps the Action Area and potentially suitable habitat is present in the Action Area. However, the Section 203 Study would not impact grasslands or pastures with cabbage palms where the species nests; therefore, it is not carried forward for further analysis.

Scientific Name	Common Name	Federal Status	USFWS Consultation Area[a/]	Carried Forward for Further Analysis	Rationale
Rostrhamus sociabilis plumbeus	Everglade snail kite	Endangered	Yes	Yes	USFWS Consultation Area overlaps the Action Area and potentially suitable habitat is present in the Action Area.
Reptiles					
Alligator mississippiensis	American alligator	Similarity in Appearance	No	No	The American alligator, a species similar in appearance to American crocodile has suitable habitat present in the Action Area. However, because this species is not listed under the ESA, it is not carried forward for further analysis.
Chelonia mydas	Green sea turtle	Threatened	N/A	No	While the Action Area is located near critical habitat for the species, the Section 203 Study would not impact beaches (i.e., nesting habitat). Note that this species also occurs in nearshore and inshore waters, but is analyzed in a separate document for NMFS.
Crocodylus acutus	American crocodile	Threatened	Yes	Yes	The USFWS Consultation Area overlaps the Action Area and suitable habitat is present in the Action Area.
Drymarchon couperi	Eastern indigo snake	Threatened	N/A	Yes	Potentially suitable habitat is present in the Action Area.
Insects					
Danaus plexippus	Monarch butterfly	Proposed Threatened	N/A	Yes	Potentially suitable habitat is present throughout the Action Area and there are known occurrences of the species in the Action Area.
Plants					
Asimina tetramera	Four-petal pawpaw	Endangered	N/A	No	The only known populations occur north of the Action Area. Because the Action Area is highly urbanized and there are no known populations in any parks, preserves, or other natural areas within the Action Area, this species is not likely to be impacted by the Section 203 Study.

Scientific Name	Common Name	Federal Status	USFWS Consultation Area[a/]	Carried Forward for Further Analysis	Rationale
Dalea carthagenensis floridana	Florida prairie-clover	Endangered	N/A	No	No potentially suitable habitat is present in the Action Area. Historic populations have been extirpated in Palm Beach County.
Jacquemontia reclinate	Beach jacquemontia	Endangered	N/A	No	Suitable habitat is present at Birch State Park, where the plant is known to occur. The park abuts the Action Area to the east but is located outside the Action Area. While the Action Area is located near beaches where the species grows, the Section 203 Study would not impact beaches or sea level in the intertidal areas where the species occurs.
Polygala smallii	Tiny polygala	Endangered	N/A	No	No suitable habitat is located in the Action Area and there are no known populations that occur in the Action Area.
Lichen					
Cladonia perforata	Florida perforate cladonia	Endangered	N/A	No	The only known nearby population occurs in the very north part of Palm Beach County. While there is potentially suitable scrub habitat in the Action Area, the species is extremely rare, and therefore unlikely to occur in the Action Area. Additionally, there is no suitable habitat in the vicinity of the structural measures proposed under the TSP.

a/ Yes = USFWS Consultation Area for the species overlaps with the Action Area; No = USFWS Consultation Area for the species does not overlap with the Action Area; N/A = No USFWS Consultation Area has been designated for the species in Florida

7.0 DESIGNATED CRITICAL HABITAT

Critical habitat includes areas essential for the survival and recovery of listed species. A list of USFWS-designated critical habitat present in and near the Action Area was requested through the USFWS IPaC. **Table 4** lists critical habitat in and near the Action Area and explains whether it is carried forward for further analysis in this document.

Critical habitat for the Everglade snail kite (*Rostrhamus sociabilis plumbeus*) was included in the USFWS IPaC, but is located outside and directly west of the Action Area (**Figure 13**). There is USFWS-designated critical habitat located north and south of the Action Area (but outside of the Action Area) for West Indian (Florida) manatee (*Trichechus manatus*; **Figure 13**). However, on September 24, 2024, the USFWS published a proposed rule under the ESA in the Federal Register (89 FR 78134) to revise the critical habitat for the West Indian manatee. The new, proposed critical habitat is within the Action Area (**Figure 14**).

Table 4. USFWS Designated Critical Habitat within and Near the Action Area.

Scientific Name	Common Name	Federal Status	Carried Forward for Further Analysis	Rationale
Rostrhamus sociabilis plumbeus	Everglade snail kite	Endangered	No	The Action Area is outside of designated critical habitat for the species. The SFWMD Section 203 Study would have No Adverse Modification to Everglade snail kite critical habitat.
Trichechus manatus	West Indian (Florida) manatee	Threatened	Yes	The Action Area is outside of the current designated critical habitat for this species and the SFWMD Section 203 Study is outside any watersheds that would impact hydrology of current critical habitat. The TSP would have No Adverse Modification to West Indian manatee critical habitat. However, proposed critical habitat is located within the Action Area and is therefore carried forward for further analysis.

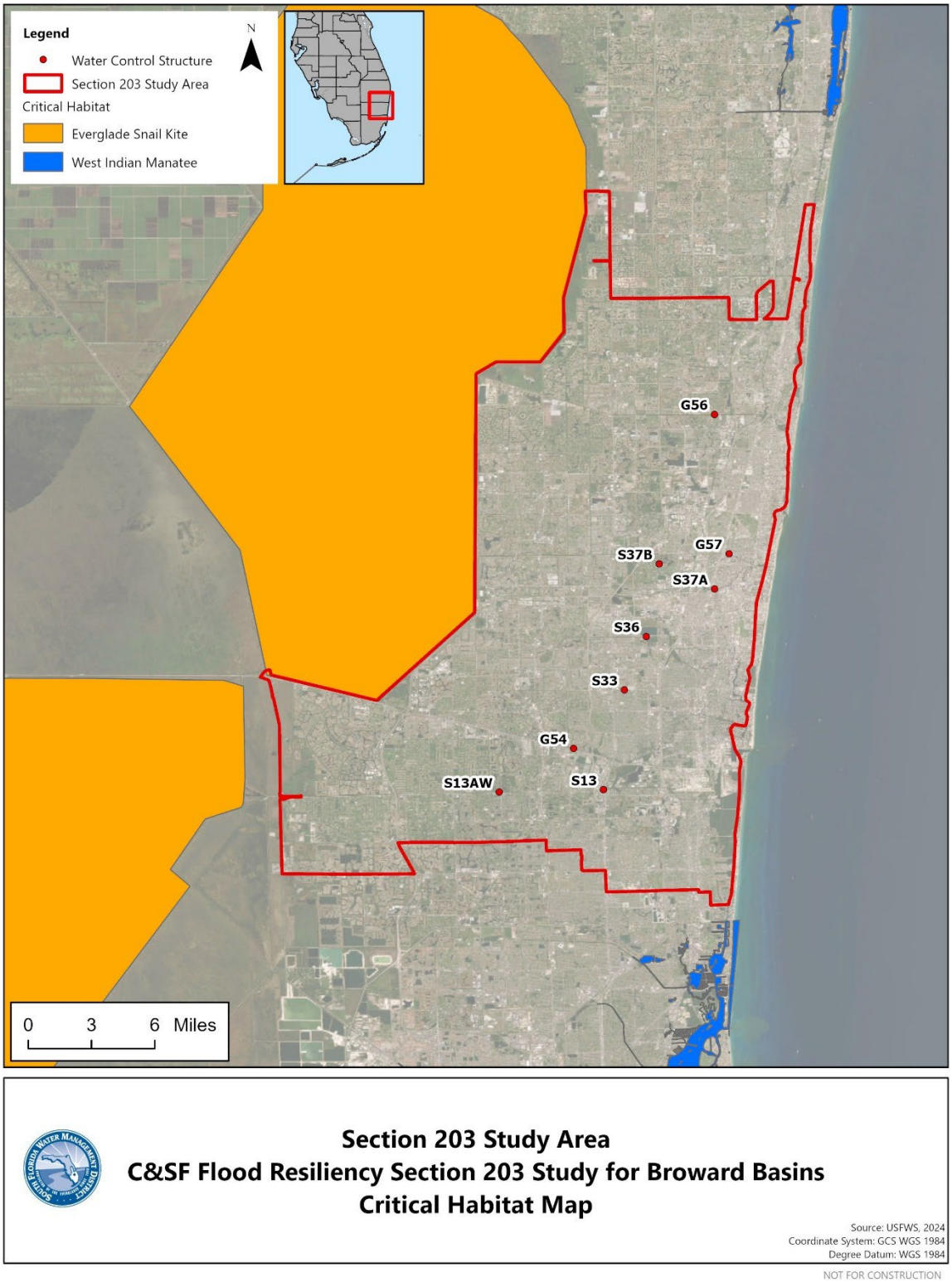

Figure 13. Species Designated Critical Habitat adjacent to the Action Area.

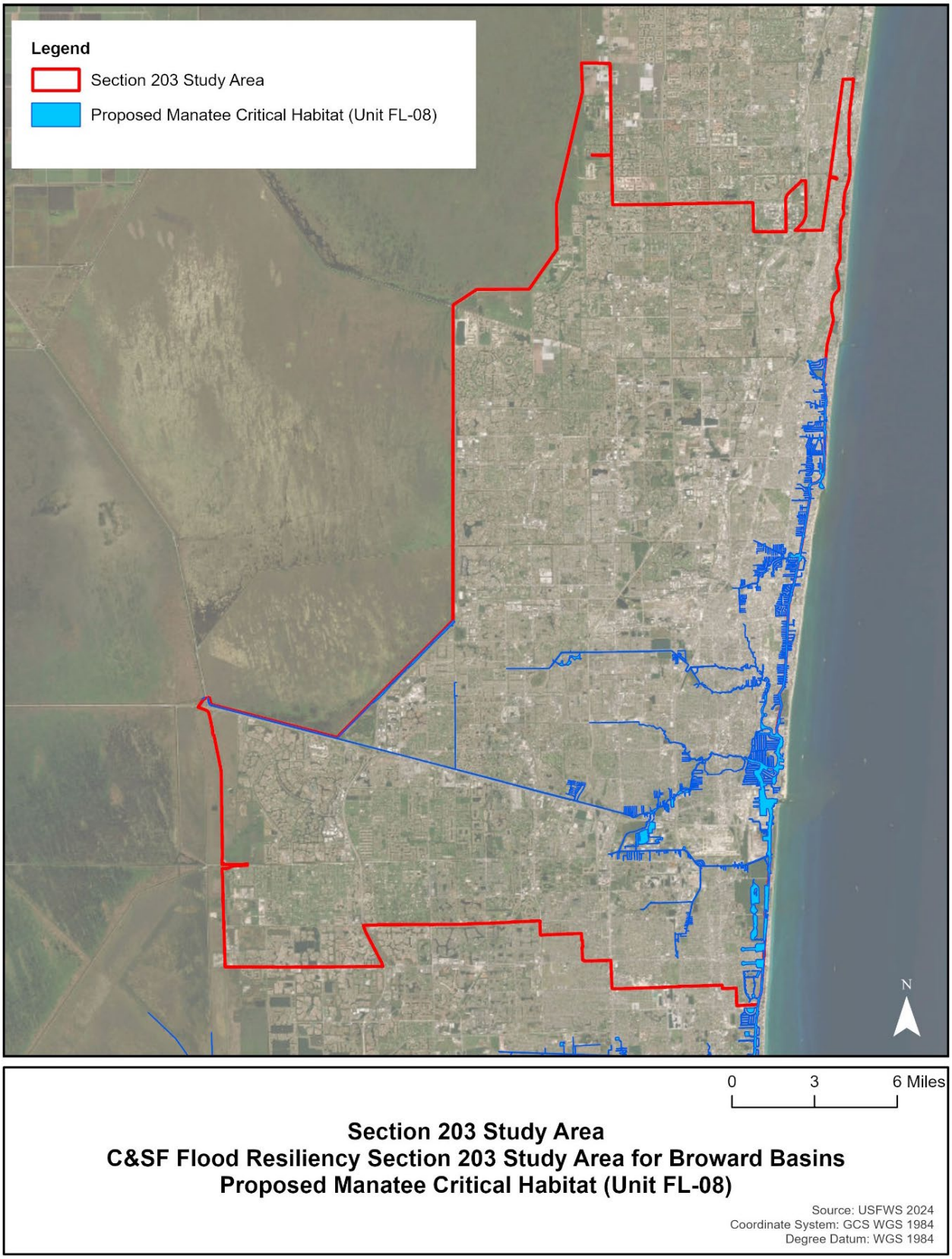

Figure 14. Proposed Manatee Critical Habitat (Unit FL-08).

8.0 SPECIES DESCRIPTIONS

Below are detailed descriptions of species status, life history, habitat requirements, and information about the species' known occurrence within the Action Area for all species that will be carried forward for further analysis in **Section 9**.

8.1 Florida Bonneted Bat

The endangered Florida bonneted bat (*Eumops floridanus*) is Florida's largest bat, weighing approximately 1.1 to 2.0 ounces, with a 19- to 21-inch wingspan and a body length of 5.1 to 6.5 inches. The species has dark brown fur and large broad ears that join and slant forward over the eyes. Roosting habitat in central and southern Florida include pine rocklands (South Florida rockland, rockland pine forest, rockland hammock); cypress communities (cypress swamps, strand swamps, domes, sloughs, ponds); hydric pine flatwoods (wet flatwoods); mesic pine flatwoods; and high pine. Florida bonneted bats roost in tree cavities, rocky outcrops, and foliage (FWC 2013). In residential communities, the bats roost in Spanish tile roofs, but have also been found in attics, rock or brick chimneys, and fireplaces of old buildings (FWC 2011a). Colonies are small, with the largest reported as just a few dozen individuals. Diverse, open foraging habitats (e.g., prairies, riverine habitat) are also important. This large bat relies on swarms of larger insects for feeding; thus, foraging habitat for the Florida bonneted bat consists of areas that hatch and concentrate insects of this size, including vegetated areas and waterways. These bats also frequently feed on insects from agricultural areas and golf courses (Bailey et al. 2017). Female bats give birth to a single pup from June through September (FWC 2011a); however, limited data suggests that a female may undergo a second birthing season possibly in January or February.

The Florida bonneted bat is Florida's only endemic bat. Based on the results of numerous surveys conducted across southern Florida since 2003, this species appears to occur predominately in central, southwest, and extreme south (mainland) Florida, with the core range primarily consisting of habitat within Polk, Charlotte, Lee, Collier, Monroe (mainland), and Miami-Dade Counties. Recent data also indicate use of portions of Highlands, Okeechobee, Glades, Palm Beach, and Broward Counties and possible use of areas within Osceola, Sarasota, and De Soto Counties (USFWS 2018). Loss of suitable habitat is believed to be the primary cause of population declines. Other perceived threats include pesticide and herbicide use, which decrease populations of insects, the bat's primary prey.

Potentially suitable habitat for Florida bonneted bat occurs in the rockland hammock, cypress swamps, and hydric and mesic pine forests within the Action Area. **Figure 15** shows the Florida bonneted bat's USFWS Consultation Area within the Action Area.

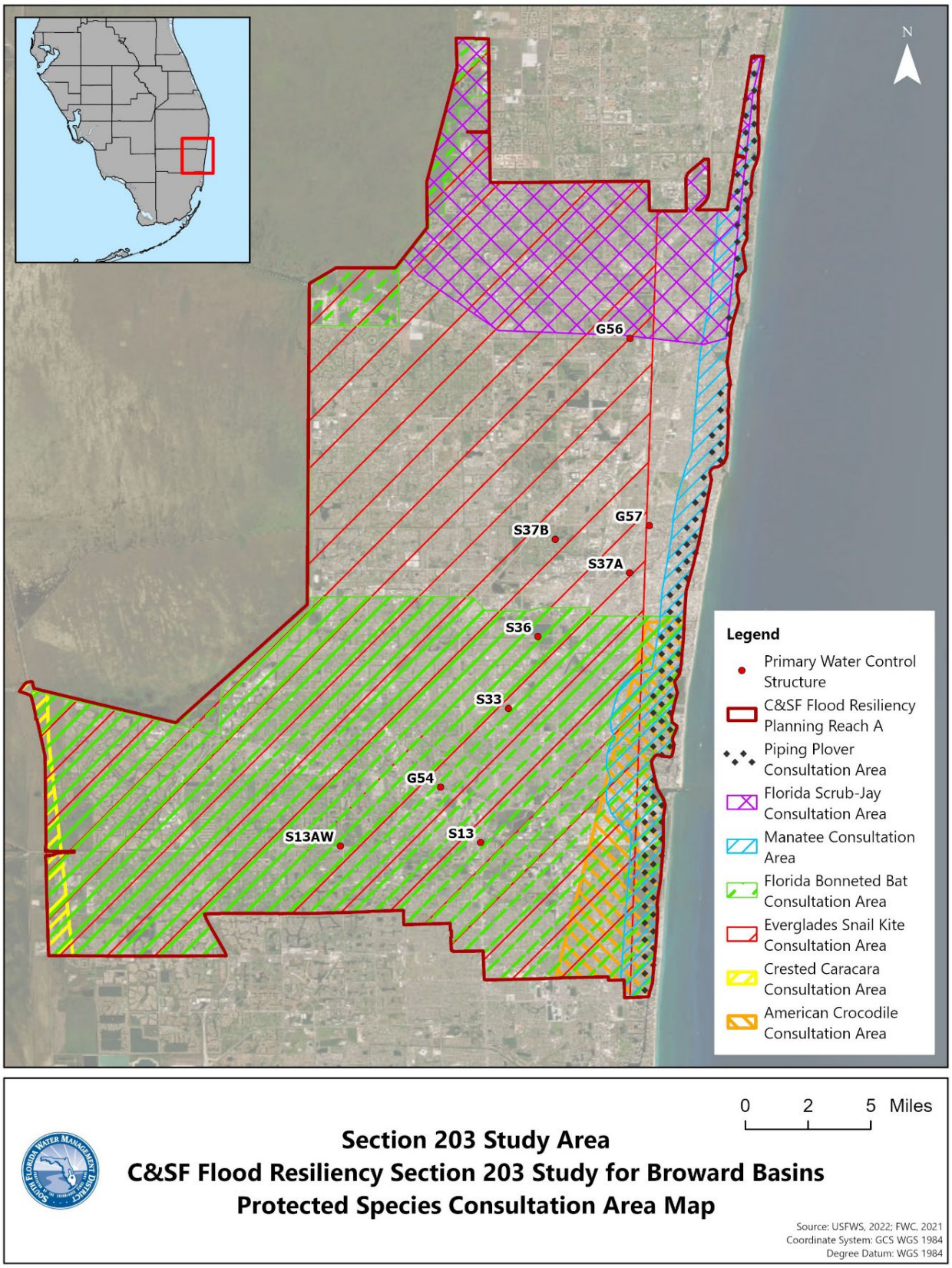

Figure 15. Protected Species Consultation Areas within the Action Area.

8.2 Tricolored Bat

On September 14, 2022, the USFWS proposed to list the tricolored bat (*Perimyotis subflavus*) as endangered under the Endangered Species Act (87 FR 56381). Designation of critical habitat was deemed not prudent at the time of the proposed listing.

The tricolored bat is a small insectivorous bat that ranges across the eastern and central United States and portions of southern Canada, Mexico, and Central America. In Florida, the species is found throughout the entire state except for the Florida Keys, but the species is rarely encountered and therefore considered uncommon in the state. Limited knowledge exists about tricolored bat typical home ranges, but different study sites generally found that tricolored bats restricted their movements to a few kilometers or less (Perry and Thill 2007; O'Keefe et al. 2009). A study in Kentucky and Tennessee found that tricolored bats remained within 2.5 kilometers (1.5 miles) of their original capture site (Schaefer 2017).

During the winter, tricolored bats are often found in caves and abandoned mines, although in the southern United States, where caves are sparse, tricolored bats are often found roosting in road-associated culverts where they exhibit shorter torpor bouts and forage during warm nights. Like other species, tricolored bats face extinction due primarily to the wide-ranging impacts of white-nose syndrome. Compared with various other North American bat species, the hibernation preferences of the tricolored bat for warm cave areas and higher humidity are thought to increase susceptibility for white-nose syndrome as these reflect ideal conditions for *Pseudogymnoascus destructans* (the fungi that causes white-nose syndrome; Fujita and Kunz 1984; Briggler and Prather 2003; Quinn and Broders 2007; CBD and DW 2016).

During the spring, summer, and fall, tricolored bats are found in forested habitats where they roost in trees, primarily among leaves of live or recently dead deciduous hardwood trees, but they may also be found in Spanish moss, pine trees, and occasionally human structures. Historically, the tricolored bat has been observed in tree and foliage roosts (Findley 1954; Jennings 1958; Davis and Mumford 1962). Recent summer telemetry studies have shown that tricolored bats commonly use tree roosts during the summer and most of the roost substrates are foliage. Thus, the tricolored bat is currently considered a foliage roosting species (Kalcounis-Rüppell et al. 2005). Many bats, including tricolored bats, are known to share roost trees or use the same tree over successive days before roost switching (Owen et al. 2002; Perry and Thill 2007).

Analyses of foliage roosting bat studies across many foliage roosting species, including the tricolored bat, showed a preference by bats for roost trees with a larger diameter at breast height, greater height, and more closed canopy compared with random trees (Kalcounis-Rüppell et al. 2005). In most of the range of the tricolored bat where tree foliage was used as the roost substrate, the species of tree had a significant effect on tree use by bats (Veilleux 2001; Perry and Thill 2007; O'Keefe 2009). In addition, tricolored bats are thought to prefer areas near water and riparian zones, more so than other sympatric bat species (Fujita and Kunz 1984; Owen et al. 2004; Ford et al. 2005; Menzel et al. 2005).

Potentially suitable habitat occurs in forested areas throughout the Action Area, particularly those that are located near water bodies that provide suitable foraging habitat for the species.

8.3 West Indian Manatee

The West Indian (Florida) manatee (*Trichechus manatus latirostris*) is a large, plant-eating aquatic mammal that can be found in the shallow coastal waters, rivers, and springs of Florida. The West Indian manatee was

listed as endangered throughout its range for both the Florida and Antillean subspecies (*T. manatus latirostris* and *T. manatus manatus*) in 1967 and received federal protection with the passage of the ESA in 1973. The manatee was designated as an endangered species prior to enactment of the ESA; therefore, no formal listing package identifying threats to the species was required by ESA Section 4(a)(1). On January 14, 2025, the USFWS published in the Federal Register (90 FR 3131) a proposed rule to maintain the federal listing of threatened for the West Indian manatee and extend the ESA's protection to the West Indian manatee.

West Indian manatees can be found throughout the southeastern United States; however, within this region, they are at the northern limit of their range (Lefebvre et al. 2000; USFWS 2001). Because they are a subtropical species with little tolerance for cold, they remain near warm water sites in peninsular Florida during the winter. During periods of intense cold, manatees will remain at these sites and will tend to congregate in warm springs and outfall canals. During warm interludes, manatees move throughout the coastal waters, estuaries, bays, and rivers of both coasts of Florida and are usually found in small groups. During warmer months, manatees may disperse great distances. West Indian manatees have been sighted as far north as Massachusetts and as far west as Texas and in all states in between (Rathbun et al. 1982; Fertl et al. 2005). Warm weather sightings are most common in Florida and coastal Georgia. They will once again return to warmer waters when the water temperature is too cold (Hartman 1979; Stith et al. 2006). West Indian manatees live in freshwater, brackish, and marine habitats, and can move freely between salinity extremes. They can be found in both clear and muddy water. Water depths of at least 3 to 7 feet are preferred and flats and shallows are avoided unless adjacent to deeper water. They also depend on canals as transit from one habitat to another, sources of freshwater, and resting sites.

Figure 15 shows the West Indian manatee's USFWS Consultation Area within the Action Area. The existing critical habitat designation for the manatee includes waters south of the Action Area, depicted in **Figure 13**. On September 24, 2024, the USFWS published in the Federal Register (89 FR 78134) a proposed rule under the ESA to revise the critical habitat for the West Indian manatee. The proposed critical habitat is within the Action Area, as shown in **Figure 14**. However, existing WCS in the Action Area canals act as physical barriers that effectively limit the upstream movement of manatees, restricting their access to downstream portions of the canal system, as shown in **Figure 16**.

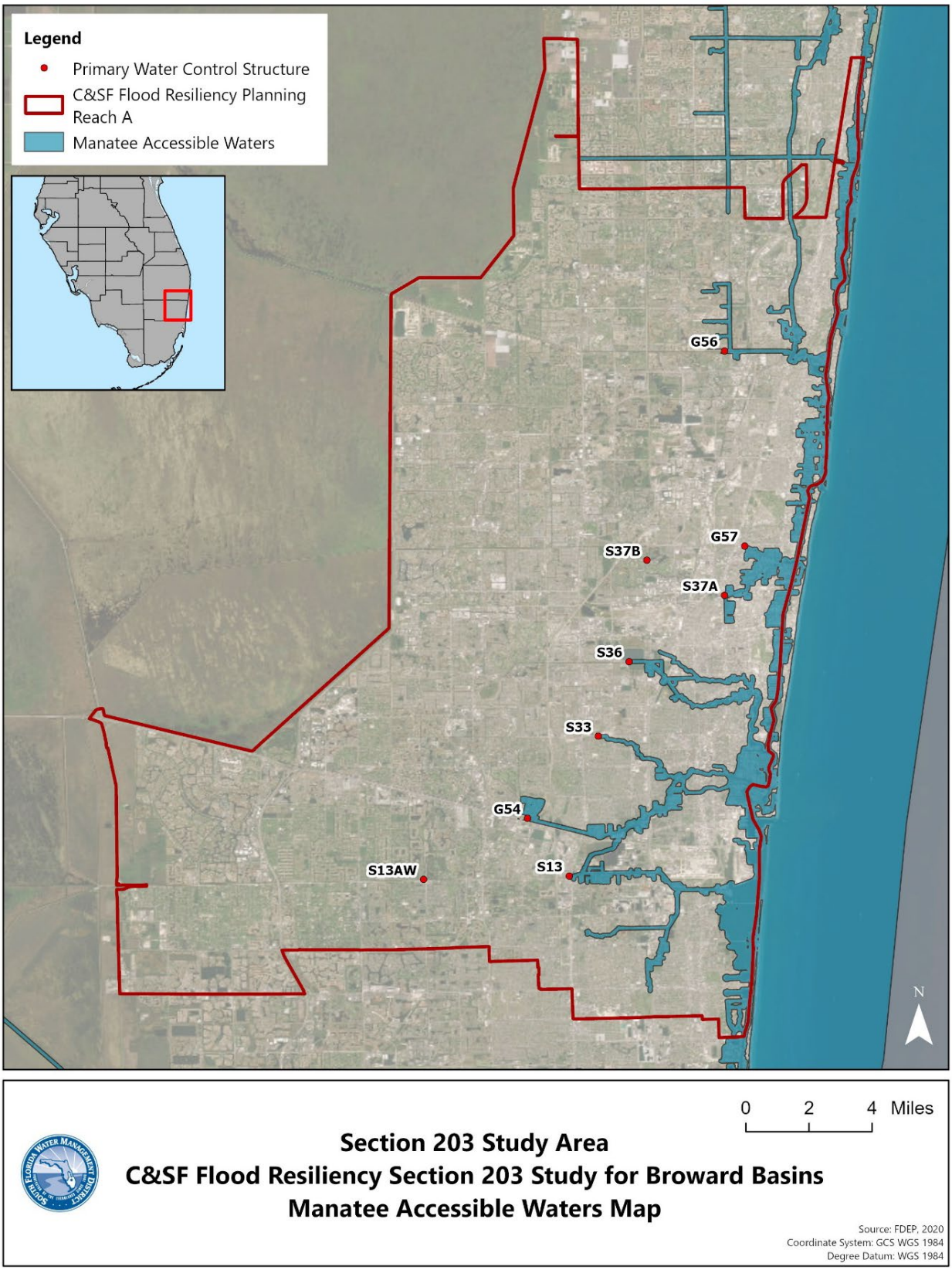

Figure 16. Manatee Accessible Waters within the Action Area.

8.4 Eastern Black Rail

The threatened eastern black rail (*Laterallus jamaicensis* ssp. *jamaicensis)* is a sparrow-sized bird and is the rarest and smallest of all rail species. Eastern black rail is a highly secretive bird that resides in marsh habitats, is rarely seen in flight, and will walk or run throughout their marsh habitat along narrow paths created by rodents. No critical habitat has been designated for the eastern black rail.

Eastern black rail range in the United States extends along the coastal areas of the eastern states, from New Jersey to the southern tip of Florida, along the gulf coast from Florida to Texas, and in the midwestern states, extending from Michigan to eastern Colorado (USFWS 2023). Within its range, the species has historically been most concentrated along the Atlantic Coast, along coastal salt marshes from Connecticut to Florida.

In Florida, eastern black rail is a year-round resident throughout the coastal areas and the full southern half of the state. Habitat for the species is characterized by shallow, densely vegetated, marshes in salt, brackish, and freshwater environments (USFWS 2023). The species appears to be limited to specific habitat characteristics in marsh environments, including persistent water coverage and depth, very dense herbaceous vegetation, and topographic variation (ACJV 2020). Habitats supporting black rail typically have water levels around 3 centimeters (0.4 inch) in depth, which is persistent. If water levels pool up seasonally or become too low or dry up in the summer months, the species will abandon the site. Vegetation structure is also an important habitat characteristic, and typically includes greater than 80 percent grasses, and includes bulrushes, sedges, and cattails. Topographic variation is an important characteristic in black rail habitat to allow for escape when water levels rise and to allow greater foraging opportunity for invertebrate food sources that rails depend on. Small numbers of black rails have also been documented in impoundments, freshwater wetlands, coastal prairies, and grassy fields, where there are suitable habitat conditions present.

Nesting occurs from mid-March through August, and the species constructs their nests on or near the ground in very dense vegetation over water or moist soil or in shallow water (Watts 2022). Clutch size is typically around seven eggs, and the eggs are incubated for 17 to 20 days. The nestlings leave the nest within 1 day and the parents are believed to care for the young and feed them.

Freshwater marshes are primarily found along the western portion of C-11 West Basin of the Action Area, adjacent to WCA-3B (**Figure 8** through **Figure 11**). They contain low-growing species such as grasses, sedges, rushes, and forbs. These areas could provide potentially suitable habitat for the eastern black rail.

8.5 Wood Stork

The threatened wood stork (*Mycteria americana*) is a large, white, long-legged wading bird that relies on shallow freshwater wetlands for foraging. It primarily uses shallow wetlands where prey is concentrated and movements during the breeding and non-breeding seasons are typically in response to the availability of such shallow wetlands. As a wading bird, wood storks are a wetland-dependent species and rely on a mosaic of wetlands for nesting, roosting, and foraging (USFWS 2021). This species was federally listed as endangered under the ESA on February 28, 1984. In February 2023, the USFWS proposed to delist the southeast district population segment of wood stork (88 FR 9830). No critical habitat has been designated for the wood stork.

In the United States, wood storks were historically known to nest in all coastal states from Texas to South Carolina (Bent 1926). Dahl (1990) estimates these states lost about 38 million acres, or 45.6 percent, of their historic wetland habitat between the 1780s and the 1980s. However, it is important to note that wetlands and wetland losses are not evenly distributed in the landscape. Hefner et al. (1994) estimated 55 percent of the 2.3 million acres of the wetlands lost in the southeastern United States between the mid-1970s and mid-1980s were in the Gulf-Atlantic coastal flats. These wetlands were strongly preferred by wood storks as nesting habitat. Currently, wood stork nesting is known to occur in Florida, Georgia, South Carolina, and North Carolina from March to late May. However, in South Florida, wood storks lay eggs as early as October and fledge in February or March. Breeding colonies of wood storks are currently documented in all southern Florida counties except for Okeechobee County.

The wood stork population in the southeastern United States appears to be increasing. Preliminary population totals indicate that the wood stork population has reached its highest level since it was listed as endangered in 1984. In 2019, 17,398 wood stork pairs were recorded across Florida, Georgia, South Carolina, and North Carolina (USFWS 2021). Wood stork nesting was first documented in North Carolina in 2005, and wood storks have continued to nest in this state since (USFWS 2021). This suggests that the northward expansion of wood stork nesting may be continuing.

The primary cause of the wood stork population decline in the United States is loss of wetland habitats or loss of wetland function resulting in reduced prey availability. Almost any shallow wetland depression where fish become concentrated, either through local reproduction or receding water levels, may be used as feeding habitat by the wood stork during some portion of the year; however, only a small portion of the available wetlands support foraging conditions (i.e., high prey density, suitable water depths for foraging, and favorable vegetation structure) that wood storks need to maintain growing nestlings. Browder et al. (1976) documented the distribution and the total acreage of wetland types occurring south of Lake Okeechobee for the period 1900 through 1973. They combined their data for habitat types known to be important foraging habitat for wood storks (e.g., cypress domes and strands, wet prairies, scrub cypress, freshwater marshes and sloughs, and sawgrass marshes) and found these habitat types have been reduced by 35 percent since 1900.

Wood storks forage primarily within freshwater marsh and wet prairie vegetation types but can be found in a wide variety of wetland types, if prey is available, and the water is shallow and open enough to hunt successfully (Ogden et al. 1978; Coulter 1987; Gawlik et al. 2004). Calm water, approximately 5 to 25 centimeters (1.8 to 9.8 inches) in depth, and free of dense aquatic vegetation is ideal; however, wood storks have been observed foraging in ponds up to 40 centimeters (15.7 inches) in depth (Coulter and Bryan 1993; Gawlik et al. 2004). Typical foraging sites include freshwater marshes; ponds; hardwood and cypress swamps; narrow tidal creeks or shallow tidal pools; and artificial wetlands such as stock ponds, shallow, seasonally flooded roadside or agricultural ditches, and managed impoundments (Coulter et al. 1999; Coulter and Bryan 1993). During nesting, these areas must also be sufficiently close to the colony to allow wood storks to efficiently deliver prey to nestlings.

Wood stork occurrences are located throughout the Action Area, as shown in **Figure 17**. Wood stork core foraging areas, which cover the entirety of the Action Area, are shown in **Figure 18**.

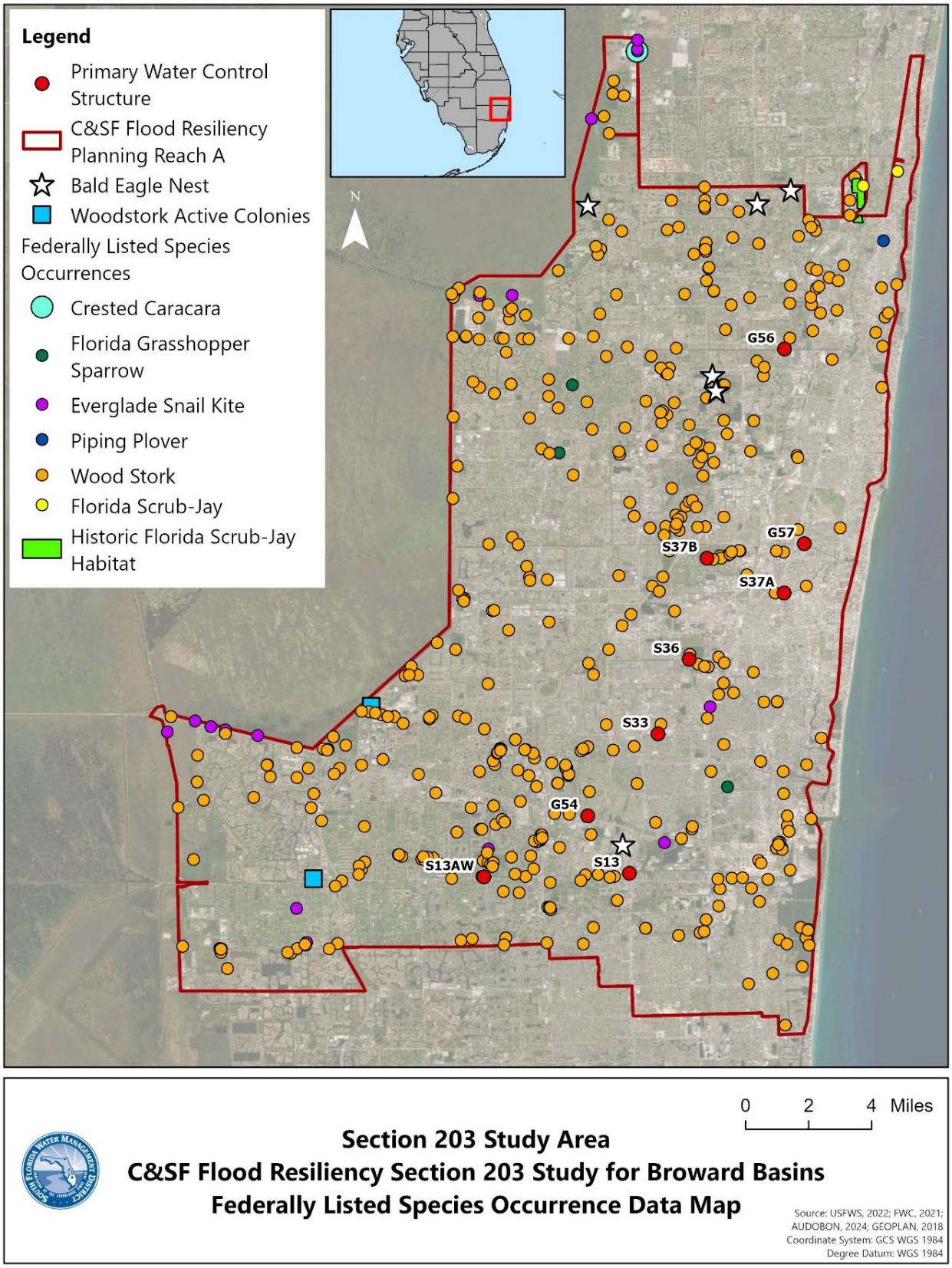

Figure 17. Federally Listed Species Occurrences within the Action Area.

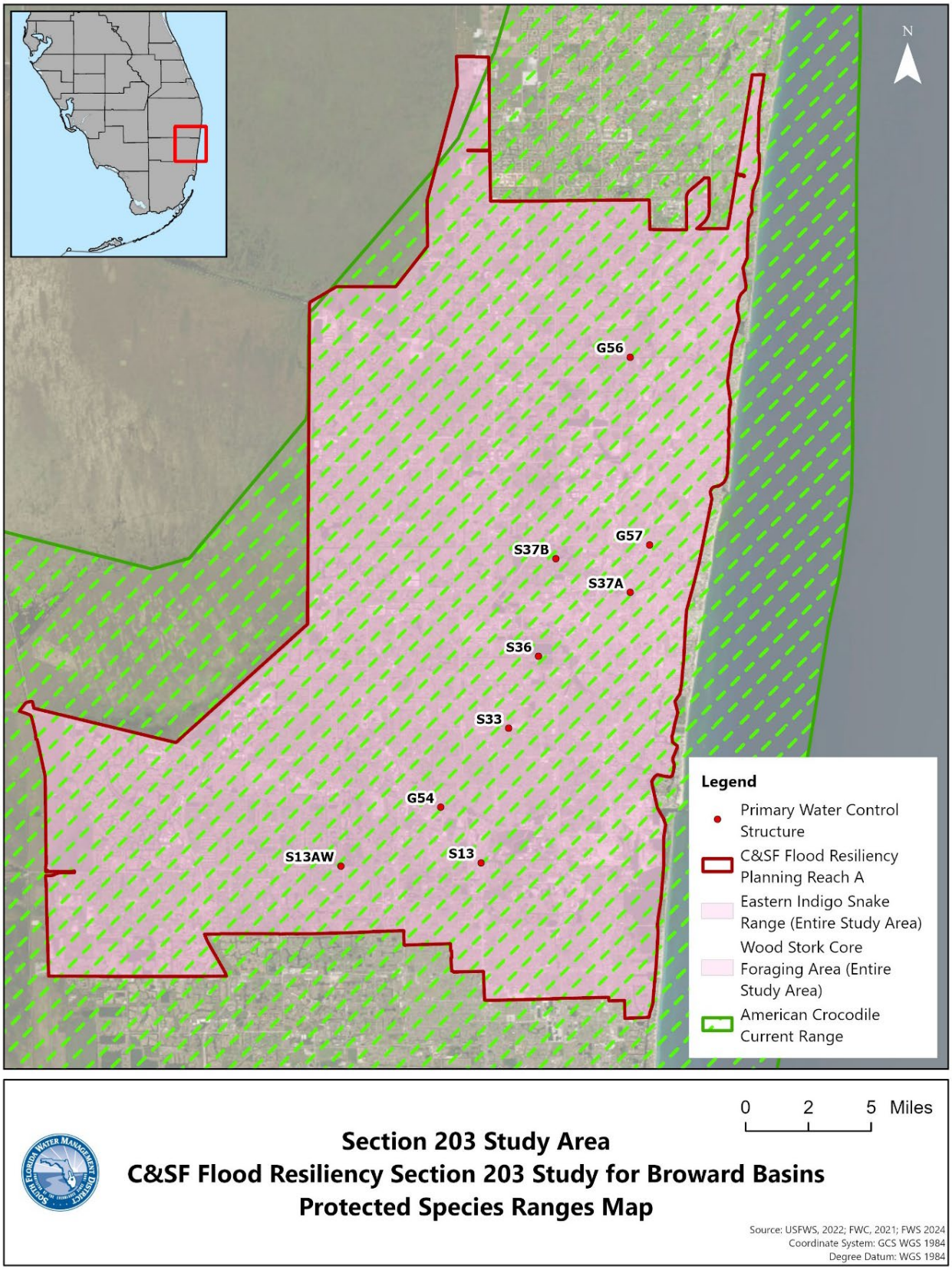

Figure 18. Protected Species Range within the Action Area.

8.6 Everglade Snail Kite

The endangered Everglade snail kite (*Rostrhamus sociabilis plumbeus*) is a medium-sized raptor characterized by its long, narrow wings and distinctive hooked beak, which is adapted for extracting apple snails (*Pomacea* sp.) from their shells. Adult males typically exhibit a dark gray plumage with a lighter, almost white head and a distinctive red eye. Females and juveniles are generally browner and have streaked underparts. Although previously located in freshwater marshes over a considerable area of peninsular Florida, the range of the snail kite is now limited to central and southern portions of Florida. Six large freshwater systems are located within the current range of the snail kite: Upper St. Johns marshes, Kissimmee Chain of Lakes, Lake Okeechobee, Loxahatchee Slough, the Everglades, and the Big Cypress basin (FWC 2024b).

The Everglade snail kite's apple snail diet is dependent on the hydrology and water quality of the watersheds. Foraging habitat requires shallow open-area ponds with low marsh areas; nesting/roosting sites are located over water. Foraging conditions have expanded recently due to the increase in exotic apple snail population (since about 2010). As a result, the Everglade snail kite breeding season has lengthened (sometimes into fall) and some previous unsuitable foraging areas now have the exotic apple snail and are being used by kites. Everglade snail kite nests are built in tall vegetation near water with nesting season usually occurring from late winter to early summer, with females laying two to four eggs. Both parents participate in incubating the eggs and feeding the chicks once they hatch.

Figure 15 shows the Everglade snail kite's USFWS Consultation Area within the Action Area, and **Figure 13** shows designated critical habitat for the Everglade snail kite, which is located outside the Action Area, adjacent to the western boundary. **Figure 17** shows occurrences of the Everglade snail kite within the western and southern portions of the Action Area.

8.7 American Crocodile

The threatened American crocodile is a large, saltwater-tolerant species that inhabits coastal waters of south Florida, as well as waters further south outside the territorial bounds of the United States. The American crocodile was listed primarily because of hunting, nest disturbance, and loss of habitat. The American crocodile was listed as endangered in 1975, when only about 300 adults were inhabiting Florida waters. Their listing was reclassified as threatened in 2007, and there are now over 2,000 adults today (Harvey et al. 2019).

In Florida, American crocodiles primarily inhabit mangrove swamps, though the species can be found in other areas such as shorelines, mudflats, nearshore salt waters, and both fresh water and estuarine swamps. Crocodiles have a higher salinity tolerance than alligators and tend to inhabit more estuarine waters, though they can be found in fresh water (IFAS 2024). Crocodiles have adapted well to development and urbanization in Florida and are now commonly observed in artificial habitats such as canals and man-made ponds in commercial and residential areas (USFWS 2022). The canals provide suitable travel corridors and prey for crocodiles, and canal banks, along with seawalls, piers, and other structures, provide suitable basking habitat. The crocodile's diet includes fish, crabs, birds, turtles, snakes, and small mammals (FWC 2024d).

Nesting habitat includes creek banks, sandy beaches, and human-made structures such as canal banks, earthen berms, and marl canal plugs. American crocodiles are not known to nest north of Virginia Key on the

eastern coast of Florida. Current nest locations are concentrated between northeast Florida Bay and southern Biscayne Bay, over 40 miles south of the Action Area. American crocodiles begin courting in late January and early February and nesting occurs in late April and early May. Their soil nests are built on land and above high tide markings.

Figure 15 shows the American crocodile's USFWS Consultation Area within the Action Area. The Action Area also overlaps the current range for American crocodiles. **Figure 18** shows the range of the American crocodile within the Action Area.

8.8 Eastern Indigo Snake

The threatened eastern indigo snake (*Drymarchon couperi*) is the largest native non-venomous snake in North America. It is an isolated subspecies occurring in southeastern Georgia and throughout peninsular Florida. The eastern indigo snake prefers drier habitats but may be found in a variety of habitats from xeric sandhills to cabbage palm hammocks, to hydric hardwood hammocks (Schaefer and Junkin 1990). The species has also been found in citrus groves and sugar cane. Eastern indigo snakes need relatively large areas of undeveloped land to maintain their population. In warm months, eastern indigo snakes use a variety of natural areas and have large home ranges (Moler 1992; USFWS 1999). Eastern indigo snakes occupy larger home ranges in the summer than the winter. Information on snakes in Florida indicates adult males have home ranges as high as 553 acres (224 hectares) in the summer (Moler 1992). Because it is such a wide-ranging species, the eastern indigo snake is especially vulnerable to habitat fragmentation that makes travel between suitable habitats difficult. The main reason for its decline is habitat loss due to development. Further, as habitats become fragmented by roads, eastern indigo snakes become increasingly vulnerable to highway mortality as they travel through their large territories (Schaefer and Junkin 1990).

In South Florida, the eastern indigo snake is thought to be widely distributed. Given their preference for upland habitats, eastern indigo snakes are not commonly found in great numbers in wetland complexes, although they have been found in pinelands, tropical hardwood hammocks, and mangrove forests in extreme South Florida (Duellman and Schwartz 1958; Steiner et al. 1983).

Within the range of the gopher tortoise (*Gopherus polyphemus*), tortoise burrows are favorite refugia for eastern indigo snakes. They are known to use burrows made by cotton rats and land crabs, hollows at bases of trees and stumps, ground litter, trash piles and rock piles lining banks of canals, and pipes or culverts. Breeding occurs from November to April with females laying 4 to 12 eggs in May through June (Moler 1992). Most hatching of eggs occurs from August to September, with yearling activity peaking in April and May (USFWS 1999).

Potentially suitable habitat for eastern indigo snake occurs in cabbage palm hammocks and hydric hardwood hammocks within the Action Area. **Figure 18** shows the eastern indigo snake's range within the Action Area.

8.9 Monarch Butterfly

Monarch butterfly (*Danaus plexippus*) was proposed for listing as a threatened species under Section 4(d) of the ESA (''4(d) rule'') on December 12, 2024. The USFWS also proposed to designate critical habitat for the monarch butterfly under the ESA (89 FR 100662).

The monarch butterfly occurs in most temperate and tropical climates worldwide. The species' ancestral origin is North America, but it has spread globally with the post-colonization worldwide introduction of milkweeds (*Asclepias* spp.), which serve as the species' larval host plant (USFWS 2020). There are three populations that occur in North America. The Florida population is non-migratory, occurring in Florida year-round (USFWS 2020). Two additional populations occur within North America, including the western North America population (which overwinters in coastal California) and the eastern North American population (which overwinters in southern Mexico). The eastern population migrates through Florida; therefore, both migratory and non-migratory monarch butterflies have the potential to occur in the Action Area.

To support strong population growth rate, monarchs require sufficient quantity and quality of habitat to accommodate all life stages; large population sizes also help maintain genetic health and facilitate individual's thermoregulation during the winter (USFWS 2020). The two North American migratory populations are experiencing lower abundance and declining population rates due to loss and degradation of habitat, continued exposure to insecticides, and climate change (USFWS 2024b). There are no abundance estimates for the non-migratory population in Florida, but the population is believed to be under threat largely due to the introduction of non-native tropical milkweed (*Asclepias curassavica*) to Florida, which has been a source for transmitting a protozoan parasite (*Ophryocystis elektroscirrha*; *OE*). *OE* is thought to have a 75 to 100 percent infection rate; however, the Florida population of monarch butterflies may be building a resistance to *OE*, as demonstrated by lower spore loads in the population. Monarch butterflies with *OE* have a lower survival rate and reproductive rate than monarchs without the *OE* parasite.

Monarch butterflies in Florida lay their eggs on milkweed plants year-round, and the eggs hatch within approximately 5 days. The larvae feed on their host milkweeds for about 9 to 18 days before pupating into chrysalides and then metamorphosing into adult butterflies about 6 to 14 days later (USFWS 2024b). Adults from the eastern North American migratory population then migrate to Mexico to overwinter, or adults from the Florida population may remain in Florida year-round.

The monarch butterfly requires large intact stands of milkweed where it can lay its eggs and breed (USFWS 2024b). Furthermore, adult monarch butterflies feed on a wide variety of floral and nectar resources; therefore, an abundance and diversity of native wildflowers are an important component of monarch butterfly habitat.

Monarch butterflies are known to occur in both Broward and Palm Beach counties within the Action Area including Yamato Natural Area, Markham Park, and Secret Woods Nature Center. Potentially suitable habitat occurs throughout the Action Area in a variety of habitats that have the potential to support milkweed and other flowering plants. Undeveloped areas within the Action Area have a greater likelihood of supporting the species, including natural areas, parks, and preserves.

9.0 SPECIES EFFECT DETERMINATIONS

The proposed project measures under the SFWMD Section 203 Study TSP and potential effects to both aquatic and terrestrial species were evaluated based on a comparison between the existing conditions and future conditions within the Action Area with implementation of the TSP. Effects were identified as either direct or indirect impacts, or beneficial effects. Where applicable, effects determination keys were applied (Appendix B).

A description of general effect mechanisms for federally listed aquatic and terrestrial species under the SFWMD Section 203 Study TSP is presented in **Table 5** below.

Table 5. General Effect Mechanisms for Federally Listed Aquatic and Terrestrial Species under the Tentatively Selected Plan.

	Canal Conveyance Improvements	Pumps and Gates at Structures	Operational Activities
Project Measures under the Tentatively Selected Plan	Canal excavation to increase flow capacity	Adding pumps where none exist, deploying additional pumps, and/or upgrading pumps to higher capacity to move water over WCS faster than it would otherwise flow by gravity; adding or expanding gates	Moving water either by pumping or gravity between canals
Project Operations	Future operations are expected to be consistent with current operations. Even though canal capacity will increase, the current water levels will be maintained, meaning flows, salinity, and temperature are expected to remain the same. The exception is that storm and pre-storm drawdown events will be more efficient, allowing for improved water conveyance, reducing the time it takes to move water through the system.	Future operations are expected to be consistent with current operations. Even though capacity will increase, the current water levels will be maintained, meaning flows, salinity, and temperature are expected to remain the same. The exception is that storm and pre-storm drawdown events will be more efficient, allowing for improved water conveyance, reducing the time it takes to move water through the system.	Future operations are expected to be consistent with current operations. In addition, water in SFWMD-managed primary canals upstream of WCS may be drawn down prior to a storm by pumping water from the upstream side to the downstream side of the WCS, with the resulting water being moved downstream to the Intracoastal Waterway. These events will be more efficient, allowing for improved water conveyance, reducing the time it takes to move water through the system.
General Effects Determinations			
Aquatic Species	Construction • Direct impacts to aquatic species could occur if they are harmed by work vessels, should the vessels not be operated at the appropriate speed or have the appropriate clearance from the canal bottom. • Direct impacts to aquatic species could occur through entanglement or entrapment in siltation and turbidity barriers. • If cofferdams are used during construction, temporary direct impacts to aquatic species could occur by limiting their mobility. • Temporary direct impacts to aquatic species could occur due to disturbance from increased human activity. • Temporary, indirect impacts to aquatic species could occur if soil is introduced to canals and/or other waterways, impacting water quality. Operations • Temporary impacts to aquatic species could occur due to changes in hydrology resulting from increased gravity flows from heavy rain events or pre-storm drawdown events that may alter salinity, temperature, turbidity, and water velocities. • Beneficial effects to some aquatic species could result from greater conveyance of flows from structural improvements by improved water conveyance, reducing the time it takes to move		Construction • N/A – There is no construction associated with operational activities. Operations • Beneficial effects to some aquatic species could result from improved water conveyance, reducing the time it takes to move water through the system. This may benefit species with lower salinity tolerances that are located downstream of WCS due to improved freshwater conveyance to the coast. • Temporary impacts to aquatic species could occur due to changes in hydrology resulting from increased gravity flows from heavy rain events or pre-storm

	Canal Conveyance Improvements	Pumps and Gates at Structures	Operational Activities
	water through the system. This may benefit species with lower salinity tolerances that are located downstream of WCS due to improved freshwater conveyance to the coast.		drawdown events that may alter salinity, temperature, turbidity, and water velocities.
Terrestrial Species	Construction • Temporary, direct impacts to terrestrial species could result from vegetation removal or ground disturbance if a species is actively nesting, burrowing, roosting, or otherwise occupying the habitat being disturbed. • Temporary, direct impacts to terrestrial species could occur due to disturbance from increased human activity. • Direct and indirect impacts to terrestrial species could occur from permanent or temporary habitat loss. Operations • Beneficial effects to terrestrial species, particularly those that nest or occupy burrows close to water, could result by reducing temporary flooding/inundation of upland and wetland habitats during and after storm events. • Beneficial effects to terrestrial species could result from preventing/reducing habitat loss by reducing permanent inundation of wetland and upland habitats that results from sea level rise. • Beneficial effects to terrestrial species that rely on water levels being maintained, such as birds that nest close to water or that forage in areas that rely on water levels being the same, could result from improved water conveyance, reducing the time it takes to move water through the system.		Construction • N/A – There is no construction associated with operational activities. Operations • Beneficial effects to terrestrial species that rely on water levels being maintained (such as those that nest near water) or that rely on water levels staying the same for foraging, could result from improved water conveyance, reducing the time it takes to move water through the system.

9.1 Effect Mechanisms

The ESA defines "take" as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct (16 U.S.C. 1532(B)). For listed species that may occur in the Action Area, all attempts will be made to avoid mortality of individuals during construction of the TSP. The primary effect on listed species from construction of the SFWMD Section 203 Study TSP measures will be loss of habitat that is currently supporting essential behavior patterns for species, including breeding, feeding, and sheltering. Beyond direct mortality to species, habitat loss can result in displacement of individuals, pushing them into nearby habitats where interspecific competition may become a stressor. Adjacent or nearby habitats may be of lower quality, resulting in lower reproductive rates and shorter life expectancy. Specific implications of habitat loss are discussed in this document for individual species. The primary effects on listed species from operation of the TSP measures, once they are constructed, will be changes in hydrology, water quality, or other physical parameters (e.g., salinity, temperature).

9.2 Species Effect Determinations

The USACE has evaluated the potential effects to federally listed species that may occur as a result of implementing the SFWMD Section 203 Study TSP. For all the species analyzed in this document, USACE has made a May Affect, Not Likely to Adversely Affect (MANLAA) determination. The USACE has determined that the potential effects to listed species as a result of the SFWMD Section 203 Study TSP are insignificant, discountable, or the effects are wholly beneficial.

Effect determinations for each of the federally listed species analyzed in this document are presented by each of the TSP management measures in **Table 6** below. The general effect mechanisms for aquatic and terrestrial species presented in **Table 5** apply to all species listed in **Table 6**. If additional effects are anticipated for a certain species, they are presented in **Table 6**.

All standard conservation measures for species would be followed during and post-construction, as further discussed in **Section 11**.

Table 6. Effects Determinations for Federally Listed Species under the SFWMD Section 203 Study Tentatively Selected Plan.

Federally Listed Species	Effect Determinations under the Tentatively Selected Plan
Florida bonneted bat	**Construction:** Both direct and indirect impacts are expected in the form of habitat loss during construction. This habitat loss will be discrete (sometimes limited to just one tree) and distributed across multiple locations across the Action Area. Trees that are 7.4 inches diameter at breast height or greater with cavities (or snag height) at 15 feet or higher would only be removed between November 15 to April 15[b/]. Tree removal that occurs outside of that period would not occur unless a pre-removal survey is completed to confirm no roosting bats are present. Trees that would be removed during project-related activities are in locations that are largely urban, and thus generally lower habitat quality than locations outside of urban areas, since they are surrounded by stressors typical of urban uses, such as insect control, noise, pets, and light pollution. Use of these trees as roost trees is expected to be limited at best. **Operations:** Normal operational activities are not expected to result in any effects to Florida bonneted bat. Beneficial effects to Florida bonneted bat could result from improved water conveyance during operational drawdown events that would reduce flooding and resulting permanent habitat loss from sea level rise. **Effect Determination: MANLAA** The conservation measures in **Section 11** will be implemented, including limits on the timing of tree clearing, as noted above.
Tricolored bat	**Construction:** Both direct and indirect impacts are expected in the form of habitat loss during construction. This habitat loss will be discrete (sometimes limited to just one tree) and distributed across multiple locations across the Action Area. Though the collective acreage of tree removal, across all project locations, may exceed 0.5 acre, which is the threshold for areas like Broward County with minimal potential habitat, tree removal at individual project locations would typically be less than 0.5 acre. In addition, trees that would be removed during project-related activities are in locations that are largely urban, and thus generally lower habitat quality than locations outside of urban areas. Use of these trees as roost trees is expected to be limited at best, since they are surrounded by stressors typical of urban uses, such as insect control, noise, pets, and light pollution. Trees that need to be removed would be examined and if they have characteristics that could support tricolored bat roosting, a pre-removal survey would be conducted to confirm no bats are present prior to removal[c/]. **Operations:** Normal operational activities are not expected to result in any effects to tricolored bat. Beneficial effects to tricolored bat could result from improved water conveyance during operational drawdown events that would reduce flooding and resulting permanent habitat loss from sea level rise. **Effect Determination: MANLAA** The conservation measures in **Section 11** will be implemented, including limits on the timing of tree clearing.

Federally Listed Species	Effect Determinations under the Tentatively Selected Plan
West Indian (Florida) manatee	**Construction:** Both direct and indirect impacts are expected during construction but anticipated to be insignificant. Improvements are highly localized at seven WCS. One discrete segment of the G-08 (Hillsboro) Canal (approximately 0.9 linear miles) downstream of the G-56 Gated Spillway would be improved through excavation. Other canal and culvert improvements are proposed upstream of WCS in waters that are not accessible to manatees. No impacts from general operations are expected because operations will not change from existing conditions. Manatee protection systems will be installed for each WCS discharge bay, per the applicable federal standards and codes. The SFWMD's latest standards, which incorporates the USACE protection guidelines for the endangered West Indian manatee by reference, will be followed. Reference Section 01531 of Appendix C. **Operations:** Normal operational activities are not expected to result in any effects to West Indian manatee. Temporary, indirect effects to West Indian manatee could occur due to changes in hydrology resulting from improved water conveyance during operational drawdown events that may alter salinity, temperature, turbidity, and water velocities. **Effect Determination: MANLAA** The conservation measures in **Section 11** will be implemented.
Proposed critical habitat West Indian manatee[a/]	**Construction:** The structural measures will not result in the adverse modification of West Indian manatee proposed critical habitat, because all structural measure improvements are highly localized at seven WCS. One discrete segment of the G-08 (Hillsboro) Canal (approximately 0.9 linear miles) downstream of the G-56 Gated Spillway would be improved through excavation. Other canal and culvert improvements are proposed upstream of WCS in waters that are not accessible to manatees. **Operations:** Normal operational activities are not expected to result in any effects to West Indian manatee proposed critical habitat. Temporary, indirect effects to West Indian manatee proposed critical habitat could occur due to changes in hydrology resulting from improved water conveyance during operational drawdown events that may alter salinity, temperature, turbidity, and water velocities. **Effect Determination: No Adverse Modification** The conservation measures in **Section 11** will be implemented.
Eastern black rail	**Construction:** There are no direct or indirect impacts expected during construction **Operations:** Normal operational activities are not expected to result in any effects to eastern black rail. Beneficial effects to eastern black rail could result from improved water conveyance during operational drawdown events that would reduce flooding and resulting permanent habitat loss from sea level rise. **Effect Determination: MANLAA** The conservation measures in **Section 11** will be implemented.

Federally Listed Species	Effect Determinations under the Tentatively Selected Plan
Wood stork	**Construction:** There are no direct or indirect impacts expected during construction. Based on the USFWS Wood Stork Effect Determination Key (USFWS 2010a), construction and operations would result in **No Effect** on wood stork because there are no active colony sites within 0.47 mile of the structural improvements and no suitable foraging habitat would be impacted. **Operations:** Based on the USFWS Wood Stork Effect Determination Key (USFWS 2010a) and because all conservation measures in **Section 11** will be implemented, normal operational activities are not expected to result in any adverse effects to wood stork. Beneficial effects to wood stork could result from improved water conveyance during operational drawdown events that would reduce flooding which results in permanent habitat loss from sea level rise. **Effect Determination: MANLAA** The conservation measures in **Section 11** will be implemented.
Everglade snail kite	**Construction:** There are no direct or indirect impacts expected during construction **Operations:** Normal operational activities are not expected to result in any adverse effects to Everglade snail kite. Beneficial effects to Everglade snail kite could result from improved water conveyance during operational drawdown events that would reduce flooding which results in permanent habitat loss from sea level rise. **Effect Determination: MANLAA** The conservation measures in **Section 11** will be implemented.
American crocodile	**Construction:** Both direct and indirect impacts are expected during construction but are anticipated to be insignificant. Improvements are highly localized at seven WCS. One discrete segment of the G-08 (Hillsboro) Canal (approximately 0.9 linear mile) downstream of the G-56 Gated Spillway would be improved through excavation. Other canal and culvert improvements are proposed upstream of WCS in waters that are not accessible to American crocodile. No impacts from general operations are expected because operations will not change from existing conditions. **Operations:** Normal operational activities are not expected to result in any adverse effects to American crocodile. Temporary, indirect effects to American crocodile could occur due to changes in hydrology resulting from improved water conveyance during operational drawdown events that may alter salinity, temperature, turbidity, and water velocities. **Effect Determination: MANLAA** The conservation measures in **Section 11** will be implemented.

Federally Listed Species	Effect Determinations under the Tentatively Selected Plan
Eastern indigo snake	**Construction:** Both direct and indirect impacts are expected during construction but are anticipated to be insignificant. Beneficial effects to eastern indigo snake could result from improved water conveyance during operations that reduces permanent habitat loss from sea level rise. Based on the USFWS Effects Determination Key for Eastern Indigo Snake (USFWS 2017) and because all conservation measures in **Section 11** will be implemented, structural measures result in a **MANLAA** determination for the eastern indigo snake. **Operations:** Normal operational activities are not expected to result in any adverse effects to eastern indigo snake. Beneficial effects to eastern indigo snake could result from improved water conveyance during operational drawdown events that would reduce flooding and resulting permanent habitat loss from sea level rise. **Effect Determination: MANLAA** The conservation measures in **Section 11** will be implemented.
Monarch butterfly	**Construction:** Both direct and indirect impacts are expected during construction but are anticipated to be insignificant. Beneficial effects to monarch butterfly could result from improved water conveyance during operations that reduces permanent habitat loss from sea level rise. **Operations:** Normal operational activities are not expected to result in any adverse effects to monarch butterfly. Beneficial effects to monarch butterfly could result from improved water conveyance during operational drawdown events that would reduce flooding and resulting permanent habitat loss from sea level rise. **Effect Determination: MANLAA** The conservation measures in **Section 11** will be implemented.

Note: MANLAA = May Affect, Not Likely to Adversely Affect

a/ The USFWS Effects Determination Key for West Indian manatee could not be used because the Tentatively Selected Plan is a USACE Civil Works Project.

b/ As defined in the 2024 USFWS Effects Determination Key for Florida bonneted bat.

c/ As defined in the USFWS 2024 Standing Analysis and Implementation Plan – Northern Long-Eared Bat and Tricolored Bat Assisted Determination Key.

10.0 CUMULATIVE EFFECTS ANALYSIS

The cumulative effects analysis in this document considers several regional projects carried out by USACE, SFWMD, the Seminole Tribe of Florida, Broward County, and the City of Fort Lauderdale (**Table 7**). All projects listed in **Table 7** are similar in nature to the Section 203 Study in that they proposed to manage flooding and prevent saltwater intrusion to freshwater aquifers from sea level rise by improving storage, drainage, conveyance, and changing operations and/or management of various WCS and associated basins.

The projects listed in **Table 7** could all contribute to the overall effects to West Indian manatee, American crocodile, American alligator, Florida bonneted bat, tricolored bat, eastern black rail, wood stork, Everglade snail kite, eastern indigo snake, and monarch butterfly. The main effects to these species from these projects are expected to be beneficial, as a result of improving water infrastructure that will allow water levels to be maintained during both flooding conditions and during dry periods. This would result in fewer nest losses and maintenance of important habitats for multiple species in the Action Area. Direct impacts to these species could include removal of upland habitat, including trees that may support nesting birds and roosting bats, and alterations to hydrology that could affect aquatic species such as West Indian manatee.

The projects listed in **Table 7** will be evaluated for potential impacts to federally listed species by the lead agency(ies) for those projects and will undergo separate consultations with USFWS where applicable. With implementation of USFWS conservation measures for these projects, it is assumed that any effects to these species from individual projects will be fully offset, and therefore, there will be no cumulative impacts to any federally listed species.

Table 7. Regional Projects Evaluated for Cumulative Effects.

Project (Lead Agency)	Description	Current Project Status	Project Status in 2085
Central Everglades Planning Project (CEPP) (USACE/SFWMD)	Major conveyance, seepage, and storage improvements to manage water flow across all reaches	Some components operational with construction ongoing	Operational
CEPP Site 1 Phase I Impoundment (USACE/SFWMD)	Reduces seepage loss from the Loxahatchee National Wildlife Refuge (Water Conservation Area 1) to retain more water in the natural system during dry periods	Phase I, features operational	Phase I, features operational
C-9/C-11 Impoundment (Broward County Water Preserve Areas) (USACE/SFWMD)	Independent operation for water diversion between canals under flood conditions to protect urban areas	Construction ongoing	Operational features for C-9 and C-11 Impoundments
C-1/C-2 Sample Road Recharge Line (Broward County)	Interconnects canals for flood control and saline water prevention; gated culvert installed for flow management	Completed and operational	Completed and operational

Project (Lead Agency)	Description	Current Project Status	Project Status in 2085
Broward and Hillsboro Basins: North Springs Improvement District Pump Station 3 (Broward County)	Operates to discharge excess water to Hillsboro Canal during high and low peak periods to maintain target water levels	Completed and operational	Completed and operational
FLL Ravenwood System Interconnection (Broward County)	Connects Northern and Ravenswood systems; phases include equalizer pipe, pump station, and stormwater management improvements for flood attenuation and sea level rise adaptation	Completed and operational	Completed and operational
Sample Road Improvement Project and Recharge Line (Broward County)	Adds gated culvert for water release from Crystal Lake to C-1 Canal; maintains consistent coastal water levels for saline intrusion prevention	Completed and operational	Completed and operational
FLL Edgewood Park Stormwater Project (Broward County)	Upgrades drainage culverts and restores drainage system to manage discharge to Osceola Creek; addresses sea level rise risk	Completed and operational	Completed and operational
FLL System 1 Basin A and B Interconnection Projects (Broward County)	Enhancements to interconnect primary drainage basins for optimized flood protection and capacity management	Completed and operational	Completed and operational
S-27 Structure Resilience Improvements (Broward County)	Reinforcement of S-27 structure to prevent saltwater backflow and protect adjacent freshwater ecosystems	Completed and operational	Completed and operational
Seawall Master Plan (Fort Lauderdale)	Planned elevation of city-owned seawalls along New River Canal to manage out-of-bank flooding and enhance flood resilience in the area	Planning in progress	Completed and operational
Progresso and Dorsey-Riverbend Neighborhood Stormwater Improvements (Fort Lauderdale)	Upgrades to stormwater management to reduce flooding and enhance water quality	Ongoing	Completed and operational
Dorsey Riverbend Stormwater Flooding Improvements (Fort Lauderdale)	Upgrades to stormwater management to reduce flooding and enhance water quality	Completed and operational	Completed and operational
Bulkhead Replacement Project (Port Everglades)	Replacement of the north bulkhead to the entrance channel	Bulkhead Replacement Project, Group 1, Project complete	Bulkhead Replacement Project, Group 1, Project complete

11.0 CONSERVATION MEASURES

USACE acknowledges the potential presence of the previously discussed threatened and endangered species and/or critical habitat within the Section 203 Action Area. USACE commits to minimizing effects of the SFWMD Section 203 Study TSP to the greatest extent possible in both the planning and construction phases of the TSP by implementing the following conservation measures, where applicable:

1. All applicable federal standards and codes will be followed to minimize effects of the TSP on threatened and endangered species and critical habitat. The SFWMD Standard Specification Measures, which incorporates federal standards by reference, will be followed, including Section 01530–Temporary Barriers and Controls, Section 02435–Turbidity Control and Monitoring, Section 01531–Manatee Protection, and Section 02436–Environmental Protection (Appendix C).
2. Due to the probability that threatened and endangered species may be present at construction sites, contractors and sub-contractors will be trained by SFWMD or USACE personnel on how to identify each species. Educational materials will include pictures of each federally listed species to inform the contractors about these species. If a federally listed species is observed at the site during construction, all work activities within the vicinity of the observation will halt, SFWMD or USACE will be contacted, and SFWMD/USACE will coordinate with the USFWS regarding next steps. USACE or SFWMD would authorize a restart of work once the issue was resolved and under the guidance of the USFWS.
3. Stormwater runoff from construction sites will be controlled, retained, and diverted to protected drainage courses by means of diversion ditches, benches, and any measures required by area-wide plans approved under paragraph 208 of the Clean Water Act. Temporary and permanent erosion and sedimentation control features or screening will be installed.
4. Contractors and sub-contractors will be responsible for keeping construction activities, including refueling and maintenance sites, under surveillance, management, and control to avoid pollution of surface waters, groundwater, and wetlands. Contractors and sub-contractors will be responsible for conducting all operations in a manner to minimize turbidity and shall conform to all water quality standards as prescribed by Chapter 62-302 Florida Administrative Code.
5. The contractor will be responsible for observing water-related work activities for the presence of manatee(s). All in-water operations, including vessels, must be shut down if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.
6. Trees of any species 34 feet (10.4 meter) or taller, snags 28 feet (8.5 meter) with 7.4 inches (19 centimeter) diameter at breast height or greater are potential Florida Bonneted Bat roost trees. Structures 15 feet or taller are also considered potential roosting structures. Removal of these trees, snags, or structures will only occur between November 15 to April 15.
7. If potential roost trees, snags or structures need to be removed, they need to be visually surveyed within 30 days prior to removal. Any cavities must be peeped with a “treetop” camera, and any cavities that cannot be reached or fully viewed by camera should be surveyed at emergence. If evidence of use by any bat species is observed, discontinue tree removal efforts in that area and coordinate with the Service on how to proceed.

Note: These removals must still occur within the November 15 to April 15 time period.

8. Speed restrictions will be implemented in the construction sites to avoid impacts to threatened and endangered species.
9. Educational kiosks will be placed at construction sites to help identify and inform all contractors and staff onsite about threatened and endangered species, should they be encountered.
10. Applicable listed species guidelines and conservation measures will be followed and coordinated with the USFWS. USACE or SFWMD would implement construction conservation measures as outlined in the USFWS Florida Bonneted Bat Best Management Practices for Land Management Activities, Development Activities, and Actions within Critical Habitat (USFWS 2024d), Standing Analysis and Implementation Plan Northern Long-eared bat and Tricolored Bat Assisted Determination Key (USFWS 2024c), Black Rail Conservation Recommendations (USFWS 2019b), Habitat Management Guidelines for the Wood Stork in the Southeast Region (USFWS 2010b), Standard Manatee Conditions For In-Water Work (FWC 2011b), and Standard Protection Measures for the Eastern Indigo Snake (USFWS 2024d) to avoid and minimize adverse effects on those species during construction activities. Monitoring for listed species during construction of the SFWMD Section 203 Study TSP would be specified in the contract specifications.
11. In addition to federally threatened and endangered species conservation measures, USACE or SFWMD will also follow conservation measures outlined in Florida Burrowing Owl Species Conservation Measures and Permitting Guidelines (FWCC 2025a), National Bald Eagle Management Guidelines (USFWS 2007b), and Gopher Tortoise Management Plan (FWCC 2025b).

12.0 CONCLUSIONS

USACE acknowledges there are 22 federally listed threatened and/or endangered species that are known to exist or potentially exist within proximity of the Action Area. Of these 22 species, 13 were not carried forward for further analysis in this document. The rationale for this is discussed in **Table 3**. Effects determinations for the remaining nine species are analyzed in **Section 9**.

For all nine species, USACE has made a May Affect but Not Likely to Adversely Affect determination. The construction of some structural measures, such as adding pumps and gates and/or canal conveyance improvements may affect the West Indian manatee, American crocodile, Florida bonneted bat, tricolored bat, eastern indigo snake, and monarch butterfly. However, such effects would be insignificant or discountable. Operational activities proposed under the SFWMD Section 203 Study TSP are expected to improve water conveyance, namely by reducing the time it takes to move water through the system. This may benefit all species, but the eastern black rail, wood stork, and Everglade snail kite may experience the greatest benefits through decreased duration of storm and pre-storm drawdown events and any associated temporary flooding and resulting habitat loss.

There would be No Adverse Modification of proposed critical habitat for West Indian manatee from any of the SFWMD Section 203 Study TSP measures.

Appropriate conservation measures will be followed throughout planning and construction. If any variations of approved conservations measures are needed, then they will be coordinated with the USFWS.

We have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination.

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APPENDIX A
INFORMATION FOR PLANNING AND CONSULTATION SPECIES LIST

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Broward and Palm Beach counties, Florida

Local office

Florida Ecological Services Field Office

(352) 448-9151
(772) 562-4288
fw4flesregs@fws.gov

777 37th St
Suite D-101
Vero Beach, FL 32960-3559

https://www.fws.gov/office/florida-ecological-services

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

NOT FOR CONSULTATION

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Florida Bonneted Bat Eumops floridanus Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/8630	Endangered
Florida Panther Puma (=Felis) concolor coryi Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1763	Endangered
Puma (=mountain Lion) Puma (=Felis) concolor (all subsp. except coryi) No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6049	SAT
Southeastern Beach Mouse Peromyscus polionotus niveiventris Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3951	Threatened
Tricolored Bat Perimyotis subflavus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10515	Proposed Endangered
West Indian Manatee Trichechus manatus Wherever found There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/4469	Threatened Marine mammal

Birds

NAME	STATUS

NOT FOR CONSULTATION

NAME	STATUS
Crested Caracara (audubon's) [fl Dps] Caracara plancus audubonii No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8250	Threatened
Eastern Black Rail Laterallus jamaicensis ssp. jamaicensis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10477	Threatened
Everglade Snail Kite Rostrhamus sociabilis plumbeus Wherever found There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/7713	Endangered
Florida Scrub-jay Aphelocoma coerulescens Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6174	Threatened
Piping Plover Charadrius melodus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Wood Stork Mycteria americana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8477	Threatened

Reptiles

NAME	STATUS
American Alligator Alligator mississippiensis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/776	SAT
American Crocodile Crocodylus acutus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6604	Threatened

NOT FOR CONSULTATION

Eastern Indigo Snake Drymarchon couperi — Threatened
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/646

Green Sea Turtle Chelonia mydas — Threatened
There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/6199

Insects

NAME	STATUS

Monarch Butterfly Danaus plexippus — Proposed Threatened
Wherever found
There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/9743

Flowering Plants

NAME	STATUS

Beach Jacquemontia Jacquemontia reclinata — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/1277

Florida Prairie-clover Dalea carthagenensis floridana — Endangered
There is **proposed** critical habitat for this species.
https://ecos.fws.gov/ecp/species/2300

Four-petal Pawpaw Asimina tetramera — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/3461

Tiny Polygala Polygala smallii — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/996

Lichens

NAME	STATUS

NOT FOR CONSULTATION

Florida Perforate Cladonia Cladonia perforata No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7516	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Everglade Snail Kite Rostrhamus sociabilis plumbeus https://ecos.fws.gov/ecp/species/7713#crithab	Final

You should contact the local field office to determine whether critical habitat for the following species should be considered:

NAME	TYPE
West Indian Manatee Trichechus manatus https://ecos.fws.gov/ecp/species/4469#crithab	Final

NOT FOR CONSULTATION

Bald & Golden Eagles

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their nests, should follow appropriate regulations and implement required avoidance and minimization measures, as described in the various links on this page.

The data in this location indicates that no eagles have been observed in this area. This does not mean eagles are not present in your project area, especially if the area is difficult to survey. Please review the 'Steps to Take When No Results Are Returned' section of the Supplemental Information on Migratory Birds and Eagles document to determine if your project is in a poorly surveyed area. If it is, you may need to rely on other resources to determine if eagles may be present (e.g. your local FWS field office, state surveys, your own surveys).

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management

- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Bald and Golden Eagle information is not available at this time

Bald & Golden Eagles FAQs

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are an eagle (Bald and Golden Eagle Protection Act requirements may apply).

Proper interpretation and use of your eagle report
On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort line or no data line (red horizontal) means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide you in knowing when to implement avoidance and minimization measures to eliminate or reduce potential impacts from your project activities or get the appropriate permits should presence be confirmed.

How do I know if eagles are breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If an eagle on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your “IPaC PROBABILITY OF PRESENCE SUMMARY” at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

Interpreting the Probability of Presence Graphs

NOT FOR CONSULTATION

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

NOT FOR CONSULTATION

Migratory birds

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (FWS).

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds

- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Migratory bird information is not available at this time

Migratory Bird FAQs

Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Avoidance & Minimization Measures for Birds describes measures that can help avoid and minimize impacts to all birds at any location year-round. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is one of the most effective ways to minimize impacts. To see when birds are most likely to occur and breed in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location, such as those listed under the Endangered Species Act or the Bald and Golden Eagle Protection Act and those species marked as "Vulnerable". See the FAQ "What are the levels of concern for migratory birds?" for more information on the levels of concern covered in the IPaC migratory bird species list.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) with which your project intersects. These species have been identified as warranting special attention because they are BCC species in that area, an eagle (Bald and Golden Eagle Protection Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, and to verify survey effort when no results present, please visit the Rapid Avian Information Locator (RAIL) Tool.

Why are subspecies showing up on my list?

Subspecies profiles are included on the list of species present in your project area because observations in the AKN for **the species** are being detected. If the species are present, that means that the subspecies may also be present. If a subspecies shows up on your list, you may need to rely on other resources to determine if that subspecies may be present (e.g. your local FWS field office, state surveys, your own surveys).

NOT FOR CONSULTATION

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go to the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating, or resident), you may query your location using the RAIL Tool and view the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your IPaC migratory bird species list has a breeding season associated with it (indicated by yellow vertical bars on the phenology graph in your “IPaC PROBABILITY OF PRESENCE SUMMARY” at the top of your results list), there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Bald and Golden Eagle Protection Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially BCC species. For more information on avoidance and minimization measures you can implement to help avoid and minimize migratory bird impacts, please see the FAQ “Tell me more about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds”.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Proper interpretation and use of your migratory bird report

NOT FOR CONSULTATION

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please look carefully at the survey effort (indicated by the black vertical line) and for the existence of the "no data" indicator (a red horizontal line). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list does not represent all birds present in your project area. It is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list and associated information help you know what to look for to confirm presence and helps guide implementation of avoidance and minimization measures to eliminate or reduce potential impacts from your project activities, should presence be confirmed. To learn more about avoidance and minimization measures, visit the FAQ "Tell me about avoidance and minimization measures I can implement to avoid or minimize impacts to migratory birds".

Interpreting the Probability of Presence Graphs
Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. A taller bar indicates a higher probability of species presence. The survey effort can be used to establish a level of confidence in the presence score.

How is the probability of presence score calculated? The calculation is done in three steps:
The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.

To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ()
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data ()
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

NOT FOR CONSULTATION

Marine mammals

Marine mammals are protected under the Marine Mammal Protection Act. Some are also protected under the Endangered Species Act[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[2].

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries[3] [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the Marine Mammals page of the NOAA Fisheries website.

The Marine Mammal Protection Act prohibits the take of marine mammals and further coordination may be necessary for project evaluation. Please contact the U.S. Fish and Wildlife Service Field Office shown.

1. The Endangered Species Act (ESA) of 1973.
2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a treaty to ensure that international trade in plants and animals does not threaten their survival in the wild.
3. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following marine mammals under the responsibility of the U.S. Fish and Wildlife Service are potentially affected by activities in this location:

NAME
West Indian Manatee Trichechus manatus https://ecos.fws.gov/ecp/species/4469

NOT FOR CONSULTATION

Coastal Barrier Resources System

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on Federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

This location overlaps the following CBRS unit(s):

System Unit (SU)

Most new Federal expenditures and financial assistance, including Federal flood insurance, are prohibited within System Units. ***Federally-funded projects within System Units require consultation with the Service.*** *Consultation is not required for projects using private, state, or local funds.*

P14A - SU 10/18/1982 - FI 10/1/1983
P14A - SU 12/21/2018 - FI 12/21/2018

Otherwise Protected Area (OPA)

OPAs are denoted with a "P" at the end of the unit number. The only prohibition within OPAs is on Federal flood insurance. ***CBRA consultation is not required for projects within OPAs.*** *However, agencies providing disaster assistance that is contingent upon a requirement to purchase flood insurance after the fact are advised to disclose the OPA designation and information on the restrictions on Federal flood insurance to the recipient prior to the commitments of funds.*

FL-19P - FI 11/16/1991
FL-19P - FI 12/21/2018
FL-20P - FI 11/16/1991
FL-20P - FI 12/21/2018

NOT FOR CONSULTATION

Data limitations

The CBRS boundaries used in IPaC are representations of the controlling boundaries, which are depicted on the official CBRS maps. The boundaries depicted in this layer are not to be considered authoritative for in/out determinations close to a CBRS boundary (i.e., within the "CBRS Buffer Zone" that appears as a hatched area on either side of the boundary). For projects that are very close to a CBRS boundary but do not clearly intersect a unit, you may contact the Service for an official determination by following the instructions here: https://www.fws.gov/service/coastal-barrier-resources-system-property-documentation

Data exclusions

CBRS units extend seaward out to either the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS data, therefore projects in the offshore areas of units (e.g., dredging, breakwaters, offshore wind energy or oil and gas projects) may be subject to CBRA even if they do not intersect the CBRS data. For additional information, please contact CBRA@fws.gov.

Facilities

Wildlife refuges and fish hatcheries

Refuge and fish hatchery information is not available at this time

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

NOT FOR CONSULTATION

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged

aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

APPENDIX B
EFFECTS DETERMINATION KEYS

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

Purpose and background of the key

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

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

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

Scope of the key

This key should only be used in the review of permit applications for effect determinations on manatees and should not be used for other listed species or for other aquatic resources such as Essential Fish Habitat (EFH). Corps Project Managers should ensure that consideration of the project's effects on any other listed species and/or on EFH is performed independently. This key may be used to evaluate applications for all types of State of Florida (State Programmatic General Permits, noticed general permits, standard general permits, submerged lands leases, conceptual and individual permits) and Department of the Army (standard permits, letters of permission, nationwide permits, and regional general permits) permits and authorizations. The final effect determination will be based on the project location and description; the potential effects to manatees, manatee habitat, and/or manatee critical habitat; and any measures (such as project components, standard construction precautions, or special conditions included in the authorization) to avoid or minimize effects to manatees or manatee critical habitat. Projects that key to a "may affect" determination equate to "likely to adversely affect" situations, and those projects should not be processed under the SPGP or any other programmatic general permit. For

all “may affect” determinations, Corps Project Managers shall refer to the Manatee Programmatic Biological Opinion, dated March 21, 2011, for guidance on eliminating or minimizing potential adverse effects resulting from the proposed project. If unable to resolve the adverse effects, the Corps may refer the applicant to the U.S. Fish and Wildlife Service (Service) for further assistance in attempting to revise the proposed project to a “may affect, not likely to adversely affect” level. The Service will coordinate with the Florida Fish and Wildlife Conservation Commission (FWC) and the counties, as appropriate. Projects that provide new access for watercraft and key to “may affect, not likely to adversely affect” may or may not need to be reviewed individually by the Service.

MANATEE KEY
Florida[1]
April 2013

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

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

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

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

1. blasting or other detonation activity for channel deepening and/or widening, geotechnical surveys or exploration, bridge removal, movies, military shows, special events, etc.;

2. installation of structures which could restrict or act as a barrier to manatees;

3. new or changes to existing warm or fresh water discharges from industrial sites, power plants, or natural springs or artesian wells (but only if the new or proposed change in discharge requires a Corps permit to accomplish the work);

4. installation of new culverts and/or maintenance or modification of existing culverts (where the culverts are 8 inches to 8 feet in diameter, ungrated and in waters accessible, or potentially accessible, to manatees)[2];

5. mechanical dredging from a floating platform, barge or structure[3] that restricts manatee access to less than half the width of the waterway;

6. creation of new slips or change in use of existing slips, even those located in a county with a State-approved Manatee Protection Plan (MPP) in place and the number of slips is less than the MPP threshold, to accommodate docking for repeat use vessels, (*e.g.*, water taxis, tour boats, gambling boats, etc; or slips or structures that are not civil works projects, but are frequently used to moor large vessels (>100') for shipping and/or freight purposes; does not include slips used for docking at boat sales or repair facilities or loading/unloading at dry stack storage facilities and boat ramps); [Note: For projects within Bay, Dixie, Escambia, Franklin, Gilchrist, Gulf, Hernando, Jefferson, Lafayette, Monroe (south of Craig Key), Nassau, Okaloosa, Okeechobee, Santa Rosa, Suwannee, Taylor, Wakulla or Walton County, the reviewer should proceed to Couplet C.]

7. any type of in-water activity in a Warm Water Aggregation Area (WWAA) or No Entry Area (see Glossary and accompanying Maps[4]); [Note: For residential docking facilities in a Warm Water Aggregation Area that is not a Federal manatee sanctuary or No Entry Area, the reviewer should proceed to couplet C.]

8. creation or expansion of canals, basins or other artificial shoreline and/or the connection of such features to navigable waters of the U.S.; [Note: For projects proposing a single residential dock, the reviewer should proceed to couplet C; otherwise, project is a *May Affect*.]

9. installation of temporary structures (docks, buoys, etc.) utilized for special events such as boat races, boat shows, military shows, etc., but only when consultation with the U.S. Coast Guard and FWS has not occurred; [Note: See programmatic consultation with the U.S. Coast Guard on manatees dated May 10, 2010.].

Project is other than the activities listed above C

C. Project is located in an Important Manatee Area (IMA) (see Glossary and accompanying Maps[4]) ..... D

Project is not located in an Important Manatee Area (IMA) (see Glossary and accompanying Maps[4]) ..... G

D. Project includes dredging of less than 50,000 cubic yards ..... E

Project does not include dredging ..... G

E. Project is for dredging a residential dock facility or is a land-based dredging operation ..... N

Project not as above ..... F

F. Project proponent **does not elect** to follow all dredging protocols described on the maps for the respective IMA in which the project is proposed ..... *May affect*

Project proponent **elects** to follow all dredging protocols described on the maps for the respective IMA in which the project is proposed ..... G

G. Project provides new[5] access for watercraft, *e.g*., docks or piers, marinas, boat ramps and associated trailer parking spaces, new dredging, boat lifts, pilings, floats, floating docks, floating vessel platforms, boat slips, dry storage, mooring buoys, or other watercraft access (residential boat lifts, pilings, floating docks, and floating vessel platforms installed in existing slips are not considered new access) or improvements allowing increased watercraft usage ..... H

Project does not provide new[5] access for watercraft, *e.g.*, bulkheads, seawalls, riprap, maintenance dredging, boardwalks and/or the maintenance (repair or rehabilitation) of currently serviceable watercraft access structures provided all of the following are met: (1) the number of slips is not increased; (2) the number of existing slips is not in question; and (3) the improvements do not allow increased watercraft usage ..... N

H. Project is located in the Braden River Area of Inadequate Protection (Manatee County) (see Glossary and accompanying AIP Map[4])
..... *May affect*

Project is not located in the Braden River Area of Inadequate Protection (Manatee County) (see Glossary and accompanying AIP Map[4]) I

I. Project is for a multi-slip facility (see Glossary) ..... J

Project is for a residential dock facility or is for dredging (see Glossary) ..... N

J. Project is located in a county that currently has a State-approved MPP in place (BREVARD, BROWARD, CITRUS, CLAY, COLLIER, DUVAL, INDIAN RIVER, LEE, MARTIN, MIAMI-DADE, PALM BEACH, ST. LUCIE, SARASOTA, VOLUSIA) or shares contiguous waters with a county having a State-approved MPP in place (LAKE, MARION, SEMINOLE)[6] ..... K

Project is located in a county not required to have a State-approved MPP L

K. Project has been developed or modified to be consistent with the county's State-approved MPP **and** has been verified by a FWC review (or FWS review if project is exempt from State permitting) **or** the number of slips is below the MPP threshold ..... N

Project has not been reviewed by the FWC or FWS **or** has been reviewed by the FWC or FWS **and** determined that the project is not consistent with the county's State-approved MPP ..... *May affect*

L. Project is located in one of the following counties: CHARLOTTE, DESOTO[7], FLAGLER, GLADES, HENDRY, HILLSBOROUGH, LEVY, MANATEE, MONROE[7], PASCO[7], PINELLAS ..... M

Project is located in one of the following counties: BAY, DIXIE, ESCAMBIA, FRANKLIN, GILCHRIST, GULF, HERNANDO, JEFFERSON, LAFAYETTE, MONROE (south of Craig Key), NASSAU, OKALOOSA, OKEECHOBEE, PUTNAM, SANTA ROSA, ST. JOHNS, SUWANNEE, TAYLOR, WAKULLA, WALTON ..... N

M. The number of slips does not exceed the residential dock density threshold (see Glossary) ..... N

The number of slips exceeds the residential dock density threshold (see Glossary) ..... *May affect*

N. Project impacts to submerged aquatic vegetation[8], emergent vegetation or mangrove will have beneficial, insignificant, discountable[9] or no effects on the manatee[10] ..... O

Project impacts to submerged aquatic vegetation[8], emergent vegetation or mangrove may adversely affect the manatee[10] ..... *May affect*

O. Project proponent **elects** to follow standard manatee conditions for in-water work[11] and requirements, as appropriate for the proposed activity, prescribed on the maps[4] ..... P

Project proponent **does not elect** to follow standard manatee conditions for in-water work[11] and appropriate requirements prescribed on the maps[4] ..... *May affect*

P. If project is for a new or expanding[5] multi-slip facility and is located in a county with a State-approved MPP in place **or** in Bay, Dixie, Escambia, Franklin, Gilchrist, Gulf, Hernando, Jefferson, Lafayette, Monroe (south of Craig Key), Nassau, Okaloosa, Okeechobee, Putnam, St. Johns, Santa Rosa, Suwannee, Taylor, Wakulla or Walton County, the determination of "*May affect, not likely to adversely affect*" is appropriate[12] and no further consultation with the Service is necessary.

If project is for a new or expanding[5] multi-slip facility and is located in Charlotte, Desoto, Flagler, Glades, Hendry, Hillsborough, Levy, Manatee, Monroe (north of Craig Key), Pasco, or Pinellas County, further consultation with the Service is necessary for "*May affect, not likely to adversely affect*" determinations.

If project is for repair or rehabilitation of a multi-slip facility and is located in an Important Manatee Area, further consultation with the Service is necessary for "*May affect, not likely to adversely affect*" determinations. If project is for repair or rehabilitation of a multi-slip facility and: (1) is not located in an Important Manatee Area; (2) the number of slips is not increased; (3) the number of existing slips is not in question; and (4) the improvements to the existing watercraft access structures do not allow increased watercraft usage, the determination of "*May affect, not likely to adversely affect*" is appropriate[12] and no further consultation with the Service is necessary.

If project is a residential dock facility, shoreline stabilization, or dredging, the determination of "*May affect, not likely to adversely affect*" is appropriate[12] and no further consultation with the Service is necessary. Note: For residential dock facilities located in a Warm Water Aggregation Area or in a No Entry area, seasonal restrictions may apply. See footnote 4 below for maps showing restrictions.

If project is other than repair or rehabilitation of a multi-slip facility, a new[5] multi-slip facility, residential dock facility, shoreline stabilization, or dredging, and does not provide new[5] access for watercraft or

improve an existing access to allow increased watercraft usage, the determination of "*May affect, not likely to adversely affect*" is appropriate[12] and no further consultation with the Service is necessary.

[1] On the St. Mary's River, this key is only applicable to those areas that are within the geographical limits of the State of Florida.

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

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

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

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

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

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

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

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

- "Construction Guidelines in Florida for Minor Piling-Supported Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh or Mangrove Habitat," prepared jointly by the U.S. Army Corps of Engineers and the National Marine Fisheries Service (August 2001) [refer to the Corps' web page], and

- "Key for Construction Conditions for Docks or Other Minor Structures Constructed in or over Johnson's seagrass (*Halophila johnsonii*)," prepared jointly by the National Marine Fisheries Service and U.S. Army Corps of Engineers (October 2002), for those projects within the known range of Johnson's seagrass occurrence (Sebastian Inlet to central Biscayne Bay in the lagoon systems on the east coast of Florida) [refer to the Corps' web page],

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

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

[9] See Glossary, under "is not likely to adversely affect."

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

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

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

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

GLOSSARY

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

FLORIDA BONNETED BAT CONSULTATION GUIDELINES

2024 REVISION

The U.S. Fish and Wildlife Service's 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;* FBB) from proposed projects. The Consultation Keys within the Guidelines assist 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.*). The Florida Bonneted Bat Consultation Guidelines and associated Consultation Keys are designed to streamline and expedite consultations; however, use of the Consultation Keys are voluntary and may not be appropriate for some projects.

These Guidelines are a revision of the 2019 Guidelines. The Consultation Area, Consultation Key, Survey Methods, and Best Management Practices (BMPs) were revised based upon the best available scientific information. These Guidelines also include a Key for the Critical Habitat for the Florida bonneted bat. As more information is obtained, these Guidelines will be revised as appropriate. If you have comments or suggestions on any section of these Guidelines, please email FBBguidelines@fws.gov. Comments will be reviewed and incorporated into future revisions.

These Guidelines do not apply to projects involving the renovation of an existing artificial structure (*e.g.*, building, house) within the urban environment with or without additional ground disturbing activities (please contact the Service for additional guidance). For communication tower projects, please confer with additional and supplemental guidance (USFWS Comm Tower Guidance, 2020 Florida Comm Tower Clearance).

Without other, project-specific guidance provided by the Service, the Guidelines and Determination Keys must be followed explicitly. If they are not followed properly, your project may not be in compliance with the Act. If you have question regarding the Guidelines, including application of the Keys for your specific project, BMPs, designing surveys, definitions, or other questions, contact the Florida Bonneted Bat Recovery Lead (Sandra_Sneckenberger@fws.gov; 772-925-5510).

HOW TO COMPLETE PROJECT REVIEWS WITHIN THE FLORIDA BONNETED BAT'S RANGE

1. Refer to "Guidance for Completing Project Reviews Under the Endangered Species Act" for steps that must be completed before using the Keys below.
2. Use both FBB Consultation Key and FBB CH Consultation Key (below) and follow all instructions and steps in keys and appendices. If additional information is needed or you want personal assistance regarding application of the Consultation Keys, survey design, or BMPs, please contact the Florida Bonneted Bat Recovery Lead.
3. Include detailed information on how required BMPs are incorporated into your project designs. If all required BMPs cannot be incorporated into project, further consultation with the Service is required.
4. Again, refer to "Guidance for Completing Project Reviews Under the Endangered Species Act" for information on submitting your project for review. If additional information is needed or you want assistance regarding the consultation process, please contact FW4FLESRegs@fws.gov.

FLORIDA BONNETED BAT CONSULTATION KEY

1a. Action area is wholly or partially within the FBB consultation area (Figure 1) ……**Go to 2**
1b. Action area does not overlap with any of the FBB consultation area (Figure 1)....**No Effect**

2a. Action area contains potential FBB foraging or roosting habitat……**Go to 3**
2b. Action area does not contain potential FBB foraging or roosting habitat……..……**No Effect**

3a. Project entirely consists of land management, conservation, or restoration activities, such as prescribed fire, forestry practices, and invasive species removal, and the activities and effects to the FBB are addressed under a current Biological Opinion (BO)
……..…… **Follow all applicable avoidance and minimization measures included in the BO.** *No additional consultation is required.*
3b. Project entirely consists of land management, conservation, or restoration activities, such as prescribed fire, forestry practices, and invasive species removal, but does not have a current BO that addresses these activities or their effects to the FBB .....**MANLAA with required BMPs**
3c. The project's purpose is not solely intended for conservation/restoration or land management actions……..……..**Go to 4**

4a. Project proponents choose to assume presence of FBB based on potential foraging habitat and/or suitable roosting habitat, historical or recent detection records (e.g., FBB capture, telemetry data, acoustic records), and/or the project location is within the FBB assumed presence polygon (Figure 1) ……..…….....……**Go to 5**
4b. Project proponents choose to not assume presence of FBB.....**Go to 9**

5a. One or more potential FBB roost trees are present within the action area (foraging and roosting habitat exists on site), but trees are too numerous within the action area to properly inventory/visually survey……..…… ……...**LAA**
Further consultation with the Service is required.
5b. One or more potential FBB roost trees are present within the action area (foraging and roosting habitat exists on site) and all trees on site can be properly inventoried/visually surveyed……**Conduct Roost Structure Inventory/Survey,** then **Go to 6**
5c. No potential FBB roosting habitat is present within the action area (foraging habitat only is present on the site)…….……**Go to 7**

6a. Survey results do not show active FBB roosting is likely…….……..……**Go to 8**
6b. Survey results show active FBB roosting is likely ……...……..**LAA**
Further consultation with the Service is required.

7a. Project impact area is less than 25 acres (10 hectares) of FBB foraging habitat and outside of Miami-Dade County…….……...**MANLAA with required BMPs**
7b. Project impact area is 25 acres (10 hectares) or greater of FBB foraging habitat or project is within Miami-Dade County……..…… **LAA**
Further consultation with the Service is required.

8a. Project impact area is less than 25 acres (10 hectares) of FBB roosting habitat and foraging habitat and outside of Miami-Dade County……...……..**MANLAA with required BMPs**
8b. Project impact area is 25 acres (10 hectares) or greater of FBB roosting habitat and foraging habitat or project is within Miami-Dade County……..…… **LAA**
Further consultation with the Service is required.

9a. Project impact area is less than or equal to 5 acres (2 hectares), trees are few enough that they can be visually surveyed/inventoried individually, and project is located outside of Miami-Dade County……..……**Conduct Roost Structure Inventory/Survey,** then **Go to 10**
9b. Project impact area is more than 5 acres (2 hectares), or trees are too numerous to properly survey individually, or the project is located in Miami-Dade County …..…… ……**Conduct Acoustic Survey,** then **Go to 11**

10a. Results do not show active FBB roosting is likely…….**MANLAA with required BMPs**
10b. Results show active FBB roosting is likely…….……... **LAA**
Further consultation with the Service is required.

11a. Survey results yield no detection of FBB acoustic activity …….. ……..**MANLAA with required BMPs**
11b. Survey results indicate FBB acoustic activity……..…**Go to 12**

12a. Project impact area is less than 25 acres (10 hectares) of FBB foraging habitat or roosting habitat and outside of Miami-Dade County……..…..**MANLAA with required BMPs**
12b. Project impact area is 25 acres (10 hectares) or greater of FBB foraging habitat or roosting habitat or project is within Miami-Dade County……..…… **LAA**
Further consultation with the Service is required.

FLORIDA BONNETED BAT CRITICAL HABITAT CONSULTATION KEY

1a. Action area does not overlap with or have indirect effects on any designated FBB critical habitat (Figure 1)……..…**No Effect (to CH)**
1b. Action area is wholly or partially within designated FBB critical habitat (Figure 1) OR may have indirect effects on designated critical habitat……**Go to 2**
Indirect effects on critical habitat adjacent or near the project area may include, for example, changes in hydrology, or reduced ability to perform prescribed fire or other land management activities.

2a. Project entirely consists of land management, conservation, or restoration activities, such as prescribed fire, forestry practices, and invasive species removal, and the activities and effects to the FBB CH are addressed under a current BO..... **Follow all the Reasonable and Prudent Measures, Terms and Conditions, and Monitoring and Reporting Requirements included in the current BO.** *No additional consultation is required.*
2b. Project entirely consists of land management, conservation, or restoration activities, such as prescribed fire, forestry practices, and invasive species removal, and the activities, but the effects to the FBB CH are not addressed under a current BO.....**MANLAA (CH) with required BMPs**
2c. The project's purpose is not solely intended for conservation/restoration or land management actions……... **Go to 3**

3a. The action area overlaps with less than 0.01% of the CH unit ……..…..**MANLAA (CH) with required BMPs**
3b. The action area overlaps with more than 0.01% of the CH unit …..…. ***Further consultation with the Service is required.***
Formal consultation may or may not be required. The Service will determine if adverse effects or adverse modification thresholds have been reached based on the function and context of the unit or subunit in which the action occurs.

Unit	Total Acreage	0.01%
1	175,735	17.5
2	28,046	2.8
3	134,677	13.5
4	12,995	1.3
5	48,865	4.9
6	714,085	71.4
7	16,604	1.7
8	25,337	2.5
9	4,281	~ 0.5

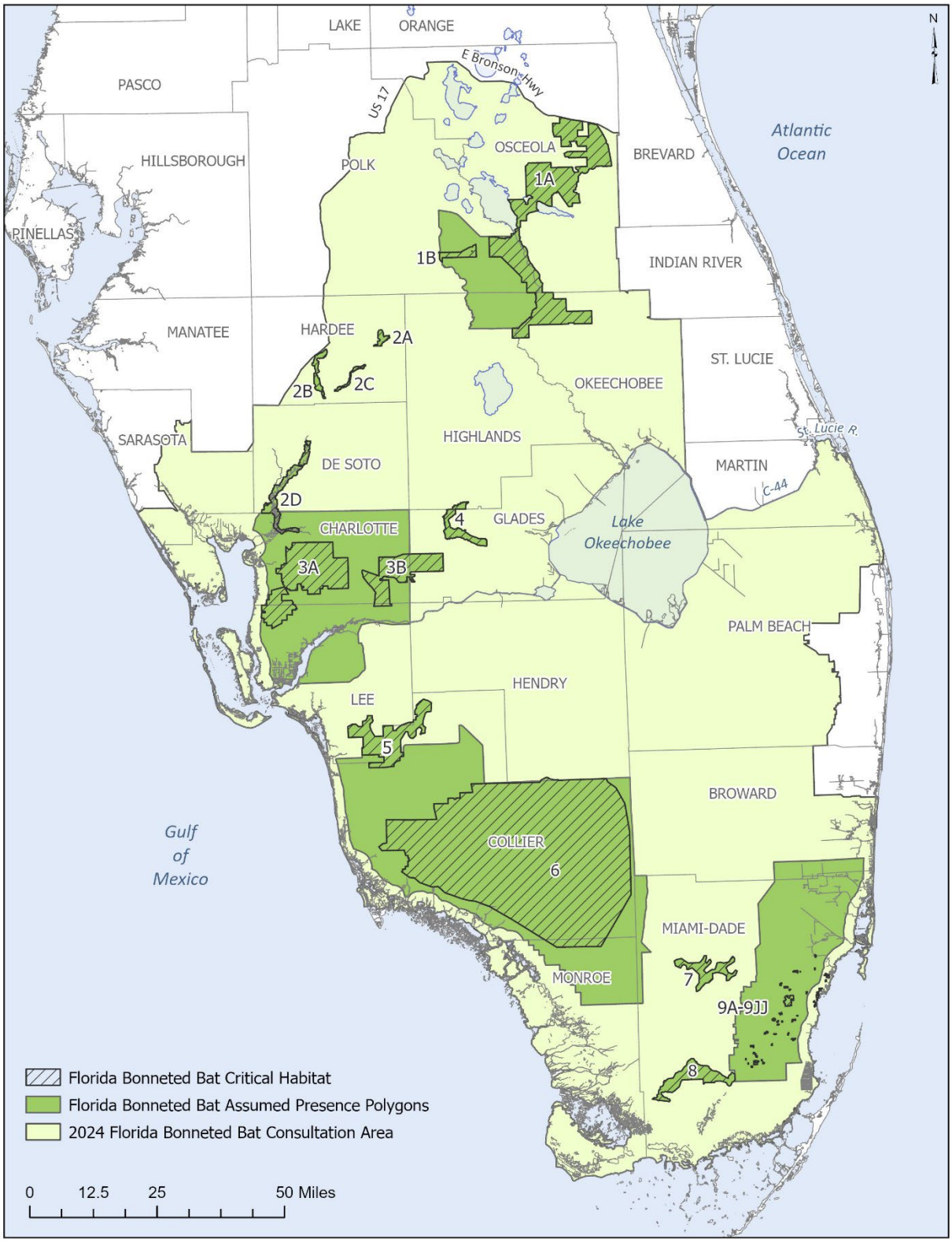

Figure 1. Florida Bonneted Bat Consultation Area, Critical Habitat Units, and Assumed Presence Polygons.

Appendix A*: Florida Bonneted Bat Potential Roost Structure Inventory/Survey Methods*

Purpose: The purpose of this survey is to: (1) identify potential Florida bonneted bat (FBB) roost structures within the project area; (2) qualitatively and quantitatively assess potential project impacts to FBBs and their habitat; 3) determine if FBB are likely to be actively roosting within suitable trees or artificial structures within the project area; (4) locate active roost(s) so loss or disturbance can be minimized; and, (5) avoid the take of individuals by informing the incorporation of conservation measures and best management practices into the project design. In many cases, changes in project designs or activities can avoid and minimize take.

If the applicant is unable to follow or does not want to follow the Florida Bonneted Bat Roost Structure Inventory/Survey Methods as recommended according to the Consultation Key, the Corps (or other Action Agency) will not be able to use these Guidelines and will need to provide a biologically supported rationale using the best available information for their determination in their request for consultation.

General Description: This survey effort is a multi-step process including a tree inventory of the project area, visual inspection of tree surfaces (as well as consideration of artificial structures or buildings on site), peeping and emergence counts for all cavities, hollows, areas of loose bark, and any other suspicious areas. Methods are dependent upon composition and configuration of project site and in most cases should be discussed with the Florida Bonneted Bat Recovery Lead.

General Survey Expectations:

- Approach is intended for project areas where the number and configuration of trees allow for all trees to be properly and thoroughly inventoried and individually inspected.

- 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 (ft) (76 meters [m]) of areas that will not be conserved. This will help avoid or minimize the loss of an active roost and individuals.

- Artificial structures and buildings on site with heights 15 ft (4.6 m) or greater should also be considered and surveyed.

- Use of provided data sheets below are preferred. If you create your own, please do not omit any information as it may not be accepted. Data requested for submission follows the data structure of the North American Bat Monitoring Program USGS Partner Portal (Loeb et al. 2015: https://www.nabatmonitoring.org/resources).

GENERAL INVENTORY OF TREES AND STRUCTURES:

- All trees over 20 ft (6 m) tall should be inventoried; tree snags and artificial structures over 10 ft (3 m) tall should be inventoried. In areas with more dense growth, line

transects can be run through roosting habitat closely enough so that all trees and snags are easily inspected.

- Tree species, height, and diameter at breast height (DBH) of each tree (over 20 ft [6 m] in height) and snags (over 10 ft [3 m] in height) on the site should be listed (see General Roost Structure Inventory Data Sheet Example). Artificial structures 10 ft (3 m) in height or greater that may mimic natural roosting conditions (e.g., bat houses, utility poles, buildings over one story high with chimneys, gaps in soffits, gaps along gutters, or other structural gaps or crevices), situated in natural or semi-natural habitats should also be listed.
- Using binoculars, trees and snags (and artificial structures) must be visually inspected for evidence of its potential use as a roost/shelter, including, but not limited to openings 1 inch (in) (2.5 centimeter [cm]) in diameter or greater.
- The presence of any cavities, hollows, decay, or loose bark should be noted, including the height of the cavity or deformity. Photographs should be taken of any trees, snags, or artificial structures with cavities or other deformities where bats may emerge or find shelter.
- If no potential roost trees, snags or structures have been identified, these data do not need to be submitted into NABat.

DATA COLLECTION FOR POTENTIAL ROOST TREES AND STRUCTURES:

- For potential roost trees and snags, and artificial structures identified in the inventory, the following information is required for NABat data submission and must be collected for every structure regardless of presence of bats in the structure. A single roost structure may have one or more roosting features (see Roost Structure Inventory Data Sheet Example for definitions):

    - GRTS Cell ID
    - Location Name
    - Latitude Decimal Degrees
    - Longitude Decimal Degrees
    - Observer
    - Exit Identifier(s)
    - Roost Location Method
    - Broad Habitat Type
    - Dominant plant species
    - Roost Type
    - Roosting Location
    - Aspect of Exit
    - Vegetation Obstruction
    - Emergence Point Height
    - Emergence Opening Width
    - Emergence Opening Height
    - Structure Height

- Structure Width
- Building Occupancy (only required if Roost Type was a building feature)
- Building Type (only required if Roost Type was a building feature)
- Tree Species (only required if Roost Type was a tree feature)
- Tree Decay (only required if Roost Type was a tree feature)
- Diameter Breast Height (only required if Roost Type was a tree feature)
- Guano Amount
- Survey Event Comments

- If no potential roost trees, snags, or structures are found in the project area or within 250 ft (76 m), survey data will still need to be submitted. Note that an area without roosting habitat, may be used for foraging. As such, if no roost structures are found, there may be a need to conduct a follow-up acoustic survey if it remains necessary to determine presence/absence of FBB.

VISUAL INSPECTION OF POTENTIAL ROOST TREES AND STRUCTURES VIA TREE-TOP CAMERAS:

- Contact the FBB Recovery Lead if active Red-cockaded Woodpecker (RCW) trees are expected within the survey area.

- Roost features on every identified potential roost structure should be visually inspected using a video probe (i.e., tree-top camera or "peeper") to assess the internal contents, when possible.

- The visual inspection survey is only considered to be a valid roost survey on its own if the entire internal contents of all roosting features identified in the area of impact can be observed. However, visual inspection with a tree-top camera alone is most often not acceptable 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 any roosting features are out of reach or otherwise do not allow for a full inspection, it is required to follow up with emergence surveys.

- Note other present wildlife or other pertinent information about the structure (e.g., carcasses or skeletons present, nesting materials found, etc.). If any bat species or listed species is present, contact the FBB Recovery Lead as soon as possible. If FBBs (or other bat species) are found in any features of a roost structure during the visual inspection survey, the following additional information must be collected (see Roost Structure Inventory Data Sheet Example for definitions):

  - Seasonal Use
  - Maternity Stage (only required if Seasonal Use was identified as maternity)
  - Species
  - Estimate Min

- Estimate Max
- Count Confidence
- Pups Observed
- Pup Count
- Pup Comments
- Survey Event Comments

- When a visual inspection survey is conducted and no bats are found in any reachable (or all) roosting features, in the Survey Event Comments, include that no bats are present.

- Please note that if it is not possible to identify the species of the bats in the roost, further surveys (e.g., emergence, acoustic surveys) may be necessary for species identification.

VISUAL INSPECTION OF POTENTIAL ROOST TREES AND STRUCTURES VIA EMERGENCE SURVEYS:

- Multiple observers should be stationed at potential roosts for emergence surveys. On a minimum of two nights of suitable weather, surveyors should be quietly stationed 30 minutes before sunset, so they are ready to look and listen for emerging 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. The use of an acoustic detector with an emergence survey can greatly increase confidence in species identification. While this can be done with a passive recording device, it may be beneficial to utilize a live spectrogram device.

- Emergence surveys can be conducted any time of year as long as weather conditions meet the criteria. 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). If any of the following weather conditions exist at a roost structure during an emergence survey, note the time and duration of such conditions, and repeat the emergence survey effort for that night, when necessary:

    - temperatures fall below 60°F (15.5°C);
    - precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the survey period; or
    - sustained wind speeds greater than 9 miles/hour (4 meters/second; 3 on Beaufort scale) for 30 minutes or more during the survey period (Service 2024).

- 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 (for the survey nights submitted).

- Note other present wildlife or other pertinent information about the structure (e.g., woodpeckers visiting structure, disturbances around structure, etc.). If Florida bonneted bats (or other bat species) are observed entering or exiting a roost structure during the emergence survey, the following additional information must be collected (see Emergence Survey Data Sheet Example for definitions):

    - Roost Exit Points
    - Seasonal Use
    - Maternity Stage
    - Species
    - Identification Method
    - Count Species In
    - Count Species Out
    - Estimate Min
    - Estimate Max
    - Count Confidence
    - Observation Method
    - Distance from Roost
    - Reason Survey Ended
    - Starting/Ending Temperature
    - Starting/Ending Relative Humidity
    - Starting/Ending Cloud Cover
    - Starting/Ending Wind Speed
    - Starting/Ending Weather Event
    - Survey Event Comments

- When an emergence survey is conducted for a potential roost structure and no bats are observed at all, in the Survey Event Comments, include that no bats are present.

FINAL REPORTING:

- Much like the acoustic data submission process, the process of submitting FBB regulatory roost inventories and surveys to the Service incorporates the North American Bat Monitoring Program Partner Portal platform. Final reporting entails completed submission of the survey into the NABat Partner Portal, as well as communication with the FBB Recovery Lead. Additional guidance and resources on how to correctly complete this process are available at https://www.nabatmonitoring.org/fbb.

- The report shall also be provided to the Corps project manager assigned to the project for which the survey was conducted, and to the Service along with the project submittal via FW4FLESRegs@fws.gov. Please use a subject line for the emails: “Submittal (or Final FBB report) for [insert Project Name] FWS Project Code [insert Project Code number]" so that it can be distributed to the appropriate biologist(s).

- Reporting requirements:
  - Summary of the project site
    - Project area acreage
    - Habitat types/land cover
    - Location (county, city, etc.), coordinates (decimal degrees latitude/ longitude), site location and detailed maps
    - Project description, purpose, designs

  - Summary of the methods used
    - Devices used (make, model, serial number, firmware version)
    - Methods used for tree inventory
    - Methods used for surveying for roost occupancy survey
    - General set-up description for surveys (e.g., distances between transects, equipment to elevate video probes, position and orientation to roost structure, etc.)
    - Photo of each/all potential roost trees and structures and its roost feature(s) (more detailed photos of each roost feature when possible)

  - Summary of survey results
    - Inventory table/data sheets
    - Effects determination and explanation
    - BMPs to be incorporated
    - Include weather conditions for the days of emergence surveys

- 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 into future revisions.

Literature Cited - Appendix A

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U.S. Fish and Wildlife Service. 2004. South Florida Ecological Services Office DRAFT July 12, 2004 Species Conservation Guidelines South Florida Red-cockaded Woodpecker. Appendix A. Red-cockaded Woodpecker South Florida Survey Protocol. July 12, 2004. South Florida Ecological Service Office, Vero Beach Florida. https://www.fws.gov/verobeach/BirdsPDFs/200407SlopesCompleteRedCockadedWoodpecker.pdf

U.S. Fish and Wildlife Service. 2024. Range-wide Indiana bat and Northern long-eared bat survey guidelines. https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

EXAMPLE DATA SHEET FOR **GENERAL ROOST STRUCTURE INVENTORY**

Document all trees over 20 ft (6 m), all snags over 10 ft (3 m), and all artificial structures over 10 ft (3 m) that are present on the project site. Using binoculars, visually inspect all structures for evidence of its potential use as a roost/shelter. Take photos when possible.

Date(s):	
Project:	
Site & GRTS ID:	
Observer(s):	

TREES AND SNAGS

Structure ID	Status (Live/Dead)	Height (m)	Species	Roosting Features? (Y/N)	Photo(s) Taken? (Y/N)	Notes

ARTIFICIAL STRUCTURES

Structure ID		Height (m)	Structure Type	Roosting Features? (Y/N)	Photos Taken? (Y/N)	Notes

Data Field Definitions (General Roost Structure Inventory)

Date(s): When the survey was conducted.

Project: Descriptive and unique project titles and project numbers.

Site: Specific site of survey for listed project.

GRTS ID: GRTS ID number of the NABat grid cell where the survey was conducted.

Observer(s): First and last names of observers involved in survey. Include company name if relevant.

TREES AND SNAGS

Structure ID: This can be as simple as consecutively identifying trees and snags as "T1, T2, T3, …" and "S1, S2, S3, …".

Status: Select either "Live" or "Dead" for trees or snags, respectively.

Height (m): Estimate or measure of the height of the tree or snag in meters. Leave blank if unknown.

Species: Scientific name of the tree or snag (if identifiable – if no species ID possible for a snag, identify as pine or hardwood if possible).

Roosting Features? (Y/N): Are there any roosting features present on the tree or snag? Select Yes or No.

Photo(s) Taken? (Y/N): Were any photos taken? Select Yes or No.

Notes: Any additional notes about the tree or snag.

ARTIFICIAL STRUCTURES

Structure ID: This can be as simple as consecutively identifying artificial structures as "A1, A2, A3, …".

Height (m): Estimate or measure of the height of the structure in meters.

Structure Types: Artificial roost, bridge, building, utility pole, other (include description in Notes).

Roosting Features? (Y/N): Are there any roosting features present on the tree or snag? Select Yes or No.

Photo(s) Taken? (Y/N): Were any photos taken? Select Yes or No.

Notes: Any additional notes about the structure.

EXAMPLE DATA SHEET FOR **ROOST STRUCTURE SURVEY**

For potential roost trees, snags, and artificial structures identified as having features that could be used for roosts, the following information is required for every structure regardless of presence of bats in the structure. A single roost structure may have one or more roosting features.

Date:	
Project:	
Site & GRTS ID:	
Observer(s):	

POTENTIAL ROOST STRUCTURES AND FEATURES					
Structure ID					
Latitude					
Longitude					
Exit Identifier(s)					
Broad Habitat					
Dominant Plant Species					
Roost Type					
Roosting Location					
Exit Aspect(s)					
Vegetation Obstruction					
Emergence Point(s) Height (m)					
Emergence Opening(s) Width (cm)					
Emergence Opening(s) Height (cm)					
Building Occupancy					
Building Type					
Tree Species					
Tree Decay					
DBH					
Guano Amount					
Survey Event Comments					

Data Field Definitions (Roost Structure Survey)

Date(s): When the survey was conducted.

Project: Descriptive and unique project titles and project numbers.

Site: Specific site of survey for listed project.

GRTS ID: GRTS ID number of the NABat grid cell where the survey was conducted.

Observer(s): First and last names of observers involved in survey. Include company name if relevant.

Structure ID: Provide a unique name for every roost structure surveyed within a project. Match ID with inventory.

Latitude/Longitude: Latitudinal and longitudinal coordinates in WGS84 decimal degrees.

Exit Identifier(s): Unique identifier for each notable exit/entry on the structure. Can be as simple as "C1, C2, ..." for cavities, etc.

Broad Habitat Type: Broad habitat type surrounding roost. Select from the following options: agriculture | barren land | forest-conifer | forest-deciduous | forested wetland | grassland | shrubland | urban | water | wetland

Dominant plant species: List the top 1 to 3 dominant plant species surrounding the roost structure.

Roost Type: The type of roost structure from which bats are emerging. Select from the following options: artificial roost bark mimic | artificial roost bat box | artificial roost bat bunker | artificial roost bat condo | artificial roost other | artificial roost unknown | bridge cavity | bridge crevice | bridge expansion joints | bridge other | bridge under bridge | bridge unknown | building attic | building basement | building chimney | building deck | building eaves | building interior | building other | building porch | building roof | building shingles | building under siding | building unknown | other artificial structure dam | other artificial structure utility pole | rock feature other | rock feature rocky outcrop | rock feature talus slope | rock feature unknown | tree basal hollow | tree branch | tree cavity | tree crevice | tree downed woody debris | tree exfoliating bark | tree foliage | tree on trunk | tree other | tree roots | tree unknown

Roosting Location: Provide a brief description about the exit/entries identified on the roost structure, focusing on the ones used by bats if observed. Limit description to 250 characters or less.

Exit Aspect(s): The cardinal direction the exit(s)/entry(ies) face. Select from the following options: east | multiple | north | northeast | northwest | south | southeast | southwest | unknown | west

Vegetation Obstruction: Is vegetation obstructing the roost exit? State either TRUE or FALSE.

Emergence Point Height: Height of the exit point(s) from the ground (m).

Emergence Opening Width/Height: Width/height of the exit point(s) (cm).

Emergence Opening Height If the "Exit Identifier" field was left blank, leave blank.

Building Occupancy: Leave blank if Roost Type was not a building feature. Building occupied by humans? State TRUE or FALSE.

Building Type: Leave blank if Roost Type was not a building feature. Select from the following options: barn | cabin | commercial building | house | shed | silo

Tree Species: Leave blank if Roost Type was not a tree feature. State the scientific name of the tree species if identifiable.

Tree Decay: Leave blank if Roost Type was not a tree feature. Indicate the decay stage of the tree. Select from the following options: NA | other | stage 1: live | stage 2: declining | stage 3: dead | stage 4: loose bark | stage 5: clean | stage 6: broken | stage 7: decomposed | stage 8: down material | stage 9: stump

DBH: Leave blank if Roost Type was not a tree feature. Diameter of the tree at breast height in centimeters.

Guano Amount: Guano seen in or around the roost structure. Select from the following options: abundant | large mounds | none | scattered

Survey Event Comments: Additional notes about the roost structure.

EXAMPLE DATA SHEET FOR **EMERGENCE SURVEYS**

Date:		Start/End Temperature (C):	
Project:		Start/End Relative Humidity (%):	
Site & GRTS ID:		Start/End Cloud Cover (%):	
Observer(s):		Start/End Wind Speed (km/h):	
		Start/End Weather Event:	

POTENTIAL ROOST STRUCTURES AND FEATURES					
Structure ID					
Latitude					
Longitude					
Exit Identifier(s)					
# Roost Exits					
Seasonal Use					
Maternity Stage					
Species					
Identification Method					
Count In					
Count Out					
Estimate Min					
Estimate Max					
Count Confidence					
Observation Method					
Distance from Roost (m)					
Reason Survey Ended					
Survey Event Comments					

Data Field Definitions (Emergence Surveys)

Date(s): When the survey was conducted.

Project: Descriptive and unique project titles and project numbers.

Site: Specific site of survey for listed project.

GRTS ID: GRTS ID number of the NABat grid cell where the survey was conducted.

Observer(s): First and last names of observers involved in survey. Include company name if relevant.

Starting/Ending Temperature: Temperature in Celsius at the start and end of the emergence survey.

Starting/Ending Relative Humidity: Relative humidity percentage at the start and end of the emergence survey.

Starting/Ending Cloud Cover: Cloud cover percentage at the start and end of the emergence survey.

Starting/Ending Wind Speed: Wind speed (kilometer per hour [km/h]) at the start and end of the emergence survey.

Starting/Ending Weather Event: Select from the following options for starting and ending weather event: Fair | Partly Cloudy | Mostly Cloudy | Cloudy | Fair / Windy | Mostly Cloudy / Windy | Haze | Fog | Light Rain | Rain | Heavy Rain | Thunder in the Vicinity | Thunder | T-Storm | Heavy T-Storm

Structure ID: Unique structure ID. Match ID with inventory data sheets.

Latitude/Longitude: Latitudinal and longitudinal coordinates in WGS84 decimal degrees.

Roost Exits: The number of exits from which bats emerged.

Seasonal Use: Seasonal use of the roost. Select from the following options: fall roost | hibernacula | maternity | multi-season | spring roost | summer roost | unknown | winter roost

Maternity Stage (only required if Seasonal Use indicated as maternity): Leave blank if Seasonal Use was not identified as maternity. State whether the roost is pre-volant or post-volant.

Species: List the bat species identified. Use one column per species.

Identification Method: Method used to identify each species. Select either acoustics or visual.

Count Species In: Number of bats observed entering the roost.

Count Species Out: Number of bats observed exiting the roost.

Estimate Min: Lowest estimate of the number of bats in the roost.

Estimate Max: Highest estimate of the number of bats in the roost.

Count Confidence: Select from the following options: high (66 - 100%) | low (0 - 33%) | medium (33 - 66%)

Observation Method: Select from the following options: cavity inspection scope | night vision camera | night vision device | night vision device and bat detector | other | thermal camera and bat detector | thermal device | thermal device

Distance from Roost (m): Distance of observer from the roost (m).

Reason Survey Ended: Select from the following options: 15 min after last bat | bats finished emerging | low visibility | unknown

Survey Event Comments: Additional notes about the emergence survey.

Appendix B*: Florida Bonneted Bat Acoustic Survey Methods*

Purpose: The purpose of this survey is to: (1) determine if Florida bonneted bats (FBBs) are likely to be present within the project area; (2) determine if Florida bonneted bat activity patterns suggest the possibility of active roosting within the project area, (3) qualitatively and quantitatively assess potential project impacts to Florida bonneted bats and their habitat, (4) avoid or minimize the take of individuals by informing the incorporation of conservation measures and best management practices into the project design. In many cases, changes in project designs or activities can avoid and minimize take.

General Description: When properly conducted, acoustic surveys are the most effective way to determine presence and assess habitat use. This survey is a robust acoustic effort designed to detect Florida bonneted bats on a site, when present. Methods are dependent upon composition and configuration of project site and in many cases should be designed collaboratively with the Florida Bonneted Bat Recovery Lead. In some cases, further surveys (e.g., emergence surveys or tree inventories) may be helpful or desirable to properly evaluate project effects or determine how best to avoid and minimize impacts.

General Survey Expectations:

- This approach is intended for larger project sites where potential FBB roost trees are too numerous to properly inventory/visually survey within the project area.

- 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 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 present/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.

- Use of provided data sheets below are preferred. If you create your own, please do not omit any information as it may not be accepted.

- 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 2024). New surveyors may request "practice projects" where they collect, analyze, interpret, and submit up to two projects for feedback from the FBB Recovery Lead.

- 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 automatic identification programs must be visually reviewed and manually verified by experienced personnel.

HABITAT ASSESSMENT:

- Start with a general assessment of habitat in the project area to identify areas with roosting habitat characteristics.
    - At minimum, conduct a general habitat assessment that records broad habitat types, dominant plant species, presence of potential FBB roosting habitat.

    - Examples of areas to target during acoustic surveys include but are not limited to (if there are any questions about this consult with the FBB Species Recovery Lead):
        - a cluster of pine trees
        - a section of cypress swamp/dome
        - an area with snags
        - a water feature (e.g., canal, pond, lake)

- For sites that do not contain ANY roosting habitat but do contain foraging habitat, acoustic 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 SURVEY DESIGN:

- The number of acoustic survey sites and nights needed for the assessment is dependent upon the overall acreage of suitable habitat (foraging or roosting) proposed to be impacted by the action.

- For non-linear projects, a minimum of 9 valid detector nights per 20 acres of suitable habitat is required. For example, for a 145-acre project, 8 detectors should be deployed for a minimum of 9 valid nights (145÷20=7.25; round up to 8). Do not multiply out to get total detector nights and then modify the number of detector sites or nights. Surveys should be planned with the intention of surveying for 9 consecutive valid nights. Contact the FBB Recovery Lead if it will take over 14 days to attain 9 valid nights.

- For non-linear projects, when surveying for both FBB and tricolored bats (TCB) a minimum of 14 valid detector nights per 20 acres of suitable habitat are acceptable for both species. When surveying for both FBB and TCB, TCB surveys are only valid if conducted March 1 to October 15. Surveys should be planned with the intention of surveying for 14 consecutive valid nights. Contact the FBB Recovery Lead if it will take over 21 days to attain 14 valid nights.

- For linear projects (e.g., roadways, transmission lines), a minimum of 9 detector nights per 0.6 mi (1 km) is required. When surveying for both FBB and TCB, TCB surveys are only valid if conducted March 1 to October 15. Surveys should be planned with the intention of surveying for 9 consecutive valid nights. Contact the FBB Recovery Lead if it will take over 14 days to attain 9 valid nights.

- Detectors should be placed to survey all suitable habitat. There is a 300 m minimum distance between deployed detectors.

- Please contact the FBB Recovery Lead if there is interest in diverting from these protocols (such as setting up detectors less than 300 m apart) or if there is concern about not being able to attain the minimum consecutive nights under valid weather conditions.

- *For any site, and in particular for sites > 250 acres, please feel free to contact the FBB Recovery Lead to assist in designing an appropriate approach.* Site acreage, site location (e.g., coordinates, project boundary, .kmz files), and a description of what is planned for the site is helpful information to include in correspondence.

ACOUSTIC EQUIPMENT DEPLOYMENT:

- The following acoustic detectors have been used for FBB acoustic surveys. (The Service does not endorse specific products or equipment.) Make sure the devices to be used in the field survey are updated with the most recent firmware version before deployment in the field. If interested in using a detector not listed below, please consult the FBB Recovery Lead.
    - Wildlife Acoustics:

SM2 Bat +	SM2 Bat 192
SM3 Bat	SM4 Bat FS
SM Mini Bat	

    - Binary Acoustic:

AR125	AR125FG
AR180	Acrobat
IFR IV	IFR V

    - Pettersson:

D1000X	D240X
D500X	M500

    - Titley:

Anabat Swift	Anabat Walkabout

- Microphones can be directional or omnidirectional, but make sure positioning is optimal. If using something other than a standard microphone for the device being used, ensure compatibility and functionality prior to deployment (this may even include a test deployment so recording ability can be assessed).

- It is important no matter what device you are using that you verify its functionality before every deployment. Some companies selling detectors also sell calibration devices to assess the sensitivity of the mics/devices. Devices should be calibrated while paired with the same mics they are going to be deployed in the field with. It is also required that surveyors verify functionality as soon as possible after device pick-up.

- Acoustic device program settings:
  - Full spectrum recording
  - Gain: 12 decibels (dB)
  - 16k High Filter: Off
  - Sample Rate: 256 kilohertz (kHz)
  - Minimum Duration: 1.5 milliseconds (ms)
  - Maximum Duration: 50 ms
  - Minimum Trigger Frequency: 8 kHz
  - Trigger Level: 12 dB
  - Trigger Window: 2 seconds (s)
  - Maximum Length: 15 s
  - Compression: None
  - Recorder schedule should be set to record from 30 minutes prior to sunset to 30 minutes after sunrise for multiple nights.

- Acoustic devices must be calibrated and properly placed for deployment. Microphones must be elevated to a minimum of 3 m (10 ft), situated in an area clear of vegetation 2 m in all directions, and fully free of vegetative or other clutter from ground to sky. When possible, elevating devices/device microphones higher than the minimum height requirement can improve call quality and reduce the number of noise files being recorded. Please note that it is not acceptable to attach acoustic devices to trees or other standing structures to elevate them – they should have a standalone set-up that gives them sufficient omnidirectional air space. Microphones should be directed away from surrounding vegetation, electrical wires and transmission lines, echo-producing surfaces, and external noises. Directional microphones should be aimed to sample the majority of the flight path/zone in an upward direction. Omnidirectional microphones should be deployed on a pole in the center of the flight path/zone and oriented horizontally (a slight angle might help prevent pooling on the microphone surface and therefore reduce long-term water damage). For monitoring possible roost sites, microphones should be directed to maximize likelihood of detection.

- Acoustic surveys can be conducted any time of year as long as weather conditions meet the criteria. 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). If any of the following weather conditions exist at a roost structure during acoustic sampling, note the time and duration of such conditions, and repeat the acoustic sampling effort for that night, when necesssary:
    - temperatures fall below 60°F (15.5°C) during the first 5 hours of the survey period;
    - precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first 5 hours of the survey period; or
    - 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 2024).

- 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 (for the survey nights submitted).

- The following metadata is required for data submission and must be collected for every detector deployment (see Acoustic Detector Deployment Example Data Sheet for definitions):
    - GRTS Cell ID
    - Location Name
    - Latitude Decimal Degrees
    - Longitude Decimal Degrees
    - Survey Start Time/End Time
    - Detector Model
    - Detector Serial Number
    - Microphone Model
    - Microphone Orientation
    - Microphone Height
    - Distance to Nearest Clutter (meters)
    - Clutter Type
    - Broad Habitat Type
    - Land Unit Code
    - Contact

ACOUSTIC ANALYSIS:

- The process of analyzing and submitting FBB regulatory survey data to the Service incorporates the North American Bat Monitoring Program Partner Portal platform. Additional guidance and resources on how to correctly complete this process are available at https://www.nabatmonitoring.org/fbb.

INTERPRETATION OF RESULTS:

- DO:
  - Include all FBB call types when considering potential roosting activity. Any type or number of calls is considered presence. Any call near sunrise or sunset can indicate potential roosting.

- DO NOT:
  - Interpret few FBB calls as low or no FBB activity. These methods are designed to detect presence. Discussions of level of activity or density are not appropriate.
  - Interpret a lack of echolocation recordings near sunset or sunrise as an indication that roosting nearby is unlikely. This needs to be assessed using multiple methods.

- If results of acoustic surveys show active Florida bonneted bat roosting is likely (6b or 10b), follow-up methods such as emergence surveys, visual inspection of the roosting structures, or follow-up acoustic surveys may be recommended to avoid or minimize impacts. Please contact the FBB Recovery Lead if you have any questions regarding the definitions or using the key.

FINAL REPORTING:

- Final reporting entails completed submission of the survey into the NABat Partner Portal, as well as communication with the FBB Recovery Lead.

- If there are any questions about data submission requirements, refer to the resources available at https://www.nabatmonitoring.org/fbb.

- The report shall also be provided to the Corps project manager assigned to the project for which the survey was conducted, and to the Service along with the project submittal via FW4FLESRegs@fws.gov. Please use a subject line for the emails: "Submittal (or Final FBB report) for [insert Project Name] FWS Project Code [insert Project Code number]" so that it can be distributed to the appropriate biologist(s).

- Reporting requirements:
  - Summary of the project site
    - Project area acreage
    - Habitat types/land cover
    - Location (county, city, etc.), coordinates (decimal degrees latitude/longitude), site location and detailed maps
    - Project description, purpose, designs

  - Summary of the methods used
    - Devices used (make, model, serial number of detector, firmware version)
    - Calibration method/device used (both before and after device deployment)
    - Automated identification software and version

- General set-up description including height of mic, etc. (see required metadata fields in section above and in data sheet)
- Photo of each final detector set-up, as well as 4 cardinal direction photos

o Summary of survey results
- Summary table of number of calls per species per detector deployment
- Inventory table of EUMFLO recording files, recording timestamp, detector ID, and local sunrise/sunset times
- Representative spectrograms of recordings that were automatically identified by software as EUMFLO but manually vetted and rejected as Florida bonneted bat recordings (these are often Noise files, TADBRA calls, or the social calls of other bat species)
- Effects determination and explanation
- BMPs to be incorporated
- Include weather conditions for the days being included in the final survey and analysis

- Negative surveys are valid for 1 year after completion of the survey. A back-up of all acoustic data collected (raw acoustic files, spreadsheets, metadata, environmental reports, weather sheets, etc.) for each project must be maintained for a minimum of 1 year post project submission.

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 future revisions.

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.

Braun de Torrez, E.C., H.K. Ober, and R.A. McCleery. 2016. Use of a multi-tactic approach to locate and endangered Florida bonneted bat roost. Southeastern Naturalist 15: 235- 242.

Loeb, S.C., T.J. Rodhouse, L.E. Ellison, C.L. Lausen, J.D. Reichard, K.M. Irvine, T.E. Ingersoll, J.T.H. Coleman, W.E. Thogmartin, J.R. Sauer, C.M. Francis, M.L. Bayless, T.R. Stanley, and D.H. Johnson. 2015. A plan for the North American bat monitoring program (NABat). United States Department of Agriculture. Forest Service. Research & Development, Southern Research Station. General Technical Report SRS-208.

Ober, H.K., E.C. Braun de Torrez, J.A. Gore, A.M. Bailey, J.K. Myers, K.N. Smith, and R.A. McCleery. 2016. Social organization of an endangered subtropical species, *Eumops floridanus*, the Florida bonneted bat. Mammalia 2016: 1-9.

U.S. Fish and Wildlife Service. 2024. Range-wide Indiana bat and Northern long-eared bat survey guidelines. https://www.fws.gov/media/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines.

EXAMPLE DATA SHEET FOR **ACOUSTIC DETECTOR DEPLOYMENTS**

Date(s):	
Project:	
Site & GRTS ID:	
Name(s):	

ACOUSTIC DETECTOR DEPLOYMENTS					
Location Name					
Latitude					
Longitude					
Survey Start TIme					
Survey End TIme					
Detector Type					
Detector Serial Number					
Microphone Model					
Microphone Orientation					
Microphone Height					
Distance Nearest Clutter (m)					
Clutter Type					
Broad Habitat Type					
Land Unit Code					
Contact Information					
Deployment Comments					

Data Field Definitions (Acoustic Detector Deployment)

Date(s): When the survey was conducted.

Project: Descriptive and unique project titles and project numbers.

Site: Specific site of survey for listed project.

GRTS ID: GRTS ID number of the NABat grid cell where the survey was conducted.

Name(s): First and last names of observers involved in survey. Include company name if relevant.

Location Name: An official or unofficial name name of the site. Provide a unique name for every acoustic detector deployment location within a project.

Latitude/Longitude: Latitudinal and longitudinal coordinates in WGS84 decimal degrees.

Survey Start/End Time: These reference the beginning and ending detector activation time. If a detector starts recording late, then start time should be listed as the date and time from the first file recorded. If a detector stops recording early, the end time should be listed as the date and time of the last file recorded. Note such incidents in the "Unusual Occurrences" metadata field. Adjust times as necessary for each detector/deployment (i.e., do not just use the same full survey time for all batches unless detectors were all active for that full time).

Detector Type: Select from the following options: BINARY ACOUSTIC AR125 | BINARY ACOUSTIC AR125-FG | BINARY ACOUSTIC AR180 | BINARY ACOUSTIC AcroBat | BINARY ACOUSTIC iFR-IV | BINARY ACOUSTIC iFR-V | PETTERSSON D1000x | PETTERSSON D240x | PETTERSSON D500x | PETTERSSON M500 | TITLEY AnaBat Express | TITLEY AnaBat SD1 | TITLEY AnaBat SD2 | TITLEY AnaBat Swift | TITLEY AnaBat Walkabout | WILDLIFE ACOUSTICS EM-Touch | WILDLIFE ACOUSTICS EM-Touch2 | WILDLIFE ACOUSTICS EM-TouchPRO | WILDLIFE ACOUSTICS EM3/EM3+ | WILDLIFE ACOUSTICS SM MICRO | WILDLIFE ACOUSTICS SM2 | WILDLIFE ACOUSTICS SM2Bat+ | WILDLIFE ACOUSTICS SM2Bat-192 | WILDLIFE ACOUSTICS SM3Bat | WILDLIFE ACOUSTICS SM4BAT | WILDLIFE ACOUSTICS SM4BAT-FS | WILDLIFE ACOUSTICS SM4BAT-ZC | WILDLIFE ACOUSTICS SMMINI-BAT | WILDLIFE ACOUSTICS SMZC

Detector Serial Number: Serial number of the detector/recording device.

Microphone Model: Leave blank if not applicable (i.e., no external microphone attachment). Select from the following options: Pettersson D500x | Pettersson M500 | TITLEY AnaBat Swift | Wildlife Acoustics SM3-U1 | Wildlife Acoustics SMM-U1 | Wildlife Acoustics SMM-U2 | Wildlife Acoustics SMX-U1 | Wildlife Acoustics SMX-US | Wildlife Acoustics SMX-UT | generic Directional | generic Internal | generic Omni-directional

Microphone Orientation: Direction in which the microphone was oriented. Select from the following options: e | n | ne | nw | s | se | sw | w | vert

Microphone Height: Height of the microphone above the ground (m).

Distance to Nearest Clutter (meters): Distance (m) between microphone and nearest clutter (for example: vegetation, buildings, or other structure).

Clutter Type: Select from the following options: Building | Other | Rock | Vegetation | Water

Broad Habitat Type: Broad habitat type surrounding device. Select from the following options: agriculture | barren land | forest-conifer | forest-deciduous | forested wetland | grassland | shrubland | urban | water | wetland

Land Unit Code: The first 4 letters of the county where the survey was conducted.

Contact information: person/entity that deployed and is responsible for the acoustic detector.

Deployment Comments: Additional notes about acoustic deployment.

Appendix C: Best Management Practices for Land Management Activities, Development Activities, and Actions within Critical Habitat

These BMPs consist of actions intended to avoid, minimize, or offset impacts to Florida bonneted bats. BMPs required to reach a "may affect, but is not likely to adversely affect" (MANLAA) determination are listed below. If the applicant is unable or does not want to incorporate the required BMPs into the project, this Consultation Key cannot be followed and further coordination and consultation with the Service is required. In these cases, formal consultation may not be required, but further evaluation of the project and discussions with the Service are needed.

Best Management Practices for Land Management Activities
The BMPs **LM1 through LM6** are required for MANLAA projects keying out to **3b** in the FBB Consultation Key (see note), no further consultation is required:

LM1. Conduct tree removal in areas with known or suspected roosting activity from November 15 to April 15. From April 16 to November 14, visual, peeping, and emergence surveys must be done prior to removal of trees 7.4 in (19 cm) dbh or greater with cavities (or snag height) at 15 ft or higher.

LM2. When feasible, roost surveys are recommended year round prior to removal of trees 7.4 inch (19 cm) dbh or greater with cavities (or snag height) at 15 ft or higher, especially for slash and longleaf pine, royal palm, and cypress.

LM3. Conduct prescribed burns in areas of known or suspected roosting activity from November 15 to April 15.

LM4. Protect known and suspected roost trees by raking and/or manually clearing vegetation around the base (150-ft (46 m) buffer) of identified trees prior to prescribed burning.

LM5. In areas of suitable FBB roosting habitat, plan to conduct only low intensity prescribed burns.

LM6. Avoid conducting frequent or sustained loud land management activities (generally above 80 decibels, such as chainsaw or heavy equipment) within 100 ft (15 m) of known or suspected roosts during the FBB breeding season (April 15 to November 15).

LM7. When possible, protect trees or snags 7.4 in (19 cm) dbh or greater with cavities (or snag height) at 15 ft or higher. These efforts may consist of avoiding removal of trees with these characteristics, raking and/or manually clearing vegetation around the base of known or potential roost trees to remove fuel prior to prescribed burning.

LM8. Forestry practices: Follow/Establish forest management efforts to maintain tree species and size class diversity to ensure long-term supply of FBB potential roost sites. Preserve large snags in open canopy when possible.

For land management activities or restoration projects that are not addressed in a current BO and cannot incorporate the BMPs above, contact the Service (Florida Bonneted Bat Recovery Lead or the Service's Environmental Review project manager) for further guidance. Note: Many land management activities are not expected to follow these BMPs (and key out to a MANLAA), nor would it be beneficial for the FBB and many other species if all management actions followed all BMPs. However, the Service is required to evaluate the need to provide take coverage for those projects that may result in take of individuals. For example, these projects could include management actions in areas with potential roosts trees during peak pup season or where fire is likely to result in significant loss of potential roost trees.

Best Management Practices for Development, Construction, and Other Similar Activities

Use the table below to determine which BMPs are required for projects keying out to a MANLAA **with required BMPs (7a, 8a, 10a, 11a, or 12a)** in the FBB Consultation Key. Information on how each BMP is each incorporated into the project must be submitted with the project for review. In cases of multiple home or multiple (future) ownership developments, how these measures will be maintained and enforced in perpetuity must also be addressed (e.g., through deed restrictions, Homeowner or Property Owner Associations (HOA/POA), Community Development Districts (CDD), planned communications to new owners and leases). If a BMP is not relevant to the project (for example, D2, if no water or water features are present or planned), please explain why is does not apply to the project.

Project keys out to:	**Required BMPs**
7a	D1 through D7; see specifics regarding D1 (20%) and D6 ($4,875 per acre)
8a or 12a	D1 through D9; see specifics regarding D1 (25%) and D6 ($7,387 per acre)
10a	D1 through D9; see specifics regarding D1 (20%) and D6 ($7,387 per acre)
11a	D4 and D8; incorporation of additional BMPs is encouraged

D1. Retain or restore a portion of the parcel in native contiguous vegetation. In most cases, habitat types similar to the habitat type impacted should be retained or restored. (For example, if upland habitat is impacted, then upland habitat with native vegetation should be retained.) Projects keying out to **7a** or **10a** must retain or restore a minimum of 20% of the project impact area acreage. Projects keying out to **8a** or **12a** must retain or restore a minimum of 25% of the project impact area acreage.

D2. Buffer all bodies of water and water features by a minimum of 50 feet (15.2 m) within which there are no impacts to substrate or vegetation. In cases where artificial water bodies (i.e., stormwater ponds) are created, edges should be enhanced with native plantings (typically herbaceous wetland vegetation).

D3. Maintain natural light conditions. Avoid and minimize the use of artificial lighting and avoid permanent night-time lighting. Where lighting is necessary to meet minimum life safety requirements it must be designed to meet each of these recommendations:

- Utilize fully-shielded fixtures to restrict the amount of upward-directed light. Light sources must be downward directed and shielded so that the luminaire emits no more than

10% of its vertical output above 80 degrees from nadir. Examples of appropriate fixtures can be found in FWC Sea Turtle Lighting Guidelines.

- Use the "Backlight, Uplight, Glare" (BUG) system developed by the Illuminating Engineering Society to avoid glare, excessive lighting and light trespass. The "uplight" rating should be zero, and "backlight" and "glare" ratings should be as close to zero as possible. Fixtures on edges of developed areas should have zero backlight ratings.
- Avoid broad spectrum and excessive short wavelength artificial light below 560 nanometers. Lights with less than 3000 Kelvin (K) color temperature must be used, while color temperatures of 2700 K or less are ideal. Lights with the lowest lumens possible should be used.
- Utilize shielding, louvers and baffles, dimming and other appropriate lighting controls to direct and minimize lighting when not in use.
- Implement partial-night lighting schemes to reduce the amount of artificial light used throughout the night. Motion-sensor lighting is also highly encouraged.
- Lighting must not illuminate any retained or restored vegetated areas.
- Prevent indoor artificial lighting reaching the outdoor environment. Use fixed window screens, blinds or tinting on fixed windows and skylights to contain artificial light inside buildings.

D4. Avoid engineering designs that encourage bats from using roofs, buildings, or structures. For example, minimize and seal any gaps, cracks, holes in roofing, siding, soffits during construction.

D5. Avoid widespread use/application of pesticides and insecticides (e.g., mosquito control, agricultural pest control). Chemicals should not be used or applied within and adjacent to areas where Florida bonneted bats are known or expected to forage or roost.

D6. Use the Florida Bonneted Bat Conservation Fund to offset impacts to roosting and foraging habitat.

Donate a recommended minimum of $7,387 per acre (based on 2023 agricultural land values (USDA 2023)) of foraging or roosting habitat impacted (projects keying out to **8a, 10a, or 12a**), and $4,875 per acre for projects keying out to **7a**. Donations are not required for temporary impacts to foraging habitat.

D7. Retain trees and snags that could provide current or future roosting habitat. This includes native potential roost trees or live royal palm, cypress, longleaf or slash pine trees of various sizes or dead or dying native trees with cavities, hollows, crevices, and loose bark. At minimum, 50% of the number of trees of these species (i.e., royal palm, cypress, longleaf or slash pine) present or 50% of the acreage of trees of these species present must be retained.

D8. Conduct roost surveys of potential roost trees prior to removal; necessary removals should occur November 15 to April 15. If potential roost trees or structures need to be removed, trees, snags, and structures need to be visually surveyed within 30 days prior to removal. Any cavities must be peeped with a "treetop" camera, and any cavities that cannot be reached or fully viewed by camera should be surveyed at emergence. If evidence of use by any bat species is observed, discontinue tree removal efforts in that area and coordinate with the Service on how to proceed. Tree, snag, or structure removals should not occur from April 15 to August 15; ideally removal should occur November 15 to April 15.

D9. When using heavy equipment, establish a minimum 150 foot (46 m) buffer around retained known or potential roosts.

Again, if the applicant is unable or does not want to incorporate the required BMPs into the project, this Consultation Key cannot be followed and further coordination and consultation with the Service is required. Formal consultation may not be required, but further evaluation of the project and discussions with the Service are needed.

Best Management Practices for Land Management Activities within FBB CH

BMPs **LM5**, **LM7**, and **LM8** are required for MANLAA projects keying out to **2b** in the FBB CH Consultation Key. No further consultation is required.

Best Management Practices for development related impacts within FBB CH

BMPs **D1 through D3, D5, D6, and D7** are required for MANLAA projects keying out to **3a** in the FBB CH Consultation Key, and information on how they are incorporated into the project must be submitted with the project for review.

Literature Cited - Appendix C

United States Department of Agriculture (USDA). 2023. Land Values 2023 Summary (August 2023). Released August 4, 2023, by the National Agricultural Statistics Service (NASS), Agricultural Statistics Board. Washington, D.C.

Appendix D: Definitions

DEFINITIONS

Action area: All areas affected directly or indirectly by the project/action, and not merely the immediate area involved in the action. The action area may include areas where, for example, effects of increased noise, artificial lighting, changes in hydrology or water quality, or increased traffic occur.

Active Florida bonneted bat roosting*:* The appropriate conclusion if **ANY** of the following occurs: (a) FBB calls are recorded within 1½ hours after sunset or 1½ hours before sunrise; (b) emergence and/or social calls are recorded; (c) human observers see (or hear) FBBs flying from or to potential roosts just after sunset (e.g., within 1½ hour of) or just before sunrise; (d) human observers see and identify FBBs 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 FBB through additional follow-up.

Best Management Practices (BMPs): Avoidance and minimization measures designed to be incorporated into the project's design such that take is not expected to occur as a result of the proposed project (i.e., not result in harassment, harm, injury, or death), after which a MANLAA determination may be possible. These recommendations for actions to conserve roosting and foraging habitat are implemented before, during, and after proposed development, land use changes, and land management activities. BMPs may also be used to offset impacts of a project with a LAA determination.

Florida bonneted bat acoustic activity*:* The appropriate conclusion if a valid acoustic survey yields at least one call file with FBB identified manually or via auto-ID with appropriate regional or species suite selected, with manual vetting from a reputable acoustic reviewer agrees that the auto-ID is correct.

Florida bonneted bat assumed presence polygons: The polygons indicate areas where repeated acoustic surveys have yielded detections of FBB. Project proponents may choose to assume presence of FBB if the project is within one of the polygons. Presence of FBB can also be assumed, if desired, based on potential foraging habitat and/or suitable roosting habitat, or other detection records (e.g., FBB capture, telemetry data).

Florida Bonneted Bat Consultation Area: The Florida Bonneted Bat 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.

Florida bonneted bat foraging habitat*:* This species forages in a variety of habitats including open fresh water, permanent or seasonal freshwater wetlands, wetland and upland forests,

wetland and upland shrub, and agricultural lands. In urban and residential areas, drinking water, prey base, and suitable foraging conditions (*i.e.,* open habitat structure) can be found in relatively small patches of natural or semi-natural habitat. A project area existing within the consultation area lacking potential foraging habitat (2b) would be unlikely, therefore, please consider contacting the Service to discuss this determination if it appears to apply to your project.

Florida bonneted bat roosting habitat*:* This species roosts in live or dead trees and tree snags. Trees of any species 34 ft (10.4 m) or taller, snags 28 ft (8.5 m) or taller, with dbh 7.4 in (19 cm) or greater are potential FBB roosting habitat. Artificial structures 15 ft (4.5 m) in height and greater that may mimic natural roosting conditions (*e.g.,* bat houses, utility poles, buildings over one story high), situated in natural or semi-natural habitats should also be considered potential FBB roosting habitat. Such buildings with 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 can be potential roosting habitat. Bridges and culverts 15 ft and higher are also expected to provide roosting habitat, based upon the species' morphology and behavior (Keeley and Tuttle 1999).

LAA/LAA CH*:* May Affect, and is Likely to Adversely Affect. The appropriate conclusion if any adverse effect to listed species (/on designated critical habitat units) may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or beneficial (see definition of "is not likely to adversely affect"). In the event the overall effect of the proposed action is beneficial to the listed species (/on designated critical habitat units), but also is likely to cause some adverse effects, then the proposed action is "likely to adversely affect" the listed species (/on designated critical habitat units). If incidental take is anticipated to occur as a result of the proposed action, an "is likely to adversely affect" determination should be made. An "is likely to adversely affect" determination requires the initiation of formal section 7 consultation.

In some scenarios, applicants may be able to design projects that would not result in LAA. For example, if appropriate avoidance measures (e.g., BMPs) could be incorporated into the project's design such that take is not expected to occur as a result of the proposed project (i.e., not result in harassment leading to harm, harm, injury, or death), then a MANLAA determination may be possible. When take cannot be avoided, Applicants and Action Agencies are encouraged to incorporate compensation to offset adverse effects. The Service can assist the Applicant in identifying appropriate compensation (e.g., conservation on site, conservation off-site, contributions to the Service's FBB conservation fund).

MANLAA/ MANLAA CH*:* May Affect, but is Not Likely to Adversely Affect. The appropriate conclusion when effects on listed species (/on designated critical habitat units) are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species (/on designated critical habitat units). Insignificant effects relate to the size of the impact and should never reach the scale where take occurs in a MANLAA. 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 required BMPs to reach a MANLAA determination.

Detailed information regarding how required BMPs are incorporated into your project designs must be included in your project submittal. If all required BMPs cannot be incorporated into project, further coordination and consultation with the Service is required.

No Effect/No Effect to CH: The appropriate conclusion when the action agency determines its proposed action will not affect listed species or designated critical habitat. The FESFO defines No Effect as projects with no impacts, positive or negative, to federally-listed species or designated critical habitat from the proposed action. This determination is usually not appropriate if suitable habitat, designated critical habitat, or species are present in the action area.

Potential roost tree: Trees of any species 34 ft (10.4 m) or taller, snags 28 ft (8.5 m) or taller, with dbh 7.4 in (19 cm) dbh or greater are potential FBB roost trees.

Project impact area*:* This is the area within the project area where any temporary or permanent impacts to foraging or roosting habitat are planned or will occur.

Take: to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct. **Harm** is further defined by FWS 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 FWS 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.

Standing Analysis and Implementation Plan – Northern Long-Eared Bat and Tricolored Bat Assisted Determination Key

Version 1.0
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Midwest and Northeast Region
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1 INTRODUCTION

1.1 PURPOSE OF ANALYSIS

This Standing Analysis (SA) provides the analytical basis for an optional, alternative consultation process for Federal action agencies to address potential effects of future actions, pursuant to section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act), to the following species: the federally listed endangered northern long-eared bat (*Myotis septentrionalis*; NLEB) and federally proposed endangered tricolored bat (*Perimyotis subflavus*; TCB). Critical habitat has not been designated for NLEB or TCB. The U.S. Fish and Wildlife Service (FWS) developed this SA to streamline the process of reviewing actions that would result in a "may affect, not likely to adversely affect" (NLAA) determination for the subject species and critical habitat(s). This SA also provides proactive technical assistance to Federal action agencies in making a "no effect" (NE) determination. This SA provides an analytical basis for consultations that is available to Federal agencies for Federal actions that meet the criteria described below as delivered through a Determination Key (DKey) in the FWS's Information for Planning and Consultation (IPaC) application. To obtain consultation documents, including technical assistance for NE and concurrence with NLAA determinations, Federal agencies must use the associated DKey in IPaC to answer questions about the proposed action. By screening the project through the DKey, all or part of the SA is adopted by the Federal action agency and used to submit a concurrence request to support their NLAA determination. It also provides technical information to help agencies determine whether an action will have no effect on the species or critical habitat. Formal consultation under ESA Section 7(a)(2) is required for actions that "may affect" a listed species or critical habitat, unless the FWS concurs in writing that actions are NLAA listed species or critical habitat. Actions which an action agency determines will have no effect on species or critical habitat do not require submittal to the FWS.

Federal agencies must consult with U.S. Fish and Wildlife Service under section 7(a)(2) of the Endangered Species Act (ESA) when an action *may affect* a listed species. TCB is proposed for listing as endangered under the ESA, but not yet listed. For actions that may affect a proposed species, agencies cannot consult, but they can *confer* under the authority of section 7(a)(4) of the ESA. Such conferences can follow the procedures for a consultation and be adopted as such if and when the proposed species is listed. Should the TCB be listed, agencies must review projects that are not yet complete, or projects with ongoing effects within the TCB range that previously received a NE or NLAA determination from the Dkey to confirm that the determination is still accurate. The Consultation Guidance would be applicable to the TCB if the final determination is to list the species under the Endangered Species Act.

With the IPaC DKey established for this SA, the action agency may receive a letter of concurrence for eligible projects by providing specific information requested by the Dkey. This analysis is based on the best available scientific information and will be updated if new information becomes available that may impact outcomes in the Dkey. The SA also explains the basis for actions that do not warrant predetermined outcomes via the DKey and that should undergo additional review or consultation.

Throughout the remainder of this document, statements regarding this SA refer to both the SA and the associated DKey. Agencies are not required to consult using this SA or follow all the built-in conservation measures. Agencies can develop programmatic or individual project consultations as desired. In

addition, if the action agency's proposed action is inconsistent with the SA or does not include the required conservation measures, it does not mean the project is automatically "likely to adversely affect" (LAA) either species. It only means a FWS biologist needs to review the project, and the Service can concur with NLAA determinations outside of the Dkey.

1.2 Benefits and Justification for Determination Key

For those federal actions that the FWS has accumulated significant knowledge in analyzing previously, the FWS is able to develop an SA to streamline the consultation process for eligible federal actions. The streamlined process facilitated by this SA will reduce the amount of FWS and action agency staff time necessary to develop consultation documents and review actions requesting consultation and provide Federal agencies, consultants, and other project proponents a predictable, consistent, and timely response for qualified actions. The Dkey provides a concurrence letter upfront for NLAA determinations that are submitted by an employee of the federal action agency or the designated non-federal representative. Concurrence letters are subjected to a 15-day waiting period (versus the 60-day time period for traditional consultation), to allow field office personnel to audit Dkey submissions and contact the project proponent if errors are found.

1.3 Eligibility for Predetermined Consultation Outcomes via the Determination Key

An SA does not convey concurrence for NLAA determinations for individual projects. Rather, it serves as a streamlining tool. Action agencies may use it to develop their request for concurrence from the FWS. By serving as the analytical template to request concurrence, the SA also allows the FWS to quickly evaluate an action agency's request for concurrence with its finding that its action is NLAA affect relevant listed species or designated CH. If the action agency's proposed action is consistent with the SA and includes any required conservation measures, the FWS will concur that the action will have insignificant, discountable, or wholly beneficial effects on the relevant listed species or CH.

The SA may also provide technical information to help agencies identify actions that will have no effects to the listed species or critical habitat(s). For projects that do not qualify to use the SA, action agencies/project proponents should coordinate directly with the local Ecological Services Field Office (ESFO) and address any consultation requirements, as appropriate.

1.4 Ensuring Accurate Determinations

As is true in all consultation procedures, the FWS relies on complete and accurate information provided by Federal action agencies during consultation. To apply this SA to a project, it is the responsibility of the action agency/project proponent to provide information that is truthful and accurate and that fully represents the entire scope of the project in order to comply with the Act. In the letters delivered to project proponents, FWS states that "All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat and Tricolored Bat Rangewide Determination Key (Dkey), invalidates this letter."

Where appropriate in our analysis, we make note of which activities are expected to have no effects[1] on a species or critical habitat. This information is provided as technical assistance to assist action agencies making no effect/may affect determinations.

1.5 Determination Key Applicability and Outcomes

The DKey is intended to be used for both section 7 consultation for federal agency actions and for proponents of actions that lack a federal nexus.

1.5.1 Federal Agency Actions

Federal agencies must consult with FWS under section 7(a)(2) of the Endangered Species Act (ESA) on any action that may affect an endangered or threatened species or critical habitat. This requirement applies to actions that a federal agency funds, authorizes, or carries out, in whole or in part.

For some actions, federal agencies will be able to complete Endangered Species Act (ESA) section 7 consultation for the NLEB and/or TCB via the DKey in IPaC. After completing the DKey, agencies have met their consultation requirement for the NLEB and/or TCB when they receive a verification letter that verifies a determination of NLAA northern long-eared bat and tricolored bat. The NLAA verification letter will be delivered if both species reach the NLAA outcome, or if one species reaches the NLAA and the other species reaches a NE determination. Two other letter types are possible. If the project is consistent with a finding that the action will not affect the NLEB and TCB, the DKey will produce a "no effect consistency letter." The NE consistency letter will only be delivered if both species reach the NE determination. If the action may affect either the NLEB or TCB but does not qualify for either of those pre-determined outcomes, the agency would receive a "may affect consistency letter" which requires direct coordination with the ESFO to complete consultation. The may affect consistency letter will be delivered if either species reaches a "may affect" determination in the Dkey. A "may affect" determination in this key indicates that the project, as entered, is not consistent with the questions in the key. Not all projects that reach a "may affect" determination are anticipated to result in adverse impacts to listed species. These projects may result in a NE, NLAA, or LAA determination after consultation with an ESFO depending on the details of the project. The "may affect consistency letter" will provide further instructions for completing consultation.

1.5.2 Use of DKey by Non-Federal Representatives of Federal Agencies

Another entity may conduct informal consultation if the federal agency has designated them in writing to FWS as their non-federal representatives (see 50 CFR § 402.08). These designated non-federal representatives may also conclude consultation for federal actions that may affect the NLEB and/or TCB if they receive a verification letter for a finding of NLAA for both species via the DKey.

1.5.3 Non-Federal Projects

Projects with *no federal nexus* are not subject to the ESA section 7(a)(2) consultation requirements but are subject to Section 9 take prohibitions. Therefore, if non-federal actions are reasonably certain to cause incidental take of the NLEB or TCB, applicants can apply for a Section 10 incidental take permit

[1] A "no effect" determination is appropriate when either the species is not present in the action area or is not exposed to any possible stressors or impacts from the proposed action, or the proposed action would not result in any physical, chemical, biotic changes to the environment that are reasonably certain to occur and would not occur but for the action (i.e., no action area can be defined).

(ITP). To help proponents of non-federal actions determine whether to apply for an ITP, actions eligible for NE or NLAA predetermined outcomes in the DKey would receive a technical assistance letter that would clarify that the action is not reasonably certain to cause incidental take of the NLEB and/or TCB. Projects that are not eligible for predetermined outcomes in the Dkey will receive a technical assistance letter indicating that further coordination may be warranted, though voluntary on the part of the proponent.

1.6 Updating the Standing Analysis

The FWS DKey sponsor will ensure that this analysis is updated whenever changes to the DKey are proposed and whenever new information warrants updates. Public access to the most recent version of the standing analysis will be available in IPaC on the description page for the Dkey and on the FWS species pages for northern long-eared bat (https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis) and tricolored bat (https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus).

2 Covered Area

This SA applies within the area described below, unless otherwise excluded (see Section 3.1.2). In delineating the geographic scope of this SA (covered area), we determined the appropriate extent based on the species included and the activities covered herein. To qualify to use this SA, a project's action area must fall completely within the covered area. More information about how the consultation range is defined can be found in the "Northern Long-eared Bat and Tricolored Bat Voluntary Environmental Review Process for Development Projects" (Consultation Guidance) (https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis

The covered area is the consultation range for the NLEB (Fig. 1). and TCB (Fig. 2) in the United States.

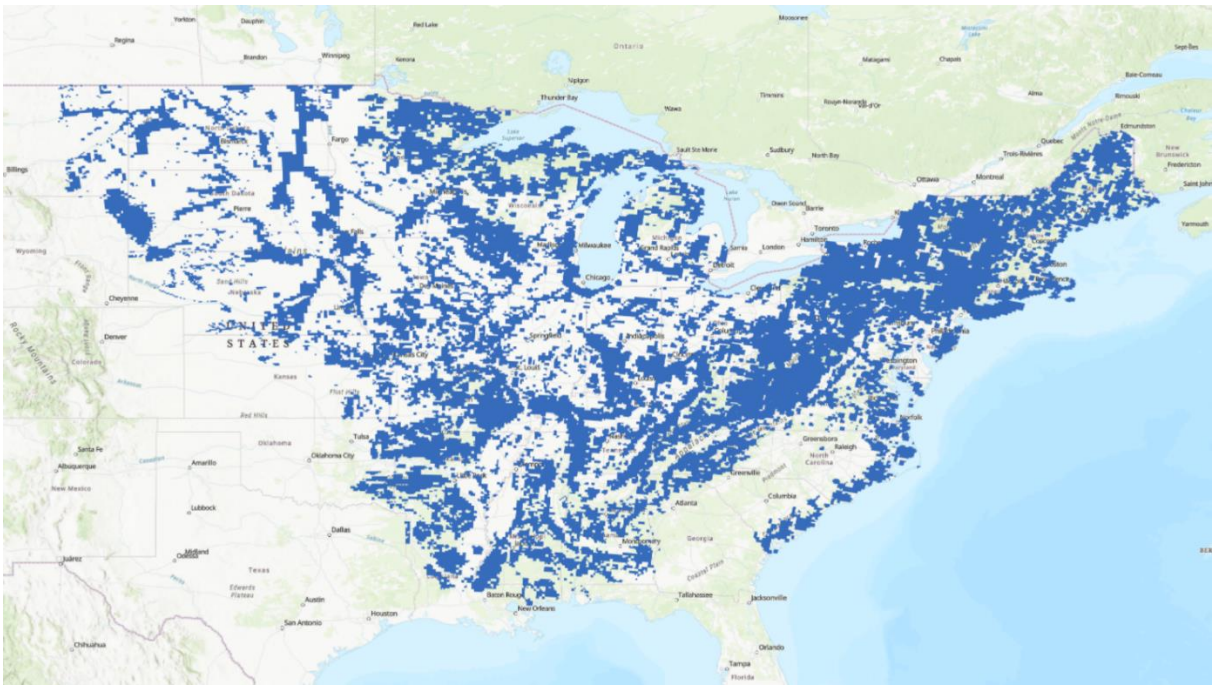

Figure 1. The consultation range of the northern long-eared bat, which is the area where northern long-eared bats may be present.

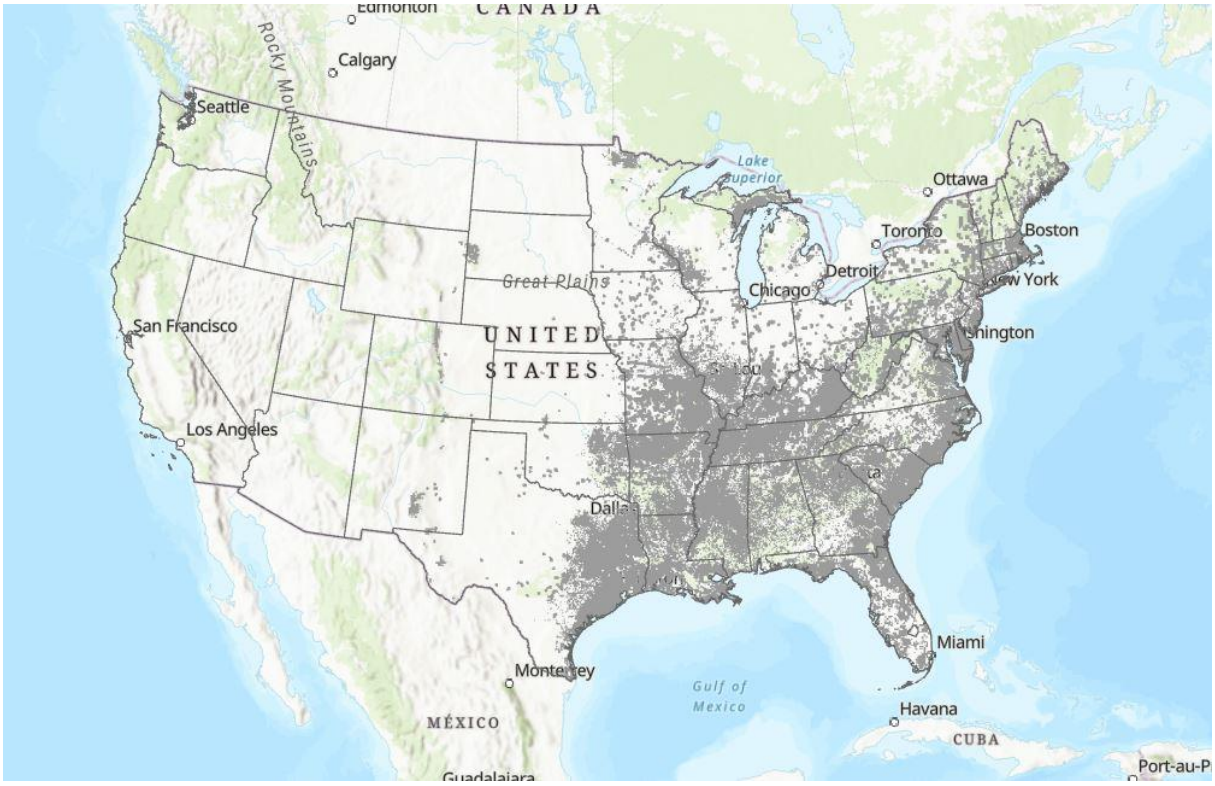

Figure 2. The consultation range of the tricolored bat, which is the area where tricolored bats may be present.

The covered area includes three zones where behavioral differences influence impacts to bats: the hibernating range, Zone 1 year-round active range, and Zone 2 year-round active range (Figure 3). In the hibernating range, NLEB and TCB roost in trees during the summer occupancy period and hibernate in caves and exhibit swarming and staging behavior in proximity to caves in the fall and spring respectively. In the southern portion of the range, NLEB and TCB exhibit year-round activity. During winter, they continue to roost in trees, as well as road-associated culverts and bridges.

To delineate the year-round active portion of the TCB and NLEB ranges, we compared winter bat activity data (e.g., captures, acoustics, and culvert use) and the number of frost-free days and determined that TCB and NLEB are active year-round in areas where the number of frost-free days is ≥ 200 days. Consequently, we determined TCB and NLEB[2] are active year-round in all or portions of Alabama, Florida, Georgia, Louisiana, Mississippi, New Mexico, North Carolina, South Carolina, Texas, and Virginia (Figure 3). Furthermore, based on a review of winter bat activity data, when temperatures fell below 40 degrees F, TCB were less likely to be detected in mist-net and acoustic surveys. We assume during these colder periods, TCB and NLEB are likely entering a state of prolonged torpor (i.e., a state of lowered body temperature and metabolic activity) and consequently, TCB and NLEB roosting in trees may not arouse in sufficient time to flush from tree roosts during tree cutting activities. Based on a review of climate data from the last 30 years from the National Oceanic and Atmospheric Administration U.S. Climate Normals, mean temperatures fell below 40 degrees F between December 15 and February 15 within the area depicted in Zone 1 within the year-round active portion of the range (Figure 3).In Zone 2 of the year-round active range, temperatures only rarely fall below 40 degrees F and bats in trees are unlikely to exhibit deep torpor due to temperature. Although we recognize winter temperatures can occasionally drop below 40 degrees F in Year-Round Active Zone 2, we anticipate these periods would be much shorter in duration than in Zone 1.

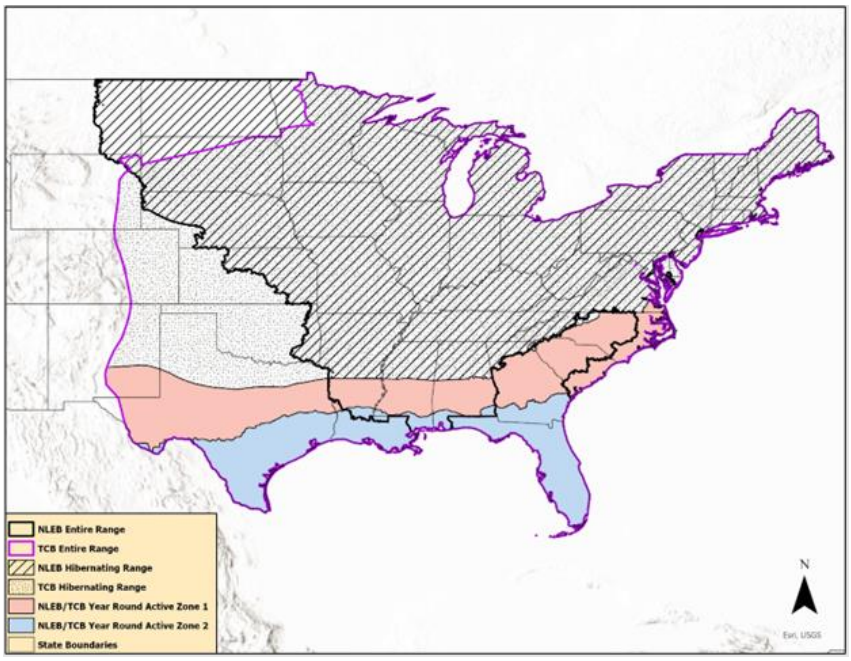

Figure 3. NLEB and TCB hibernating and year-round active ranges.

[2] NLEB's range does not extend into Florida, New Mexico, or Texas.

3 COVERED ACTIVITY DESCRIPTION

The activities described herein include all activities addressed in this SA. The activity description, conservation measures, and covered area inform the SA and describe which specific activities are appropriate for NE or NLAA outcomes under this analysis. The description of activities and their inclusion in the SA should not be construed to indicate that these activities will always result in effects to the species, nor is it meant to cover activities that fall outside of the analysis described below. Action agencies are not required to use this SA; they continue to have the option to request individual consultation on a project; however, in most cases, we anticipate use of the SA will substantially decrease consultation time frames. The SA includes a wide variety of different activities that could cause effects to the NLEB and/or TCB and to which agencies and others may apply the DKey. The structure of the DKey, including conservation measures (see below), will determine which specific actions in these broad groupings will be eligible for predetermined NE or NLAA outcomes. Listing of activities here does not imply that they will always result in effects to the NLEB and/or TCB.

- Vegetation management – for example, prescribed burning and tree removal
- Construction, maintenance, operation, and/or removal of infrastructure projects including:
    - Roads and trails
    - Communication towers
    - Transmission and utility lines
    - Bridges and culverts
    - Oil and gas pipelines
    - Solar power facilities
    - Hydroelectric facilities/dams
    - Canals, levees, or dikes
- Commercial, residential, and recreational developments
- Agricultural activities
- Habitat restoration and enhancement
- Dredging and filling of wetlands or waterbodies

3.1 LIMITS/SIDEBOARDS

The FWS will provide a series of questions through IPaC to assess whether the project meets the requirements of this SA. Projects that meet the requirements of the SA will result in a determination of NE or NLAA for NLEB and/or TCB based on the impacts associated with the project or through the implementation of conservation measures to avoid impacts to either species. Any actions that are LAA either species do not qualify under this SA and require separate individual project review and consultation by the local ESFO.

Additional actions that may otherwise reach a NLAA determination will not be addressed in this SA. These actions may include certain activities, occur in certain geographic areas, or meet one or more context-dependent conditions, and as a result, will not be eligible for pre-determined NE or NLAA consultation outcomes. Instead, the DKey will request that proponents of these actions contact the appropriate ESFO directly.

3.1.1 Activity Based Limits/Sideboards

To receive the FWS's technical assistance acknowledgement of an action agency's NE determination or the FWS's concurrence for a NLAA determination, based on this SA, actions and activities may NOT include the following:

1. Purposeful take of a NLEB or TCB (e.g., capture and handling for surveys or research).
2. Actions that may include leasing, construction or operation of wind turbines.

3.1.2 Location Based Limits/Sideboards

As outlined in the Covered Area Section (2.0) this SA will apply broadly where the NLEB and/or TCB may be present, except in Michigan, where the NLEB and TCB questions will be incorporated into a state specific Dkey for all listed species in Michigan.

Actions that include blasting will also be excluded when they occur in certain geographic areas (e.g., karst landscapes), as will actions that affect areas near a documented hibernaculum. These and other conditional exclusions are addressed below under Conservation Measures.

3.2 IPaC and Individual Action Areas

The DKey is made available to agencies and the public via IPaC. The DKey uses GIS data to answer some key questions and to implement certain conservation measures, as described in the next section. To ensure that these geographically sensitive conservation measures are applied correctly, DKey users will have to accurately enter their "project location" in IPaC.

IPaC users enter project locations by uploading GIS data or by using the built-in drawing tools. When in the program the instructions for the user are to "Draw the area where activities will occur." For projects with significant effects to areas outside of where project activities will occur, it's possible that some users will not fully define the action area. This is addressed by an answer to the 'frequently asked question' in IPaC:

- What should be considered when defining a project location?

  When designating your project location in IPaC, the FWS recommends that you consider not only the physical location of project activities, but also any surrounding area on the landscape where potential effects to species may occur (e.g., delineate all areas that could possibly be affected, including nearby areas that may be affected by runoff, noise, etc.). For projects with a Federal nexus that are required to consult with FWS under section 7 of the Endangered Species Act, we recommend defining the project location for IPaC as your Action Area; definitions of Action and Action Area can be found at 50 CFR 402.02.

If DKey users define the action area in IPaC according to these instructions, incorrect determination in the DKey would be avoided or minimized due to failure to include the full extent of the affected area.

3.3 Conservation Measures

This SA applies conservation measures as design features to avoid adverse effects on an individual, population, or species. The FWS has previously found that incorporation of certain conservation

measures, while voluntarily adopted by action agencies, has reduced effects to the extent that the actions are NLAA species or CH and therefore, do not require formal consultation and the FWS. We have built these conservation measures into questions in the Dkey such that any action that gets a NLAA verification letter or NE consistency letter is not expected to adversely affect the species. Therefore, answers to certain questions in the Dkey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid. The inability to voluntarily adopt certain conservation measures may result in a project reaching a may affect determination which will result in a project not qualifying to use this SA.

3.3.1 Protection of Known and Potential Hibernacula and hibernating bats

3.3.1.1 Known Hibernacula

The Dkey results in a may affect consistency letter if the project would affect any area within 0.5 mile of an entrance to a hibernaculum. For most states within the species' ranges, the DKey will use embedded GIS data to identify actions that fall within 0.5-mile of a known hibernacula opening. Bat location data in the Dkey is hidden to protect sensitive species locations. For a few states within the species' ranges, the DKey will direct users to a webpage where they can find one or more information sources for their state to determine whether their action area occurs within the 0.5-mile hibernaculum "buffer".

3.3.1.2 Potential Hibernacula

When an action area does not overlap with a known hibernaculum buffer, the Dkey prompts the user to evaluate the area for potential hibernacula by using the recommended assessment process in the FWS survey guidelines (FWS 202*4a*, p. 57). These guidelines direct users to assess and report any potential NLEB or TCB hibernation habitat in the action area – caves and their associated sinkholes, fissures, and other karst features, as well as anthropogenic features such as abandoned mines and tunnels. Therefore, the Dkey is sensitive to the possibility that an action will affect an area that is within 0.5-mile of an opening to a *potential* NLEB or TCB hibernaculum - a hibernaculum in which the NLEB or TCB has not been recorded.

3.3.1.3 Culverts or Bridges

NLEB and TCB have been documented using culverts and/or bridges as roosts during both summer and winter depending on the geographic area. In northern portions of the range, NLEB and TCB are most likely to be found roosting in culverts or bridges during the summer season. In southern portions of their range, NLEB and TCB are present on the landscape and considered active year-round, and do not use traditional hibernacula that bats are found using in the northern/hibernating range. These bats found in the southern part of their range may go into short bouts of torpor while roosting and can be found using trees or structures for roosting locations during the winter. The suitability of bridges or culverts for roosting bats may be impacted by changes to the surrounding environment. As a result, the Dkey results in a may affect consistency letter if the project would affect any area within 0.25 mile of a bridge or culvert that is known to be occupied by either NLEB or TCB at any time of year.

3.3.2 Protection of Northern Long-Eared Bats and Tricolored Bats in "Atypical" Hibernacula

To ensure that certain natural atypical hibernacula are considered, we include a question in the key for certain states to ensure that action agencies coordinate with the FWS on actions that affect areas that contain talus, rock shelters, or rock crevices (within cliff or rock faces). NLEB and TCB hibernation in talus

slopes has been documented in Maine (W. Mahaney, FWS, pers. comm. August 18, 2022). NLEB and TCB hibernation in crevices in cliffs, rock faces, or shallow rock shelters in cliffs has been documented in Maine (W. Mahaney, FWS, pers. comm, 2023), Nebraska (Lemen et al. 2016, entire; White et al. 2020, entire), Ohio (Johnson et al. 2021, p. 51; 2024, pp. 6- 11), Pennsylvania (Johnson et al. 2024, p. 6; Aaron Semasko, pers comm, 2023) and Kentucky (Lacki and Hutchinson 1999, p. 11). Although documented thus far only in those states, FWS biologists also suspect use of talus or rock crevices in Alabama, Arkansas, Connecticut, Georgia, Illinois, Indiana, Iowa, Kansas, Maine, Massachusetts, Minnesota, Mississippi, Montana, Nebraska, New Hampshire, western North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Vermont, and Wyoming. Therefore, the DKey will direct users to field offices for individual coordination when actions may affect these 'atypical' potential hibernacula in those states.

3.3.3 Blasting and drilling

The DKey includes a series of questions to ensure that blasting is not carried out where it could damage hibernacula, harm hibernating NLEBs or TCBs, or harm roosting NLEBs or TCBs in suitable roosting habitat due to noise or vibration. In some states (Alabama, Arkansas, Kansas, Kentucky, Michigan, Nebraska, New York, and Ohio) all blasting and drilling actions are excluded from the DKey for individual review. In those states FWS staff concluded that the risk posed to NLEBs and/or TCBs by blasting may be too great even when known or potentially suitable hibernacula were not known to occur within the affected area. In other states, DKey users may only proceed with the key if the action will not include drilling, blasting or other activities that could affect known or potentially suitable hibernacula at any time of year, or if the action could affect suitable roosting habitat when bats are present (suitable summer habitat in the hibernating range, or suitable habitat within the active year-round portion of the range). Dkey questions that are protective of known (section 3.3.1.1) or suitable hibernacula (section 3.3.1.2) will ensure that blasting or drilling activities will not impact hibernacula structures or harm hibernating NLEBs or TCBs. Impacts could also include changes to hydrology or air flow that may impact the suitability of hibernacula. In suitable roosting habitat, impacts could include disturbance of roosting bats from noise or vibrations, TOYRs are applied to avoid these impacts.

There are two general types of blasting: production and controlled. Production blasting uses widely spaced, large explosive charges that are designed to fragment a large amount of burden (the rock that lies between the existing slope face and blasthole). Controlled blasting uses more tightly spaced and smaller explosive charges to remove smaller amounts of burden. This technique can remove material along the final slope face, or it can be used prior to production blasting to create an artificial fracture along the final cut slope. Drilling is a cutting process where a drill bit is spun to cut a hole of circular cross-section in solid materials. Drilling that does not result in noise or vibrations above the baseline conditions at the site does not need to be considered.

3.3.4 Protection of spring staging/fall swarming habitat

Geographic data is also used in the DKey as embedded GIS data to notify users when their actions fall within spring staging or fall swarming habitat, which is defined as a buffer around hibernacula openings of 5-miles for NLEB or 3-miles for TCB. In other states, the DKey will direct users to a webpage to help with this determination.

Tree removal that occurs within 0.5 mile of a hibernaculum would not be eligible for a pre-determined NLAA outcome in the DKey regardless of the timing or extent of the tree removal. For tree cutting within

staging/swarming buffers, DKey users could get an NLAA determination if the tree cutting is not carried out during fall swarming or spring staging for both species within the hibernating range. Proximity to hibernacula (unless it occurs within 0.5 mile of a hibernacula entrance) is not considered in Zone 1 (Figure 3) of the year-round active area for tree cutting because bats in the year-round active zone are not hibernating and we have no information to suggest that bats are swarming or staging around caves. In Zone 1 of the year-round active area, tree cutting should not be conducted during winter torpor.

In addition to the time of year restrictions described above, tree cutting in fall swarming/spring staging habitat should not exceed the appropriate acreage as determined for the forest density category identified for the project location (see section 5.4.3).

3.3.5 Protection of 'summer' Habitat and Tree-roosting NLEBs and TCBs

3.3.5.1 Tree Removal

3.3.5.1.1 Summer Occupancy Season Tree Removal

NLEB

To ensure that tree removal does not affect NLEBs directly (crushing or injury), the DKey results in a may affect consistency letter if the action includes tree removal in suitable summer habitat during the summer occupancy season unless there is sufficient evidence of the species' absence. NLEBs could be harmed by tree cutting during the summer occupancy season (see Section 5.4.2). The timing of the summer occupancy season – when bats are present on their summer home range and/or roosting in colonies – varies depending on geographic location. To ensure that project proponents appropriately consider the timing of any tree removal relative to the potential presence of the NLEB in the affected area, the DKey directs users to Bat Activity Periods for each state in Appendix L of the FWS's Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines (FWS 2024a). Date-based time of year restrictions are used for tree cutting in the Dkey, rather than a temperature-based time of year restriction, because tree cutting actions are more difficult to stop and start based on changing site conditions. A temperature based TOYR requires a high level of communication and control over individual practitioners that is not likely to be effectively implemented in tree cutting activities.

In Zone 1 of the year-round active areas, where NLEB may be present and roosting in trees year-round, time of year restrictions on tree cutting also include the time when bats may be in winter torpor and unable to rouse quickly to exit tree roosts. These dates have been calculated to include the timeframe when mean winter temperatures fall below 40 degrees Fahrenheit (F) and bats roosting in trees are in torpor. Torpor is a state of lowered body temperature and metabolic activity that reduces a bats ability to respond to environmental cues like noise or vibration.

Actions that include tree removal during the active season may be eligible for a pre-determined consultation outcome of NLAA if there is sufficient information that the NLEB is probably absent, based on a presence/probable absence summer bat survey that targeted the northern long-eared bat in the action area. The survey must have followed the FWS Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines (FWS 2024*a*), must have been conducted within the last five years, and the results will have to have been confirmed as valid by the ESFO. To ensure that the ESFO has recognized the survey results as valid, DKey users will be prompted to upload that confirmation. If the survey was conducted without pre-approval of the methods by FWS, the DKey user will have to coordinate with the

ESFO and receive and upload both survey results and field office authorization of the survey design – the same coordination and approval will be needed for any survey that is older than five years.

TCB

To ensure that tree removal does not affect TCBs directly (crushing, injury), the DKey results in a may affect consistency letter if the action includes tree removal in suitable summer habitat during the pup season unless there is sufficient evidence of the species' absence. TCBs are not likely to be harmed by tree cutting during the rest of the summer occupancy season because we expect TCBs capable of flight to flush from roosts when physically disturbed (see Section 5.4.2). While adult TCBs are capable of flushing during tree cutting, removal of occupied roosts when flightless young are present (i.e., pup season) may result in direct injury or mortality. Flightless young are not capable of flight and cannot independently flush from a falling tree. The timing of the pup season – when TCB pups may be present but unable to fly– varies depending on geographic location. To ensure that project proponents appropriately consider the timing of any tree removal relative to the potential presence of the non-volant TCB pups in the affected area, the DKey directs users to Bat Activity Periods for each state in Appendix L of the FWS's Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines (FWS 2024a). Date-based time of year restrictions are used for tree cutting in the Dkey, rather than a temperature-based time of year restriction, because tree cutting actions are more difficult to stop and start based on changing site conditions. A temperature based TOYR requires a high level of communication and control over individual practitioners that is not likely to be effectively implemented in tree cutting activities.

In Zone 1 of the year-round active area where TCB may be present and roosting in trees year-round, time of year restrictions on tree cutting also include the time when bats may be in winter torpor and unable to rouse quickly to exist tree roosts. These dates have been calculated to include the timeframe when mean winter temperatures fall below 40 degrees F and bats roosting in trees are in torpor. Torpor is a state of lowered body temperature and metabolic activity that reduces a bats ability to respond to environmental cues like noise or vibration.

Actions that include tree removal during the pup season may be eligible for a pre-determined consultation outcome of NLAA if there is sufficient information that the TCB is probably absent, based on a presence/probable absence summer bat survey that targeted the TCB in the action area. The survey must have followed the FWS Range-wide Indiana Bat and Northern Long-Eared Bat Survey Guidelines (FWS 2024a), must have been conducted within the last five years, and the results will have to have been confirmed as valid by the ESFO. To ensure that the ESFO has recognized the survey results as valid, Dkey users will be prompted to upload that confirmation. If the survey was conducted without pre-approval of the methods by FWS, the Dkey user will have to coordinate with the ESFO and receive and upload both survey results and field office authorization of the survey design – the same coordination and approval will be needed for any survey that is older than five years.

3.3.5.1.2 Winter Tree Cutting

Winter tree cutting may result in indirect impacts to bats from increased energy expenditure, which may result in reduced fitness (see Section 5.4.3). To minimize the likelihood that tree removal during the hibernation period will adversely affect the species indirectly, the Dkey results in a may affect consistency letter if the action includes tree cutting above the acreage specified for the action area

depending on the forest density category of the 5x5 km grid that the action area is located within (see Section5.4.3). The forest density for each 5x5 km grid was measured as the average forest cover within each 5x5 km grid cell based on the National Land Cover Database dataset from 2019. (National Land Cover Database, Dewitz 2019, entire). The forest density category for the action area is determined based on the intersection of the action area with a set of maps that include all areas that fall within particular forest density categories, from 0-9.9%, 10-19.9%, 20-29.9% and 30-100%. Projects will be eligible for a predetermined consultation outcome of NLAA if the tree cutting acreages are less than or equal to 0.5 acres for the 0- 9.9% category, 5 acres for the 10- 19.9% category, 40 acres for the 20-29.9% category or 100 acres for the 30- 100% category for both NLEB and TCB. The action area may intersect with multiple forest density categories, which are shared as viewable maps in the Dkey where the user can see their project area in relation to the areas included in each forest density map. The Dkey will default to the lowest forest density category that the action area intersects with. The Dkey does not have an ability to average the forest density categories that the action area intersects with. As a result, the lowest category intersected with may represent a small portion of the action area. Projects where this is the case can choose to use the traditional consultation process through the ESFO.

3.3.5.1.3 Protection of Known Roost Trees

The Dkey results in a may affect consistency letter if the project would affect any area within 150 feet of a known NLEB or TCB roosts tree. For most states within the species' ranges, the DKey will use embedded GIS data to identify actions that fall within 150 feet of a known roost tree. Bat location data in the Dkey is hidden to protect sensitive species locations. For a few states within the species' ranges, the DKey will direct users to a webpage where they can find one or more information sources for their state to determine whether their action area occurs within the 150-foot roost tree "buffer".

3.3.5.2 Tree Cutting in Utility Rights-of-Way

To avoid direct impacts to NLEBs and TCBs from tree cutting, limbing and trimming in already established and currently maintained Utility ROWs, the Dkey results in a may affect consistency letter if the action would occur during the time of year restrictions provided for this activity. This is not expected to be applied to roads, only to already established and currently maintained utility ROWs.

1. Pup Season – hibernating range away from hibernacula and year-round active Zone 2.
2. Pup Season plus Fall Swarming and Spring Staging - within 5.0 miles of a hibernacula for NLEB, and within 3.0 miles of a hibernacula for TCB.
3. Pup season plus Winter Torpor- year-round active range Zone 1.

NLEB is a forest-interior species that is not expected to be found roosting in trees within or directly adjacent to or along the edges of a previously cleared and established utility right-of-way (ROW). If NLEB are occasionally roosting in trees along the edges of currently maintained utility ROWs, the time of year restrictions described above further reduce the likelihood of effect to the NLEB because they should be able to rouse and flush from the trees before direct impacts occur. The time-of-year restrictions (TOYR) applied to currently maintained utility ROWs will ensure that non-volant pups and bats in torpor are not harmed as a result of tree cutting.

In addition to TOYRs, tree cutting, trimming and limbing will be limited to actions within already established and currently maintained utility corridors and actions that will not expand the footprint of the established ROW. This will ensure that trees within the forest interior will not be cut and most trees

that are cut in established ROWs are small, which further limits the potential effects. If these conditions are met, tree cutting, trimming and limbing will not be restricted to the acreage limits imposed on tree cutting outside currently maintained utility ROWs. Tree cutting acreage limits are not imposed on this action because cutting will be conducted in a linear fashion within areas that have been previously fragmented. As a result, tree cutting, trimming or limbing is not expected to appreciably reduce the home range for NLEB or TCBs, and direct impacts will be avoided by implementing TOYR.

3.3.5.3 Prescribed Fire

To avoid the likelihood that prescribed fire could adversely affect NLEBs and TCBs, the Dkey results in a may affect consistency letter if the action includes prescribed fire that is conducted within suitable habitat for NLEB or TCB unless they include certain conservation measures. Actions that include prescribed fire may be eligible for a 'NLAA determination when they include the following measures:

1. Prescribed fire plan includes average flame length of ≤ 4 feet in western states (CO, KS, MT, NE, ND, NM, OK, SD, UT, WY) or ≤ 8 feet in eastern states (AL, AR, CT, DE, GA, IL, IN, IO, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, NH, NJ, NY, OH, PA, RI, SC, TN, TX, VA, VT, WI, WV). These flame lengths are anticipated to be equivalent to conducting prescribed fire at low to medium intensity.
2. Fire is only conducted when temperatures are ≥ 40 degrees F.
3. Fire is conducted outside the pup season.

Unless surveys adequately demonstrate the probable absence of the NLEB or TCB, prescribed fire that will affect suitable summer habitat for the NLEB or TCB during the pup season will not be eligible for a NLAA outcome in the Dkey. This will minimize the likelihood that NLEB or TCB pups will be exposed to harmful heat and flames or other indirect effects of fire during the period when they are unable to fly (non-volant). To ensure that project proponents appropriately consider the timing of any prescribed fire relative to the potential presence of non-volant pups in the affect area, the Dkey directs user to Bat Activity Periods for each state in Appendix L. of the FWS's Range-wide Indiana Bat and Northern long-eared Bat Survey Guidelines (FWS 2024a).

Prescribed fire of high intensity will not be eligible for a NLAA outcome in the Dkey at any time of year. Fire intensity is defined by the average flame length. In the eastern U.S., fires with average flame length ≤ 8 feet will result in a fire of low to moderate intensity. In the western U.S the prescribed fire plan should include an average flame length of ≤ 4 feet to ensure that prescribed fire will be low to moderate intensity. The designation of average flame lengths accounts for regional variability in conditions, that include, but are not limited to topography, fuel types, and weather conditions. Prescribed fire will not be eligible for a NLAA outcome in the Dkey if it will be conducted when temperatures are lower than 40 degrees F because bats present on the landscape may be in deep torpor at these temperatures. For other activities (e.g., tree cutting), the Dkey implements additional TOYR to avoid impacts to bats that may be in deep torpor while roosting in trees. These TOYR include fall swarming and spring staging activity periods in the hibernating range, and winter torpor in the year-round active range. For prescribed fire, we can use temperature as a surrogate for the additional TOYR applied to other activities because prescribed fire plans routinely include environmental conditions that must be met before the action can proceed. This practice provides the appropriate level of oversight needed to successfully meet the required conditions to avoid take. Other activities that may have less direct oversight of on-the-ground activities will use a date-based TOYR rather than a temperature-based TOYR.

3.3.6 Protection of Northern Long-Eared Bats and Tricolored Bats in Bridges and Culverts

3.3.6.1 Types of Bridge Actions Likely to be Excluded/Covered Under the Dkey

The Dkey includes measures to ensure that it does not inappropriately provide NLAA determinations for actions that involve work on bridges or culverts. The Dkey mostly excludes actions that are eligible to be covered under the Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat, Northern Long-eared Bat, and Tricolored Bat (Transportation Programmatic; FWS 2018, entire). Many of the bridge actions that may affect the NLEB and/or TCB will be covered under the procedures adopted for that programmatic consultation.

Dkey users may have actions, however, that do not have a nexus to any of those three agencies or for which project proponents choose to use the range-wide key. This may include, for example, bridge actions carried out by a federal land management agency or actions carried out by state or local governments that lack federal assistance.

3.3.6.2 Geographically Specific Measures and Transportation Structure Assessments

In several states, the FWS opted to direct any action that may affect a bridge and that was not covered by the Transportation Programmatic to the field office for individual review – those states include Georgia, Michigan, Mississippi, Missouri, and North Dakota. In New Jersey, the Dkey will direct users online to bridge evaluation guidelines specific to the state. In all other states within the range, proponents of bridge actions will have to carry out a site-specific bridge/structure assessment, coordinate directly with the FWS field office, or both. For assessments of bridge and certain other transportation structures that NLEBs or TCBs may inhabit (e.g., culverts), the Dkey directs users to Appendix K of the Range-wide Indiana Bat and Northern Long-eared Bat Survey Guidelines (FWS 2024a). The DKey instructs users to coordinate with ESFOs before applying the results in the key to ensure that they use only valid results.

There is no record of the NLEB using bridges for roosting in either New Hampshire or Vermont, except for covered bridges (S. Von Oettingen, FWS, pers. comm. 2022). In areas that only include NLEB, the Dkey will present bridge questions for actions affecting covered bridges, but not if the actions affect other bridge types. TCBs have been observed roosting in bridges in VT (A. Bennett, Vermont Agency of Natural Resources, Department of Fish and Wildlife, Essex Junction, VT, pers. comm. 2024) and are generally more likely to be observed using bridges than NLEB. The Dkey will present bridge questions for actions affecting bridges in NH and VT where TCB is present on the official species list.

Compared to bridges, culverts are addressed differently in the DKey. In no state are actions automatically kicked out for ESFO coordination due to effects to a culvert. If a culvert may be impacted by project activities, proponents of the action will be directed to conduct a structure assessment depending on the size of the culvert (see Appendix K in the FWS's Rangewide Indiana Bat and Northern Long-eared Bat Survey Guidelines at https://www.fws.gov/library/collections/range-wide-indiana-bat-and-northern-long-eared-bat-survey-guidelines for more information). For TCB, a structure assessment should be conducted if the culvert is greater than 3 feet tall and 23 feet in length. For NLEB, a structure assessment should be conducted if the culvert is greater than 4.5 feet tall and 23 feet in length. Project proponents should conduct a structure assessment using the same guidance as discussed above for bridges or coordinate with the ESFO. The dimensions for each species are equivalent to or slightly smaller than the minimum dimensions of culverts in which NLEB or TCB has been documented, based on

a review of the available information for NLEB and TCB conducted in 2022 by the FWS Asheville, North Carolina ESFO and that are described below in the section 5.6. The smallest-diameter and shortest culverts in which NLEBs have been documented was in Louisiana and were 4.5 feet tall and 131 feet long (Nikki Anderson, unpublished data, March 23, 2022). The smallest-diameter and shortest culverts in which TCBs have been documented were in Louisiana. The shortest culvert for TCB was 5.0 feet tall and 23.3 feet long. The smallest-diameter culvert was 2.5 feet tall and 377 feet long. The smallest culvert overall was 3 feet tall and 49.2 feet long and was used in the summer and winter (Nikki Anderson, unpublished data, March 23, 2022). Through the review of existing data, it was determined that culverts less than 23 feet in length do not need to be surveyed. The length dimensions are based on the typical size of a two-lane road and bats are unlikely to be present in shorter culverts. The height dimensions for NLEB were based on the height of the shortest culvert where NLEB were found. TCBs have been documented in culverts as small as 2.0 feet in diameter (FWS 2022), however, instances of TCB in culverts this small are expected to be rare and present a potential safety concern for regular surveys. Therefore, we recommend that culverts 3.0 feet or larger in diameter be considered for assessments for TCB.

3.3.7 Protection of Northern Long-Eared Bats and Tricolored Bats in Buildings

3.3.7.1 Intentional Exclusion of Bats from Buildings

To ensure that intentional exclusion of bats from a building or structure is NLAA NLEBs or TCBs, the DKey will not provide a predetermined consultation outcome for any action that includes this activity. The DKey directs users to seek assistance from FWS to help determine whether bats may be present. The key also provides guidance to ensure that the exclusion, if eventually carried out, is done in a way that would avoid harm to bats.

3.3.7.2 Removal, Modification, or Maintenance of Buildings with Bats

To help ensure that removal, modification, or maintenance of human-made structures (barns, houses, or other buildings) does not adversely affect NLEBs or TCBs, actions that include any of those activities will not be eligible for a predetermined NLAA outcome if the structures are known or suspected to contain roosting bats.

3.3.8 Potential Impacts of Increased Vehicle Traffic – Ensuring Adequate Review

Increased vehicle traffic may pose a risk to NLEBs and TCBs due to effects of increased risk of collision and noise. Actions eligible for the national bat transportation programmatic will be addressed outside of the range wide key. Therefore, this conservation measure will apply to those transportation actions that fall outside the scope of that consultation.

To ensure that risks to the NLEB caused by increased vehicular traffic are adequately considered by action proponents and FWS, the range wide DKey poses the following questions for actions whose effects occur within 1000’ of suitable NLEB habitat:

1. Will the action directly or indirectly cause construction of one or more new roads that are open to the public? Or, will the action include or cause any construction or other activity that is reasonably certain to increase average daily traffic on one or more existing roads? Or, will the action include or cause any construction or other activity that is reasonably certain to increase the number of travel lanes on an existing thoroughfare?

2. Will any new road, increased traffic, or new lands go through any area of contiguous forest that is greater than or equal to 10 acres in total extent or will any new road pass between two patches of contiguous forest that are each greater than or equal to 10 acres in extent and are separated by less than 1,000 feet?
3. If the answer is 'yes' to each question, the action is ineligible for the key and the action proponent will be directed to coordinate with the FWS ESFO unless the answer is yes to the following question – "For every 1,000 feet of new road that crosses between contiguous forest patches, will there be at least one place where bats could cross the road corridor by flying less than 33 feet (10 meters) between trees whose tops are at least 66 feet (20 meters) higher than the road surface?"

To ensure that risks to the TCB caused by increased vehicular traffic are adequately considered by action proponents and FWS, the range wide DKey poses the following question for actions whose effects occur within suitable TCB habitat:

1. Will the action directly or indirectly cause construction of one or more new roads that are open to the public? Or will the action include or cause any construction or other activity that is reasonably certain to increase average daily traffic on one or more existing roads? Or will the action include or cause any construction or other activity that is reasonably certain to increase the number of travel lanes on an existing thoroughfare?

The additional questions included for NLEB (questions 2 and 3 above) were not included for TCB due to differences in the biology of the two bat species. NLEB tend to forage within forests or close to forested/wooded edges, therefore, new roads, travel lanes or increases in traffic that are not associated with forested areas are not likely to result in collisions for NLEB. TCB will forage in more open landscapes, therefore, they may be at risk of collision in open areas. As a result, questions to exclude activities in open areas are not referenced for TCB.

The DKey deals with other potential effects of transportation actions in other series of questions, including effects to habitat and effects of artificial lighting.

3.3.9 Addressing Exposure to Water-Borne Contaminants

NLEBs and TCBs may be exposed to water-borne contaminants in drinking water and in aquatic invertebrate prey. Water for drinking is known to be important for other myotid bats and it's presumed that NLEBs and TCBs also drink routinely from surface water sources (Adams and Hayes 2008, p. 1115; Geluso et al. 2018, p. 288). Although NLEBs may prey primarily on terrestrial insects, they do sometimes prey on aquatic insects (Broders et al. 2014, p. 321).

To minimize the likelihood that actions will raise a significant risk of exposure to water-borne contaminants, actions for which the answer is 'yes' to either of the following two questions will be kicked out for individual coordination:

1. Will the proposed action involve the creation of a new water-borne contaminate source (e.g., leachate pond pits containing chemicals that are not NSF/ANSI 60 compliant)?
2. Will the proposed action involve the creation of a new point source discharge from a facility other than a water treatment plant or storm water system?

3.3.10 Lighting

To avoid or minimize the likelihood that artificial lighting could adversely affect NLEBs and TCBs, the DKey results in a may affect consistency letter if the action that includes temporary or permanent lighting within 1000' of suitable NLEB or TCB habitat unless they include certain conservation measures. In other words, actions that include lighting may be eligible for a NLAA determination when they include the following measures:

1. The use of downward-facing, full cut-off lens lights (with same intensity or less for replacement lighting) when installing new or replacing existing permanent lights.
2. Or, if using the Backlight, Uplight, Glare (BUG) system developed by the Illuminating Engineering Society, will all three ratings (backlight, uplight, and glare) be as close to zero as is possible, with a priority of "uplight" of 0?

Even when projects include the two measures above, they must also ensure that any temporary lighting is directed away from suitable habitat during the active season to be eligible for a NLAA determination via the key. Actions that include lighting may be available for a NLAA determination when they include the following measure:

1. Will the action direct any temporary lighting away from suitable NLEB or TCB roosting habitat when bats may be present?

4 COVERED SPECIES

The following section includes a summary of relevant background information on the species and critical habitat(s) used to develop this SA. A complete description of the species can be found on ECOS (https://ecos.fws.gov). This overview is included to inform the reader of the species prior to the analysis of the effects of the action presented below. Species and critical habitats within a project's action area that may be affected by the proposed action, but are not covered by this SA, will require individual consultation with the local ESFO.

The Dkey covers the endangered NLEB and proposed endangered TCB.

4.1 SPECIES HABITS AND HABITATS

NLEB

Within the hibernating portion of the NLEB's range, they spend winter hibernating in caves, mines, or similar structures, preferring areas with constant temperatures, high humidity, and no strong air currents. The "active season" includes the portion of the year that the species is not hibernating. In the southern portion of their range (i.e., year-round active range), NLEBs have been found to be present and active year-round. In some places, where there are no known non-cave-like hibernacula (Grider et al. 2016, p.11), NLEB were observed to be active and roosting in trees the majority of the winter, and although torpor was observed, time spent in torpor was very short with the longest torpor bout (i.e., hibernation period) for each bat averaging 6.8 days (Jordan 2020, p. 672).

During summer, NLEBs typically roost underneath bark or in cavities, crevices, or hollows of both live trees and snags (standing dead trees) that are typically ≥3 inches diameter at breast height (DBH);

however, maternity roost trees are typically larger (≥ 9 in DBH). NLEBs exhibit site fidelity and return to general areas, but they use many alternate roost trees and a wide variety of tree species. To a lesser extent, NLEBs may roost in manmade structures, such as barns and sheds.

During spring, summer, and fall, NLEBs are a forest-interior species and typically roost in mature forests (Caceres and Pybus 1997) with occasional foraging over forest clearings, water, and along roads (Van Zyll de Jong 1985). Roosting and foraging habitat are typically within closed, intact forest stands (Sasse and Pekins 1996; Foster and Kurta 1999; Lacki and Schwierjohann 2001; Owen et al 2002). When available, NLEBs will use narrow lines of trees to move between forest patches to avoid crossing open fields and may "rarely venture more than a few meters from forest" (White et al. 2017, p. 8). Fall swarming near hibernacula occurs between the summer and winter seasons in areas outside of the year-round active range. Swarming sites play an important role in maintaining genetic diversity because mating and copulation occurs during swarming and because they attract members of multiple summer colonies (Kurta et al. 1997, p. 479, Lowe 2012, p. 51; Randall and Broders 2014, p. 114).

Based on best available information from NLEB radio-tracking studies, the NLEB typically roosts, commutes, and forages within 1.5-miles of known roost trees (Timpone et al. 2010, p. 118; Swingen et al. 2018, pp. 26–27), and we refer to this area as the maternity colony home range (USFWS 2024a, p. 52). A 1.5-mile buffer encompasses 4,524 acres.

NLEBs are nocturnal foragers and use hawking (catching insects in flight) and gleaning (picking insects from surfaces) behaviors in conjunction with passive acoustic cues (Nagorsen and Brigham 1993, p. 88; Ratcliffe and Dawson 2003, p. 851). The NLEB has a diverse diet including moths, flies, leafhoppers, caddisflies, and beetles (Griffith and Gates 1985, p. 452; Nagorsen and Brigham 1993, p. 88; Brack and Whitaker 2001, p. 207), with diet composition differing geographically and seasonally (Brack and Whitaker 2001, p. 208). The most common insects found in the diets of NLEBs are lepidopterans (moths) and coleopterans (beetles) (Brack and Whitaker 2001, p. 207; Lee and McCracken 2004, pp. 595–596; Feldhamer et al. 2009, p. 45; Dodd et al. 2012, p. 1122), with arachnids also being a common prey item (Feldhamer et al. 2009, p. 45).

NLEB maternity colonies, consisting of females and young, are generally small, numbering from about 30 (Whitaker and Mumford 2009, p. 212) to 60 individuals (Caceres and Barclay 2000, p. 3); however, larger colonies of up to 100 adult females have been observed (Whitaker and Mumford 2009, p. 212). NLEB has experienced severe declines following the arrival of WNS. WNS has caused estimated population declines of 97–100 percent across 79 percent of NLEB's range (USFWS 2022, p. 35). NLEB populations where WNS is present are severely reduced, which is likely to extend to NLEB maternity colony size. Most studies have found that the number of individuals roosting together in a given roost typically decreases from pregnancy to post-lactation (Foster and Kurta 1999, p. 667; Lacki and Schwierjohann 2001, p. 485; Garroway and Broders 2007, p. 962; Perry and Thill 2007b, p. 224; Johnson et al. 2012, p. 227). NLEBs exhibit fission-fusion behavior (Garroway and Broders 2007, p. 961), where members frequently coalesce to form a group (fusion), but composition of the group is in flux, with individuals frequently departing to be solitary or to form smaller groups (fission) before returning to the main spatially discrete unit or network (Barclay and Kurta 2007, p. 44). As part of this behavior, NLEBs switch tree roosts often (Sasse and Pekins 1996, p. 95), typically every 2 to 3 days (Foster and Kurta 1999, p. 665; Owen et al. 2002, p. 2; Carter and Feldhamer 2005, p. 261; Timpone et al. 2010, p. 119). Adult females give birth to a single pup (Barbour and Davis 1969, p. 104). Birthing within the colony tends to

be synchronous, with the majority of births occurring around the same time (Krochmal and Sparks 2007, p. 654). Parturition (birth) may occur as early as late May or early June (Easterla 1968, p. 770; Caire et al. 1979, p. 406; Whitaker and Mumford 2009, p. 213) and may occur as late as mid-July (Whitaker and Mumford 2009, p. 213). Juvenile volancy (flight) often occurs by 21 days after birth (Kunz 1971, p. 480; Krochmal and Sparks 2007, p. 651) and has been documented as early as 18 days after birth (Krochmal and Sparks 2007, p. 651).

TCB

In the hibernating portion of their range, TCBs spend winters hibernating in caves, abandoned mines, or similar structures, preferring areas with constant temperatures, high humidity, and no strong air currents. TCBs have also been documented roosting in natural rock faces and outcrops (Lemen et al. 2016, p. 11; Johnson et al. 2024, p. 9). In the southern portion of their range (i.e., year-round active range), TCBs exhibit shorter torpor length compared to northern portions of the range and TCBs remain active and feed during the winter (Grider et al. 2016, pp. 8–9; Newman 2020, pp. 13–17; Stevens et al. 2020, p. 528; Shute et al. 2021a, p. 970). Within the year-round active range, caves are sparse and TCB often roost in road-associated culverts (Sandel et al. 2001, entire; Katzenmeyer 2016, pp. 32–36; Limon et al. 2018, p. 218; Bernard et al. 2019, p. 3; Lutsch 2019, unpaginated; Meierhofer et al. 2019, p. 3) and sometimes bridges (Ferrara and Leberg 2005, p. 731; Newman et al. 2021, p. 1335). In addition, tree cavities, foliage, and Spanish moss (*Tillandsia usneoides*) serve as winter roosting habitat for TCBs in the southern portion of the range (Newman et al. 2021, p. 1335).

During spring, summer, and fall, TCBs typically roost in live and dead leaf clusters of live and recently dead deciduous hardwood trees (Veilleux et al. 2003, p. 1071; Perry and Thill 2007a, pp. 976-977; Thames 2020, p. 32). In the southern and northern (Canadian) portions of the range, TCB will also roost in Spanish moss and beard lichen (*Usnea trichodea*), respectively (Davis and Mumford 1962, p. 395; Poissant 2009, p. 36; Poissant et al. 2010, p. 374). Tricolored bats rarely roost in buildings, and when they do, they are often in well-lit or full daylight areas (Barbour and Davis 1969, p. 116). TCB will roost in a variety of tree species, especially oaks (*Quercus* spp.), and often select roosts in tall, larger diameter trees, but will roost in smaller diameter trees when potential roost substrate is present (e.g., 4-inch [10 centimeter]; Leput 2004, p. 32). TCBs commonly roost in the mid to upper canopy of trees although males will occasionally roost in dead leaves at lower heights (e.g., < 16 feet [5 meters] from the ground; Perry and Thill 2007a, p. 979) and females will occasionally roost in Spanish moss of understory trees (Menzel et al. 1999, p. 191). Occasional summer roosts also include clusters of dead pine needles of large living pines (*Pinus echinata*), live branches of Norway spruce (*Picea abies*), eastern red cedar (*Juniperus virginiana*), abandoned gray squirrel (*Sciurus carolinensis*) nests, and under exfoliating birch (*Betula spp.*) bark (Veilleux et al. 2003, p. 1071; Perry and Thill 2007a, p. 977; WDNR 2016, unpaginated; WDNR 2017a, p. 6; WDNR 2017b, unpaginated; WDNR 2018, p. 8; Thames 2020, p. 32; Hammesfahr et al. 2022, p. 161).

Although the species has been captured within a variety of forest types, studies on forest associations of this species are limited (Silvis et al. 2016, p. 32). Tricolored bats roost almost exclusively in hardwood trees and often roost in forest stands that contained abundant deciduous hardwoods (Perry et al. 2007, p. 164).

TCBs are opportunistic feeders and consume small insects including caddisflies (Trichoptera), flying moths (Lepidoptera), small beetles (Coleoptera), small wasps and flying ants (Hymenoptera), true bugs

(Homoptera), and flies (Diptera) (Whitaker 1972, p.879; LaVal and LaVal 1980, p. 24; Griffith and Gates 1985, p. 453; Hanttula and Valdez 2021, p. 132). TCB emerge early in the evening and forage at treetop level or above (Davis and Mumford 1962, p. 397; Barbour and Davis 1969, p. 116) but may forage closer to the ground later in the evening (Mumford and Whitaker 1982, p. 170). TCB exhibit slow, erratic, fluttery flight while foraging (Fujita and Kunz 1984, p. 4) and commonly forage with eastern red bats (*Lasiurus borealis*) and silver-haired bats (*Lasionycteris noctivagans*) (Davis and Mumford 1962, p. 397; Mumford and Whitaker 1982, p. 169).

TCB forage most commonly over waterways and forest edges (Barbour and Davis 1969, p. 116; Mumford and Whitaker 1982, pp. 170-171; Hein et al. 2009, p. 1204). TCBs seem to prefer foraging along forested edges of larger forested openings, along edges of riparian areas, and over water. TCBs avoid foraging in dense, unbroken forests, and narrow road cuts through forests (Davis and Mumford 1962, p. 395; Kurta 1995, p. 87; Lacki and Hutchinson 1999, p. 11; Ford et al. 2005, p. 535; Thames 2020, p. 63). Reproductively active (i.e., pregnant and lactating) adult female TCBs typically forage within 1.5 miles (2.4 kilometers) of roost trees (Veilleux et al. 2003, p. 1073; Leput 2004, p. 28; Helms 2010, p. 14; Wisconsin DNR 2017b, unpaginated; Wisconsin DNR 2018, p. 11). Maximal distance traveled from roost areas to foraging grounds was 5.6 miles [9.1 kilometers] for a pregnant adult female in Tennessee (Cable and Willcox 2024, p. 6) and 15.2 miles [24.4 kilometers] for male TCB in Tennessee (Thames 2020, p. 61).

Based on best available information from TCB radio-tracking studies, the TCB typically roosts, commutes, and forages within 1.5-miles of known roost trees (Veilleux et al. 2003, p. 1073; Leput 2004, p. 28; Helms 2010, p. 14; Wisconsin DNR 2017b, unpaginated; Wisconsin DNR 2018, pp. 8–11; Cable and Willcox 2024, p. 6), and we refer to this area as the colony home range (USFWS 2024a, p. 52). A 1.5-mile buffer encompasses 4,524 acres.

In the hibernating portion of their range, fall swarming near hibernacula occurs between the summer and winter seasons when male and female TCB converge at cave and mine entrances. Swarming sites play an important role in maintaining genetic diversity because mating and copulation occurs during swarming and because they attract members of multiple summer colonies. TCB disperse from winter hibernacula to summer roosting habitat in the spring. Female TCBs exhibit high site fidelity, returning year after year to the same summer roosting area (Allen 1921, p. 54; Veilleux and Veilleux 2004a, pp. 197–198; Poissant 2009, p. 57; Whitaker et al. 2014, pp. 51–52).

TCB maternity colonies are generally small, with groupings sometimes consisting of only a single female and her two pups. In Indiana, maternity colonies averaged 4.4 ± 2.4 bats (range: 1–8) (Veilleux and Veilleux 2004b, p. 62). TCBs switch roost trees regularly. In Indiana, 18 pregnant or lactating female tricolored bats monitored for an average of 9.1 days (± 1.7) used an average of 2.8 (± 1.7) roost trees and remained at roosts for an average of 3.9 (± 2.5) days (Veilleux et al. 2003, p. 1072). Young start flying at three weeks of age and achieve adult-like flight at four weeks of age (Lane 1946, p. 59; Whitaker 1998, pp. 654–655). As the maternity season progresses, colony sizes begin to fluctuate, females begin to disband soon after young became volant, and post-lactating females roost singly for the remainder of the summer (Veilleux and Veilleux 2004b, pp. 62–63).

4.2 SPECIES STATUS IN THE ACTION AREA

NLEB

The NLEB is found in 37 states in the eastern and north central United States, the District of Columbia, and eight Canadian provinces from the Atlantic Coast west to the southern Northwest Territories and eastern British Columbia. The NLEB is one of the species most impacted by white-nose syndrome. Due to declines caused by white-nose syndrome and continued spread of the disease, the NLEB was listed as threatened under the ESA on April 2, 2015 (80 FR 17974). In 2022, FWS completed a species status assessment (SSA) for the NLEB, which included a thorough review of the species' taxonomy, life history, and ecology (FWS 2022, entire). The SSA informed the FWS's proposal to reclassify the NLEB as endangered (87 FR 16442), which published on November 30, 2022, effective March 31, 2023 (88 FR 4908).

Although relatively common and locally abundant before WNS, the NLEB is now of conservation concern across its distribution. Although there are countless stressors affecting NLEB, the primary factor influencing the viability of the NLEB is white-nose syndrome, a disease of bats caused by a fungal pathogen. Other primary factors that influence NLEB's viability include wind energy mortality, effects from climate change, and habitat loss (FWS 2022, p. iii). Habitat loss may include loss of suitable roosting or foraging habitat, resulting in longer flights between suitable roosting and foraging habitats due to habitat fragmentation, fragmentation of maternity colony networks, and direct injury or mortality. Loss of or modification of winter roosts (i.e., making hibernaculum no longer suitable) can result in impacts to individuals or at the population level (FWS 2022, p. iv).

For additional information on the NLEB, including the SSA, visit: https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis.

TCB

The TCB's range includes much of the United States east of the Rocky Mountains, southern portions of four Canadian provinces from the Atlantic Coast west to the Great Lakes, and portions of Mexico, Guatemala, Honduras, Belize, and Nicaragua near the Gulf of Mexico. The TCB is one of the species most impacted by white-nose syndrome (WNS). Due to declines caused by WNS and continued spread of the disease, the FWS published a proposed rule to list the TCB as endangered (87 FR 56381) on September 14, 2022. In 2021, FWS completed a SSA for the TCB, which included a thorough review of the species' taxonomy, life history, and ecology (FWS 2021, entire). The SSA was updated in 2024 (FWS 2024b, entire).

Although relatively common and locally abundant before WNS, the TCB is now of conservation concern across its distribution. The primary stressors influencing TCB include WNS, wind related mortality, and habitat loss (FWS 2021, p. ii). Population declines of this species following WNS have been great, and risk of local extirpation has increased following introduction of the disease (Frick et al. 2015, p. 745). The greatest threat to this species is WNS. Wind related mortality of TCB is also proving to be a consequential stressor at local and regional levels. TCB are killed at wind energy projects primarily through collisions with moving turbine blades (FWS 2021, p. ii; Arnett et al. 2008, p. 64). Loss of roosting, foraging, and commuting habitat may lead to minor or significant impacts to TCB depending on

the timing, location, and extent of the removal. Loss or modification of winter habitats may also result in negative impacts to TCB, especially given the species' high site fidelity and narrow microclimate requirements for hibernation. Disturbance during hibernation results in increased arousals in TCB, which leads to increased energy expenditure at a time when food and water resources are scarce or unavailable.

For additional information on the TCB, including the SSA, visit: https://www.fws.gov/species/tricolored-bat-perimyotis-subflavus.

5 EFFECTS OF COVERED ACTIVITIES

This section covers the effects of the anticipated activities covered in this SA to the covered species (above). Where appropriate in our analysis, we make note of which activities are expected to have no effect on a species or critical habitat. This information is provided as helpful technical assistance to those agencies and project proponents who may be unfamiliar with the species and activities and can be incorporated by reference by action agencies when they make a NE determination.

The effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action but that are not part of the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action (50 CFR 402.02).

A project's action area must include all areas affected (i.e., modifications to land, air, or water) by the proposed action, and not merely the immediate area involved in the action. If the activities satisfy the two-part test for causation ("but for" and "reasonably certain to occur"), they should be considered as part of the action. To qualify for use of this SA, a project's action area must be wholly encompassed by the coverage area for this SA as described above and all activities within the proposed action must fit within the scope of the SA.

Qualifying actions typically involve one or more of the stressors addressed below. Effects of the action apply to both NLEB and TCB unless otherwise noted.

5.1 EFFECTS OF NOISE

5.1.1 Effects of Noise to Foraging and Drinking Bats

NLEB

Exposure to intense night-time noise could have adverse effects on NLEBs ability to use affected areas for foraging by impairing perception of sounds made by prey. Gleaning bats like the NLEB "rely on listening for prey rustling sounds to find food (i.e. `passive listening')" (Schaub et al. 2009, p. 3174). In a controlled study, greater mouse-eared bats – another gleaning species – were allowed to forage in silent chambers or those with three different noise treatments. The bats avoided areas exposed to sources of

intense noise, including that resembling noise of vehicle traffic (Schaub et al. 2009, p. 3179). The bats also avoided noise whose structure resembled vegetation noise, but at an intensity that may only occur during storms (Schaub et al. 2009, p. 3174). The "click-like" noise used in their study to resemble the noise of rustling vegetation may have impaired the bats' "perception of prey-rustling clicks" (Schaub et al. 2009, p. 3179). NLEBs are "active gleaners" – they glean but use echolocation to detect their prey (Faure et al. 1993). The authors concluded that their results suggested that foraging areas within 50 meters of highways and presumably also to other sources of intense broadband noise "are degraded in their suitability as foraging areas for the greater mouse-eared bat" and that the number of vehicles would affect the intensity of the degradation (Schaub et al. 2009, p. 3179).

Other sources of night-time noise, like loud music, can have a similar and distracting effects on foraging and also drinking (Domer et al. 2021, p. 499). Noise can distract bats and when attempting to forage in noisy areas they increase sonar pulses and are less successful in locating and capturing prey (Bunkley and Barber 2015, p. 1; Allen et al. 2021, p. 1). Noise effects on bat foraging and other behaviors will vary in relation to volume, proximity, and duration of noise. Effects from noise attenuates with distance; for example, two studies found no or insignificant effects of traffic noise to bats when bats were more than 50-150 meters (m) from the noise source (Schaub et al. 2009, p. 3179; Bonsen et al. 2015, p. 355). Pallid bats' foraging efficiency was reduced when exposed to "noise playbacks replicating acoustic conditions as far away as 640 m from a major road and 320 m from a natural gas compressor station bunk (Bunkley and Barber 2015, p. 1120).

In an experiment that exposed free-living bats to recorded traffic noise in England, *Myotis* species substantially decreased their activity in experimental areas where they were exposed to the noise (Finch et al. 2020, p. 4). They found no evidence of habituation across the approximately 2-3 month duration of the two study periods in 2017 and 2018 (Finch et al. 2020, p. 3-5). The lesser response to ultrasound compared to noise in the sonic spectrum indicated that the noise acted "through general deterrence and avoidance" as opposed to interfering with echolocation (Finch et al. 2020, p. 5). In Germany, successful foraging bouts decreased "and search time drastically increased" for greater mouse-eared bats (*Myotis myotis*) when exposed to noise intended to simulated conditions 7.5 meters from a road (Siemers and Schaub 2011, p. 1646). Similar results were found for pallid bats (*Antrozous pallidus*) "when exposed to played-back traffic and gas compressor station noise in the laboratory" (Bunkley and Barber 2015, p. 1116). Pallid bats are a gleaning species, a trait shared by the NLEB, and increased time needed to locate prey generated sounds by two- to threefold when exposed to both types of noise. Like the findings of Finch et al. (2020) for *Myotis* species, Luo et al. (Luo et al. 2015, p. 3278) found that noise acted as an aversive stimulus and did not mask prey echoes.

Some bats – for example, the piscivorous *Noctilio albiventris* – are versatile in their use of different pulse types and apply that versatility when "faced with noisy conditions" (Yantén et al. 2022, p. 6). This species increased feeding in response to traffic noise, presumably due to challenges in detecting and locating prey "under noisy conditions" despite their ability to vary the duration of their echolocation pulses (Yantén et al. 2022, p. 4).

TCB

Exposure to intense night-time noise could have adverse effects on TCBs ability to use affected areas for foraging by impairing use of echolocation or causing bats to abandon noisy feeding patches. Luo et al. (2015, entire) observed that bats reduced their foraging effort in conditions with traffic noise, even

when traffic noise did not overlap with prey echoes. Bats abandoned feeding patches immediately after the start of noise playback, suggesting that they are avoiding the noise itself.

Ambient noise influences the availability and use of acoustic information in animals in many ways. Anthropogenic noise emissions, such as urban and traffic noise, constitute a major source of ambient noise. Noise can obscure relevant acoustic signals to bats (Schaub et al. 2009, p. 3174). For bats that use echolocation to detect prey, the ability to detect the return of echolocation calls could potentially be reduced by high levels of ambient noise (Schaub et al. 2009, P. 3174). Studies suggest that noise from turbulent water could interfere with echo-based prey detection in bats that forage close to water surfaces (Rydell et al. 1999, p. 252; Schaub et al. 2009, p. 3179). Evidence also suggests that bats adjust echolocation call structure to avoid acoustic interference from ambient noise in their local environment (Schaub et al. 2009).

Other sources of night-time noise, like loud music, can have similar and distracting effects on foraging and drinking (Domer et al. 2021, pp. 499-500). Noise can distract bats and when attempting to forage in noisy areas they increase sonar pulses and are less successful in locating and capturing prey (Allen et al. 2021, pp. 4- 5). Noise effects on bat foraging and other behaviors will vary in relation to volume, proximity, and duration of noise. Effects from noise attenuates with distance; for example, two studies found no or insignificant effects of traffic noise to bats when bats were more than 54- 164 yards (y) [50-150 meters (m)] from the noise source (Bonsen et al. 2015, p. 347, 355). Pallid bats' foraging efficiency was reduced when exposed to "noise playbacks replicating acoustic conditions as far away as 700 y [640 m] from a major road and 350 y [320 m] from a natural gas compressor station bunk (Bunkley and Barber 2015, p. 1120).

In an experiment that exposed free-living bats to recorded traffic noise in England, *Myotis* species substantially decreased their activity in experimental areas where they were exposed to the noise (Finch et al. 2020, p. 5). They found no evidence of habituation across the approximately 2 to 3-month duration of the two study periods in 2017 and 2018 (Finch et al. 2020, p. 5). The lesser response to ultrasound compared to noise in the sonic spectrum indicated that the noise acted "through general deterrence and avoidance" as opposed to interfering with echolocation (Finch et al. 2020, p. 5). In Germany, successful foraging bouts decreased "and search time drastically increased" for greater mouse-eared bats (*Myotis myotis*) when exposed to noise intended to simulate conditions 8 yards [7.5 m] from a road (Siemers and Schaub 2011, p. 1650). Similar results were found for pallid bats (*Antrozous pallidus*) "when exposed to played-back traffic and gas compressor station noise in the laboratory" (Bunkley and Barber 2015). Pallid bats increased time needed to locate prey generated sounds by two- to threefold when exposed to both types of noise. Like the findings of Finch et al. (2020, entire) for *Myotis* species, Luo et al. (2015, p 3285) found that noise acted as an aversive stimulus and did not mask prey echoes.

Some bats – for example, the piscivorous *Noctilio albiventris* – are versatile in their use of different pulse types and apply that versatility when "faced with noisy conditions" (Yantén et al. 2022, p. 6). This species increased feeding in response to traffic noise, presumably due to challenges in detecting and locating prey "under noisy conditions" despite their ability to vary the duration of their echolocation pulses (Yantén et al. 2022, p. 4). Experimental studies done on the insectivorous bats *Antrozous pallidus* and *M. myotis* indicate that search time increases, and capture success is reduced when they are exposed to noisy conditions (Siemers and Schaub 2011, p. 1650). Since foraging under noisy conditions may affect bat activity, there are potentially missed foraging opportunities when bats decide to abandon

feeding patches due to frequent or chronic noise that interferes with the detection of signals or reduces the chance of detecting threats (Francis and Barber 2013, p 308).

5.1.2 Effects of Noise on Roosting Bats

Day-time noise produced during construction or implementation phases of actions and more permanently during operational phases could cause NLEBs or TCBs to respond adversely. Adverse responses could include increased exposure to predators, energy depletion, and physiological stress (Luo et al. 2014, entire). An individual's response to this stressor is dependent on the magnitude of the noise, the proximity of the individual to the source, and an individual's level of habituation to the stressor.

Day-time noise could cause NLEBs or TCBs to flush from roosts where they may face an increased risk of predation. Clutter-adapted gleaning species, like the NLEB may be particularly vulnerable to predators due to their typically low and slow flight (Mariton et al. 2023, p. 7).

Exposure to day-time noise while roosting can result in stress that leads to physiological and psychological changes that impact eating habits. Chronic noise, defined as noise over a timescale of multiple days, can impact how bats perceive the level of threat and lower the ability to communicate through acoustic signals. This may result in increased energy expenditures related to anti-predator behavior or vocalization (Song et al. 2020, p 1922). Song et al. (2020, p. 1915) exposed Asian particoloured bats to a recording made at a bridge and played back at an intensity intended to mimic exposure roosting in crevices of the bridge. The exposed bats fed and weighed more and had a higher concentration of thyroid hormones (Song et al. 2020, p. 1922). The authors concluded that increased feeding was probably a result of the stress response to the noise and noted that weight gain is an expected result of a physiological stress response.

Several bat species roost in places that are exposed to loud anthropogenic noise. Nearly all bats are most sensitive to frequencies greater than 10 kHz, which is much higher than the frequencies in anthropogenic sounds (Luo et al. 2014, p. 1072). There is experimental evidence that bats can habituate quickly to exposure to "repeated and prolonged noise" when in torpor, but that they become more sensitive to noise as torpor progress towards night (Luo et al. 2014, p. 1074). The type of noise that they are exposed to can also impact the level of disturbance that bats experience. Luo et al. (2014, p. 1073) observed that traffic noise was less disturbing than colony or vegetation noise for torpid bats. Traffic noise has the most energy below 5 kHz, which falls outside the range where bats have the most hearing sensitivity. Sensitivity to noise frequency range may impact bats reactivity levels to different anthropogenic noises.

Some bat species, like the greater mouse-eared bats, may commonly roost where they are exposed to noise – e.g., in church towers near loud bells and in highway bridges (Schaub et al. 2009, p. 3178). These areas may remain useful for roosting, however, due to the short duration and low frequency of church bell use and by roosting in the structure of bridges where "high frequency components of traffic noise will be strongly attenuated" (Schaub et al. 2009, p. 3178).

5.1.3 Sources of Chronic or Intense Anthropogenic Noise

In addition to vehicle traffic, sources of chronic or intense anthropogenic noise that have been found to cause adverse effects in wild terrestrial organisms include compressor stations (Kleist et al. 2018); large concentrations of humans (i.e., crowds; Duarte et al. 2011, p. 840); military training (vehicles, aircraft,

and encampments, Gese et al. 1989, p. 338); and low-altitude jet aircraft (Maier et al. 1998, pp. 761-763). Other potential sources of adverse anthropogenic noise include oil and gas extraction, construction, and mining (Jerem and Mathews 2021, entire)**.**

5.2 Effects of Artificial Lighting

Artificial lighting at night can fluctuate depending on location, with light pollution tending to be highest in urban areas and lower in rural areas. Natural environments have approximately 0.1 to 0.3 lux illuminance on a night with a full moon. In contrast, artificial light produced from a typical shopping center can be about 200 times more than a full moon at 20- 30 lux (Falchi et al. 2011, p. 2716).

Lighting may deliver both costs and benefits to individual bats, making the net impact difficult to estimate. Avoidance of areas with artificial light may result in increased energy expenditure and reduced opportunity to forage (Stone et al. 2012, p.2464). Bats may react to changes in the amount of light due to predation risk, changes in spatial orientation abilities, or prey availability in the area (Polak et al. 2011, p. 25). Artificial lighting may result in changes in the use of established flight routes and delaying commuting behavior (Stone et al. 2009, p. 1125). Open-air flying species have been observed to emerge and start to feed as insect abundance starts to decline, suggesting that factors other than insect abundance, such as prevailing light level, are impacting foraging behavior (Rydell et al. 1996, p. 249). Exposure to visual predators (e.g., owls) may be greater when light levels are higher (Rydell et al. 1996, p. 249). In response, bats may fly faster when light levels are higher to reduce risk of capture (Polak et al. 2011, p. 25).

Some bat species use vision for prey capture. Vision may improve when artificial light is present, which may improve a bats ability to orient in these conditions (Polak et al. 2011. p. 25). Bat species that are fast flying may be attracted to white lights due to the high numbers of insects near light sources (Blake et al. 1994; Stone et al. 2009, p. 1125). Insect density tends to be higher under illumination. In addition to light attracting large numbers of insects (Perkin et al. 2014), white streetlights appear to impair the ability of nocturnal insects (particularly moths) to hear bat calls and show evasive flight maneuvers (Polak et al. 2011, p. 25; Stone et al. 2012, p. 2462).

Projects that incorporate certain conservation measures that will limit the ‘spill’ of light into habitat suitable for the NLEB and TCB will qualify for predetermined NLAA determinations in the key. Studies have suggested that tree cover can mitigate the impacts of artificial light at night. In England, *Myotis* species remained active near lit areas as long as the experimental light treatments were blocked by a hedge, “indicating that good management of light spill, can mitigate disturbance to” these bats (Zeale et al. 2018, p. 5915). Straka et al. (2019, p. 8) observed that bat activity was higher in areas with tree cover when artificial light was present.

<u>NLEB</u>

Bat species such as the NLEB that fly late at night, forage in narrow spaces, and that are adapted for “flight within cluttered vegetation” are consistently found to avoid or reduce activity in areas lit artificially (Threlfall et al. 2013; Pauwels et al. 2019, p. 1; Voigt et al. 2021). As a clutter-adapted, gleaning (picking insects from surfaces) species, we presume NLEB would also be characterized as a “late species.” Late species tend to be “gleaning or flutter-detecting” clutter-adapted species with a prey base that are abundant throughout the night (Threlfall et al. 2013; Mariton et al. 2023, p. 7). This presumed

tendency is consistent with NLEB activity patterns analyzed by Gorman (2023, p. 41). Artificial light can delay onset of nightly activity in these "late species", which are active mostly during the darkest hours (Mariton et al. 2022; 2023). Late species are also typically slow flyers, which may be vulnerable to predation at higher light levels (Lacoeuilhe et al. 2014, p. 7).

Numerous studies involving bat species like the NLEB suggest that artificial light could reduce the suitability of an area for foraging and cause them to avoid lit areas. In North Carolina, NLEBs were never recorded at sites with bright artificial light at night (Li et al. 2024, p. 9). In Connecticut, lighting negatively affected little brown bat activity and decreased their use of a lit wetland for foraging (Seewagen and Adams 2021, p. 5640). In England, activity of *Myotis* species declined significantly under orange, white, and green light – impacts of red light were also negative, but not significantly so (Zeale et al. 2018, p. 5912). In France, lighting had a significant negative effect on *Myotis* species activity whether the lighting was on for the entire night or for only partial nights (Azam et al. 2015, p. 4336-4337). In Italy, bat activity declined at lit sites "mainly due to the response of the most abundant species, *Myotis daubentonii*" (Russo et al. 2019, p. 1671). In France, lighting intensity had mixed effects on bats, but the effect was significantly negative for *Myotis* species (Lacoeuilhe et al. 2014, p. 3). The light-negative species included aerial hawking and primarily gleaning bats, the two foraging habits used by NLEBs – no gleaning bat species were among light-tolerant species (Lacoeuilhe et al. 2014, p. 4). In the Netherlands, feeding of pond bats (*M. dasycneme*) was reduced by 60% on nights when they were exposed to artificial light versus dark control nights (Kuijper et al. 2008, p. 37). In England and Wales, experimental exposure even to low levels of LED lights reduced activity of *Myotis* species (Stone et al. 2012, p. 2458).

Citing Azam et al. (2018) and Pauwels et al. (2019), Schroer et al. (2020, p. 11) stated that "The behavior of light-sensitive bats can be impaired within the radius of up to 50 m distance to the light source, even if the luminance level is as low as 1 lux" (lx). Azam et al. (2018, p. 130) actually detected streetlight avoidance at values <u>below</u> 1 lux[3] by *Myotis* species and Serotine bat (*Eptesicus serotinus*) at 50 m from a streetlight (Azam et al. 2018, p. 123). They did <u>not</u> detect avoidance at 100 m and recommended "separating streetlights from ecological corridors by at least 50m and to limit vertical light trespass on vegetation to less than 0.1 lx to allow their effective use by light-sensitive bats" (Azam et al. 2018, p. 130).

<u>TCB</u>

Streetlights can have a positive impact on the feeding abilities of some bat species by concentrating a large number of insects in a small space (Acharya and Fenton 1999, p. 32; Jones and Rydell 2003, p. 331). The responses of bats to lighting are species-specific and can be influenced by flight morphology and type of flight (Rydell 1992, p. 744; Rowse et al. 2016, p. 187). Fast-flying aerial hawking species, similar to TCB, have been observed feeding around streetlights suggesting light-tolerance. Slow-flying bats that forage in more confined spaces, like NLEB, are often light-averse (Rowse et al. 2016, p. 200). As artificial lighting became common, bats have routinely been observed feeding near lights (Acharya and Fenton 1999, p. 1999; Rowse et al. 2016, p. 196). However, Li et al. (2024, p. 6) observed that TCB

[3] A lux is "a unit of illumination equal to the direct illumination on a surface that is everywhere one meter from a uniform point source of one candle intensity or equal to one lumen per square meter" ("lux," Merriam-Webster.com Dictionary, https://www.merriam-webster.com/dictionary/lux. Accessed 1/11/2023).

forraging activity was approximately 4 times higher at sites without artificial night lighting than at sites with artificial light at night, suggesting that TCB show higher activity levels in dark areas.

Illuminated streets and roads have been found to be frequently used as feeding sites by insectivorous bats (Blake et al. 1994, p. 453). Impacts on bats and insects depend on the light spectra associated with streetlamps with ultraviolet wavelengths attracting the most insects (Rowse et al. 2016, p. 187). Blake et al. (1994) found that roads with white streetlamps attracted three times more foraging bats (mostly *Pipistrellus pipistrellus*) than roads with orange streetlamps or unlit roads.

Studies have observed certain species being attracted to artificial light while foraging, including common pipistrelle (*Pipistrellus pipistrellus)* (Blake et al. 1994. p. 406) and northern bats (*Eptesicus nilssoni)* (Rydell 1991, p. 206). Li and Wilkins (2022, p. 829) recorded more acoustic activity and increased foraging rates for big brown bats (*Eptesicus fuscus*), red bats (*Lasiurus borealis*) and silver-haired bats (*Lasionycteris noctivagans*) as artificial light levels increased. Cravens and Boyles (2019, p. 72) observed that red bats are more likely to be observed foraging around lights, while other species avoid lit areas. In southern Sweden, Rydell (1992, p. 744) observed fast-flying species that use long-range echolocation systems (*Nyctalus noctula*, *Vespertilio murinus*, *Eptesicus nilssonii* and occasionally including *Pipistrellus pipistrellus)* were regularly foraging around streetlamps, while *Myotis* spp. did not. In this study, the energy intake of *E. nilssonii* feeding around streetlamps was more than twice as high than when feeding in woodlands (Rydell 1992, p. 744).

The time of evening emergence for bat species may reflect the light level that is tolerated by the bat (Jones and Rydell 1994, p. 452). TCB emerge early in the evening and feed in relatively open habitats, foraging at treetop level or above (Davis and Mumford 1962, p. 397; Barbour and Davis 1969, p. 116) but may forage closer to ground later in the evening (Mumford and Whitaker 1982, p. 170). They exhibit slow, erratic, fluttery flight while foraging (Fujita and Kunz 1984, p. 4) and commonly forage with eastern red bats (*Lasiurus borealis*) and silver-haired bats (*Lasionycteris noctivagans*) (Davis and Mumford 1962, p. 397; Mumford and Whitaker 1982, p. 169). Despite their small size, TCB foraging behavior may have more similarities to larger tree bats than to *Myotis* bats. In a study of managed pine forests in North Carolina, TCB presence was positively related to edges, while *Myotis* species were negatively related to edges (Morris et al. 2010, p. 31). Bats in the genus *Myotis* consistently foraged within stand interiors and avoided edges.

Artificial lighting may result in changes in the use of established flight routes and delaying commuting behavior (Stone et al. 2009, p. 1125). Open-air flying species have been observed to emerge and start to feed as insect abundance starts to decline. This suggests that factors other than insect abundance, such as prevailing light level, are impacting foraging behavior (Rydell et al. 1996, p. 249). Exposure to visual predators (e.g., owls) may be greater when light levels are higher (Rydell et al. 1996, p. 249). In response, bats may fly faster when light levels are higher to reduce risk of capture (Polak et al. 2011, p. 25).

Although artificial lighting may provide an opportunity to forage in areas of concentrated insect activity, it may also delay the timing of emergence for open-air flying species like TCB. Studies suggest that open-air flying species do not time evening emergence with the peak of insect activity, instead they emerge later in the evening while insect abundance is declining, and light levels are lower (Rowse et al. 2016, p. 206). For *Pipistrellus pygmaeus*, artificial lighting was found to delay roost emergence, but also to

provide foraging locations (Hale et al. 2015, p. 2468). Emerging later in the evening may provide open-air flying bat species some protection from diurnal predators (Rydell et al. 1996, p. 249).

An increase in night-time artificial light may result in a delay in foraging, which can cause foraging bats to miss the peak abundance of insects. As a result, TCB exposed to artificial light at night may not meet their energy requirements leading to a potential reduction in fitness (Rowse et al. 2016, p. 206). Foraging accounts for the largest proportion of energy use for pregnant and lactating bats and these energy requirements may account for the low proportion of energy spent on tissue production and milk production compared to small terrestrial mammals (Kurta et al. 1989, p. 816). As a result, if artificial lighting creates a mismatch between emergence and peak insect abundance, impacts may be highest to pregnant or lactating females who have increased energetic demands (Cravens and Boyles 2019, p. 70). For *Pipistrellus pygmaeus*, artificial lighting was found to delay roost emergence, but also to provide foraging locations (Hale et al. 2015, p. 2468).

TCB may be less likely to avoid lit areas when foraging and commuting than NLEB. As a result, TCB are less likely to use additional energy attempting to avoid lit areas and artificial light may be less likely to result in negative impacts to foraging suitability. However, artificial light may influence direct impacts to TCB because of the location of the light. Blake et al. (1994, p. 234) showed that for every 1-km section of road, the mean number of bat flight passes was positively correlated with number of white streetlamps as well as to the number of trees and hedgerows. This suggests that bats may be selectively foraging near white streetlamps, which are likely to be positively correlated with proximity to roads. In these cases, bats that are attracted to white streetlamps to forage may be spending more time foraging near roads, and therefore, be at higher risk of collision with road traffic.

Although artificial lighting may have a positive impact on foraging for some bat species, it has been shown to reduce the commuting activity of bats. Stone et al. (2012, p. 2464) showed that disturbance from lights along commuting routes can result in species-specific responses and can vary based on the type of lighting used. The fitness consequences of changes to commuting behavior are hard to quantify. In some instances, artificial lighting is not sufficient to change commuting behavior but is enough to deter crossing, which may reflect perceived predation risk from crossing a gap with higher light levels (Hale et al. 2015, p. 2475). Avoidance of lit areas may cause increased energetic costs, which could impact individual fitness and reproduction.

5.3 Loss and Degradation of Aquatic Resources

NLEBs and TCB may be affected by a reduction in stream length over which they forage and by a reduction in habitat available for aquatic insects. Water quality degradation, because of increased sedimentation during construction, could reduce the densities of aquatic insects that bats consume. Bats may have to fly farther to access foraging resources. Actions that will directly impact streams likely require a permit or authorization from the U.S. Army Corps of Engineers conditioned with Best Management Practices (BMPs) to minimize sedimentation onsite and downstream. We expect the effects of sedimentation of aquatic resources to be temporary and minimal due to the scale of qualifying actions, the temporary nature of the activity, and the use of the BMPs.

5.4 Tree Cutting, Loss of Roost Trees

For the purposes of this DKey, tree removal is defined as tree cutting or other means of knocking down or bringing down trees, tree topping, or tree trimming. When tree removal or tree cutting is used, it should be interpreted to mean cutting, or other means of knocking down or bringing down trees, tree topping, or tree trimming.

5.4.1 Northern Long-Eared Bat and Tricolored Bat Roost Trees

NLEB

NLEBs roost in live trees and snags (standing dead trees) ≥3 inches DBH that have exfoliating bark, cracks, crevices, and/or cavities; however, maternity roost trees are typically larger (≥ 9 in DBH). NLEBs typically roost singly or in maternity colonies underneath bark or more often in cavities or crevices of both live trees and snags (Sasse and Pekins 1996, p. 95; Foster and Kurta 1999, p. 662; Owen et al. 2002, p. 2; Carter and Feldhamer 2005, p. 262; Perry and Thill 2007b, p. 222; Timpone et al. 2010, p. 119). Roosting habitat is typically within the forest interior and away from edge habitat. NLEBs select roosts to optimize thermal conditions and so preferences for tree species and roost characteristics (e.g., live versus dead; canopy position and solar exposure, etc.) vary with difference in ambient temperatures based on weather and climate (Patriquin et al. 2016, p. 53). NLEBs typically roost singly or in maternity colonies underneath bark or more often in cavities or crevices of both live trees and snags (Sasse and Pekins 1996, p. 95; Foster and Kurta 1999; Owen et al. 2002, p. 2; Carter and Feldhamer 2005, p. 262; Perry and Thill 2007b, p. 222; Timpone et al. 2010, p. 119; Silvis et al. 2015, p. 758). Individual trees may be considered suitable roosting habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of forest.

NLEBs are flexible in tree species selection and while they may select for certain tree species regionally, likely are not dependent on certain species of trees for roosts throughout their range; rather, many tree species that form suitable cavities or retain bark will be used by the bats opportunistically (Foster and Kurta 1999, p. 668; Silvis et al. 2016, p. 12; Hyzy 2020, p. 62). Carter and Feldhamer (2005, p. 265) hypothesized that structural complexity of habitat or available roosting resources are more important factors than the actual tree species. Further, Silvis et al. (2012, p. 7) found forest successional patterns, stand and tree structure to be more crucial than tree species in creating and maintaining suitable long-term roosting opportunities. To a lesser extent, NLEBs have also been observed roosting in colonies in human-made structures, such as in buildings, in barns, on utility poles, behind window shutters, in bridges, and in bat houses (Mumford and Cope 1964, p. 72; Barbour and Davis 1969, p. 77; Cope and Humphrey 1972, p. 9; Burke 1999, pp. 77–78; Sparks et al. 2004, p. 94; Amelon and Burhans 2006, p. 72; Whitaker and Mumford 2009, p. 209; Timpone et al. 2010, p. 119; Bohrman and Fecske 2013, pp. 37, 74; Feldhamer et al. 2003, p. 109; Sasse et al. 2014, p. 172; USFWS 2015, p. 17984; Dowling and O'Dell 2018, p. 376).

TCB

TCB predominantly roost in the foliage of deciduous hardwood trees. TCB roost singly or in small groupings. Roosts are often in clusters of live and dead foliage of live and recently dead trees or broken branches that retain dead leaves. Single dead oak leaves may also serve as roosting sites for lone males (Perry and Thill 2007a, p. 977). Live-leaf roosts are typically dense in structure but occasionally exhibit only a few leaves serving as shelter (Veilleux et al. 2003, p. 1071). Other important roost substrates

include Spanish moss (*Tillandsia usneoides*) and beard lichen (*Usnea trichodea*) (Jennings 1958, p. 23; Davis and Mumford 1962, p. 395; Menzel et al. 1999, p. 191; Shute et al. 2021b, p. 467; Poissant 2009, p. 36; Poissant 2010, p. 374; Quinn and Broders 2007, p. 7). Occasional summer roosts include clusters of dead pine needles of large live pines (*Pinus echinata*), live branches of Norway spruce (*Picea abies*), abandoned gray squirrel (*Sciurus carolinensis*) nests, and under the pealing bark of live birch trees (*Betula spp.*) (Veilleux et al. 2003, p. 1071; Perry and Thill 2007a, p. 977; Wisconsin DNR 2016, p. unpaginated; Wisconsin DNR 2017a, p. 6; Wisconsin DNR 2017b, p. unpaginated; Wisconsin DNR 2018, p. 8).

TCBs roost in a variety of tree species, especially oaks (*Quercus* spp.), and often select roosts in tall, large diameter trees, but will roost in smaller diameter trees when foliage is present (e.g., 4-inch [10-centimeter]; Leput 2004, p. 32). TCBs commonly roost in the mid to upper canopy of trees although males will occasionally roost in dead leaves at lower heights (e.g., < 16 feet [5 meters] from the ground; Perry and Thill 2007a, p. 979) and females will occasionally roost in Spanish moss of understory trees (Menzel et al. 1999 p. 191). TCBs may roost and forage in forested areas near anthropogenic structures and buildings (e.g., suburban neighborhoods, parks, etc.) (Helms 2010, p. 11; Shute et al. 2021a, p. 973). Highly developed urbanized areas generally devoid of native vegetation (including isolated trees surrounded by expansive anthropogenic development), however, are considered unsuitable habitat (e.g., parking lots, industrial buildings, shopping centers).

TCBs exploit a diversity of forest types, and roost sites have been located in mixed pine-hardwood stands in southwestern Nova Scotia (Quinn and Broders 2007, pp. 19–24; Poissant et al. 2010, p. 374); upland hardwood, riparian hardwood, and bottomland hardwood forests in west-central Indiana (Veilleux et al. 2003, pp. 1071–1073); fragmented woodlots in central Indiana (Helms 2010, pp. 4–5); hardwood-dominated forests in Kentucky and Tennessee (Schaefer 2016, pp. 40–48; Thames 2020, pp. 32–34; Zirkle 2022, pp. 18–20); hardwood-dominated and mixed pine-hardwood forests in Arkansas (Perry and Thill 2007a, pp. 976–978); upland hardwood and cove hardwood forests in southwestern North Carolina (O'Keefe et al. 2009, pp. 1760–1761); upland cove hardwood, pine-hardwood, and pine-dominated forests in western South Carolina (Leput 2004, p. 28); bottomland hardwood in west-central South Carolina (Carter et al. 1999, p. 5); mixed oak-pine stands and oak stands along the Georgia coast (Menzel et al. 1999, pp. 187–192); and mixed pine–hardwood forests, maritime forest, and bottomland forest in the southern coastal plain of South Carolina (Shute et al. 2021b, pp. 467–470).

Female TCBS exhibit site fidelity to summer roosting areas, returning year after year to the same locations (Allen 1921, p. 54; Veilleux and Veilleux 2004a, pp. 197-198; Poissant 2009, p. 57; Whitaker et al. 2014, pp. 51-52). Given TCB primarily roost in leaves, TCB roosts are considered a common (non-limiting) resource in forested landscapes and highly ephemeral. Silvas et al. (2016, p. 38) stated, "virtually nothing is known about the effects of roost loss on TCBs," but concluded that effects of roost loss would "limited, given their preference for an abundant and highly ephemeral roosting resource (i.e., foliage that lasts for days to weeks rather than years)." TCBs switch roost trees regularly (Veilleux et al. 2003, pp. 10972-1073; O'Keefe et al. 2009, p. 1760; Poissant 2009, pp. 56-58) and are likely well-adapted to shifting roosts when their current roosts are no longer suitable (e.g., leaves fall off trees during wind/storm events). In forest-dominant landscapes, individuals will not have to expend a significant amount of energy to locate new roosts if their current roosts are lost. In areas where forest is more limited, however, we are less certain of potential effects to TCB from the removal of suitable roost trees.

5.4.2 Avoiding Effects of Roost Removal in Occupied Habitat during the Active Season

NLEB

Because NLEBs typically roost in cavities, cracks, or under bark, removing an occupied roost tree may harm or kill adult and flightless young that may not be able to safely exit the roost. In addition, this may increase the risk of day-time predation compared to TCBs due to differences in roosting ecology. To avoid direct effects to NLEBs while they are roosting in trees, suitable roost trees[4] will only be removed in habitat that may be inhabited by the NLEB during the timeframe when the species is not likely to be present unless site-specific information (e.g., survey) demonstrates probable absence from the Action Area. In addition to avoiding direct effects to NLEB from suitable roost tree cutting, potential indirect effects will be avoided by limiting the amount of habitat removed.

In summer use areas, time of year restrictions are applied during the summer occupancy season to avoid direct effects to the NLEB. This period is longer than TCB restrictions, which are focused on the pup season, because NLEBs may be less likely to flush as easily or effectively as TCBs given their differences in roosting ecology (i.e., propensity to form larger colonies, remain in colonies longer, and roost in tree cracks/crevices). Ultimately, the chance that NLEBs may be adversely affected by tree removal activities outside the summer occupancy activity period (or winter torpor in Zone 1) is discountable since individuals are more likely to roost singly or in smaller groups during this time, and the dispersed nature greatly reduces the risk. When NLEBs are roosting individually or in smaller groups, it is easier for bats to flush (respond by flying away) when disturbed.

TCB

To avoid direct effects to TCB from suitable roost tree cutting, suitable roost trees will not be cut during timeframes when flightless young are present (i.e., pup season), during spring staging and fall swarming near hibernacula, and when TCB are in torpor when temperatures are below 40 degrees F in areas where TCB do not hibernate. Within 3.0 miles of known TCB hibernacula, time of year restrictions when cutting will include the pup season, spring staging, and fall swarming. Spring staging and fall swarming are added to the time of year restrictions in these areas because bats are concentrated in the areas around known hibernacula and temperatures at these times of years are more likely to be below 40 degrees F, where bats may go into torpor. If trees are cut when bats are in torpor, they are less likely to arouse in time to safely exit their roost location. In addition to avoiding direct effects to TCB from suitable roost tree cutting, potential indirect effects will be avoided by limiting the amount of habitat removed.

We expect TCBs capable of flight to flush from roosts when physically disturbed. For example, while monitoring a maternity colony with a spotting scope, Veilleux (2022, pers. comm.) observed TCBs flush from their roost when disturbed by strong winds. Strong thunderstorms arrived in late afternoon (at least two hours prior to the time TCBs would typically be emerging for their nightly foraging). The wind "violently" shook the leaf cluster, with the leaf cluster "crashing" into neighboring branches and

[4] Examples of habitats that are *not* suitable for the northern long-eared bat include: 1) individual trees that are greater than 1,000 feet from suitable forested/wooded areas; 2) individual trees in predominantly unforested, developed portions of urban areas (e.g., street trees, downtown areas, scattered yard trees); and stands of trees or shrubs less than 3-inch dbh that do not contain larger trees.

consequently, TCBs flushed from the roost. Arguably, the wind from the thunderstorm simulated what we might expect to happen when a tree is felled (e.g., shaking the leaf cluster) and in this case, the bats responded by flushing and presumably found alternative cover because they returned to the same leaf cluster the following day. We also do not expect additional risk of predation after flushing given TCB are likely more adapted to day-time roost flushing and can find cover quickly, especially compared to NLEB. Ultimately, the chance that TCBs may be adversely affected by tree removal activities outside the pup season activity period (or winter torpor in Zone 1) is discountable since TCB individuals that are capable of flight are expected to be able to flush when disturbed and switch roosts regularly.

While adult TCBs are capable of flushing during tree cutting, removal of occupied roosts when flightless young are present (i.e., pup season) may result in direct injury or mortality. Young that are not capable of flight cannot independently flush from a falling tree. Female TCBs typically have two pups and during the first few nights after birth females carry pups (Lane 1946, p. 60). When disturbed, adult females will "carry much larger young" (Lane 1946, p. 60). Although mothers can carry/move young, pups may ultimately become too heavy to move as they grow, especially in the haste of escaping a falling roost tree. To avoid direct effects to TCB, suitable roost trees will not be cut when flightless young are present unless site-specific information (e.g., survey) demonstrates probable absence from the Action Area.

5.4.2.1 Avoiding Effects of Roost Removal during Spring Staging and Fall Swarming

Within the hibernating portion of the range (Figure 3), bats spend the winter season hibernating in caves, then emerge in the spring to migrate back to their summer roosts in trees. NLEB and TCB are emerging from hibernation during the spring. At this time, NLEB and TCB will have their lowest fat reserves, and will be concentrated in trees near hibernacula while they forage in preparation for spring migration (i.e., spring staging). In the fall, there is a period of increased activity (including mating) near hibernacula prior to hibernation, and like spring staging, NLEB and TCB will be concentrated in trees near hibernacula (i.e., fall swarming).

To avoid direct effects to NLEB and TCB, in addition to avoiding tree cutting during the summer occupancy season and pup season respectively, suitable roost trees will not be cut during spring staging and fall swarming within 5.0 miles of hibernacula entrances for NLEB and within 3.0 miles of hibernacula entrances for TCB. Spring staging and fall swarming are added to the time of year restrictions in these areas because bats are concentrated in the areas around known hibernacula and temperatures at these times of years are more likely to be below 40 degrees F, where bats may go into torpor. If trees are cut when bats are in torpor, they are less likely to arouse in time to safely exit their roost location.

5.4.2.2 Avoiding Effects of Roost Removal when Bats are in Winter Torpor

NLEB and TCB in the southern portion of the range exhibit shorter torpor bouts and remain active and feed year-round. During the winter in the year-round active portion of the range, NLEB and TCB have been observed to be active and roosting in trees year-round. In addition to roosting in trees, NLEBs and TCBs have been observed roosting in culverts (most often) and bridges (less common). TCB will also roost in cavities in live trees, live and dead leaf clusters, and/or Spanish moss (Sandel et al. 2001, pp. 174–176; Newman et al. 2021, pp. 1335–1336).

To avoid effects to NLEB and TCB in torpor and roosting in trees during cold winter temperatures, in addition to avoiding tree cutting during the summer occupancy and pup season, respectively, suitable roost trees will not be cut during winter torpor (December 15 and February 15) within Zone 1 of the

year-round active range. This additional TOYR does not apply in Zone 2 of the year-round active range because the time periods when winter temperatures drop below 40 degrees F are likely to be limited and brief. As a result, the tree cutting TOYRs are limited to the summer occupancy period for NLEB and the pup season for TCB, which are the most vulnerable timeframes. We recognize NLEB and TCB use torpor at other times of the year, especially during cooler spring and fall weather; consequently, protections are in place to avoid effects to TCB during spring staging and fall swarming.

5.4.3 Avoiding Indirect Effects from Tree Cutting and Roost Removal

Bats will shift roosting and foraging areas over time in direct response to habitat loss (Whitaker et al. 2004, pp. 157–159; FWS 2011, pp. 14–16). Effects of roost tree removal to NLEB and TCB will likely vary depending on the amount of removal and remaining alternative roosts for bats to shift. We must consider whether and to what degree the anticipated habitat alteration will alter the quantity and character of roosting habitat available to NLEB and/or TCB within their home range. If suitable roost trees become limiting after loss of roosting habitat, adverse fitness consequences are possible (e.g., increased energetic costs caused by longer flights between roosting and foraging areas). Consequently, potential impacts would likely be reduced if an adequate extent of suitable roost habitat is maintained within the traditional maternity colony's home range (i.e., roost trees used before the habitat loss occurs), particularly in forest-limited areas where there is less habitat for colonies to shift. Adverse impacts are more likely in areas with little forest or highly fragmented forests (e.g., western U.S. and central Midwestern states), as there is a higher probability of removing roosts or causing loss of connectivity between roosting and foraging habitat (FWS 2021, FWS 2022).

To determine whether forest loss within NLEB and TCB home range areas effect individual bat fitness, we elicited expert opinion from a multidisciplinary team of experts following widely accepted best practices in planning, preparing, eliciting, and synthesizing expert judgments (Szymanski and Gilbert 2023, entire). Expert input was elicited using facilitated discussion and asking experts to first provide their lowest and highest reasonable estimates for the variable in question, followed by their level of confidence that the true value of the variable falls within their stated range (lowest to highest values), and lastly, the most likely (best) estimate.

Specifically, experts were asked what percentage of forest in a NLEB or TCB colony home range area can be removed without negative impacts occurring to an individual bat when assuming a landscape and home range with varying amounts of forest cover (e.g., 5, 15, 25, 35, 50, and 75 percent forest cover). A negative impact was defined as impaired fitness of an individual NLEB or TCB (experts were told negative impacts do not need to rise to the level of direct mortality). Fitness impairments could include: 1) using roosts that do not provide thermal conditions conducive to energy conservation by adults or young affecting, for example, the ability of lactating females to maximize milk production; or 2) increasing energetic costs caused by longer flights between roosting and foraging areas due to fragmentation of remaining forest patches. Forest removal refers to cutting of trees suitable for roosting followed by replacement with non-forest land cover types (experts were told to assume the forest removal was permanent). Finally, experts were told to assume direct impacts (e.g., injury or death) would be avoided by avoiding suitable roost tree removal during the summer occupancy season for NLEB and during the pup season for TCB. We assumed tricolored bats capable of flight will avoid direct impacts by flushing from trees before being killed or injured. Pups will not be capable of flight during the

pup season. For both NLEB and TCB, tree removal should be avoided during spring staging/fall swarming periods near hibernacula, and when NLEB or TCB are exhibiting prolonged torpor due to cold temperatures in Zone 1 of the year-round active portion of the range.

As expected, there was a clear positive relationship between the amount of forest loss that can occur without fitness consequences and the amount of forest within a hypothetical NLEB or TCB home range (Figure 4).

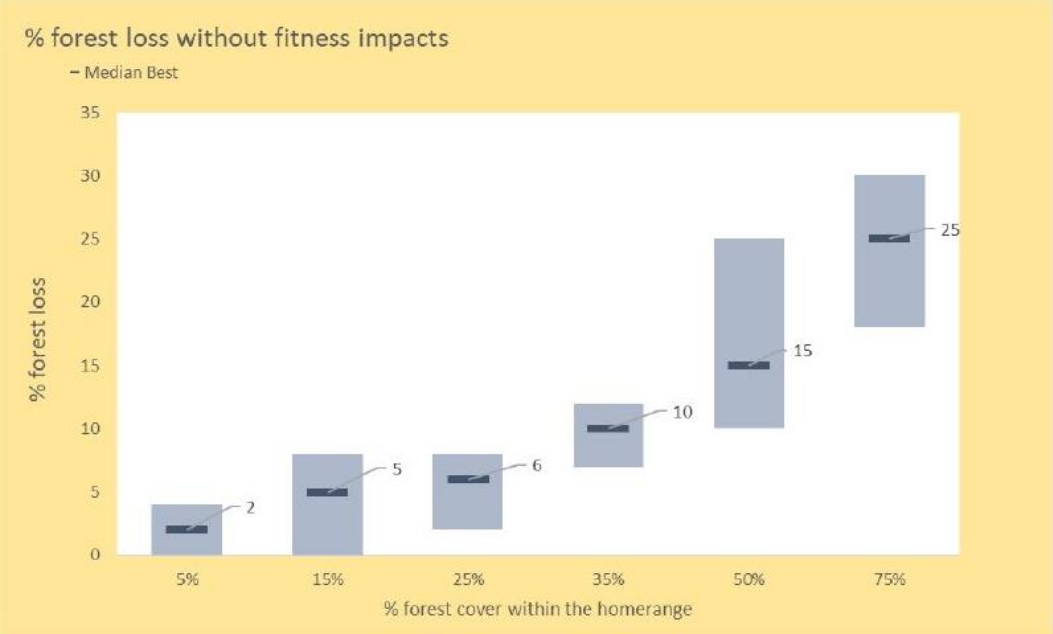

Figure 4. Median estimates of forest loss that can occur without negative impacts incurred. Box represents median lowest (bottom of box), median best (dash line), and median highest (top of box) estimates. X-axis represents the percent forest cover within the hypothetical TCB home range (source: Figure 2, Szymanski and Gilbert 2023).

Based on the expert's median best estimates of forest loss[5] and our knowledge of the home range size for NLEB and TCB, to avoid effects to NLEB and/or TCB, forest removal will not exceed the following number of acres in each of 4 forest density categories. As described above, we assumed a 4,524-acre home range for the NLEB and TCB. Forest cover was measured as the average forest cover within 5x5 km grid cells (National Land Cover Database, Dewitz 2019, entire). Projects will be eligible for a predetermined consultation outcome of NLAA if the tree cutting occurs outside the time of year restrictions and acreages are less than or equal to 0.5 acres for the 0- 9.9% category, 5 acres for the 10-19.9% category, 40 acres for the 20-29.9% category or 100 acres for the 30- 100% category.

These thresholds also apply within 5 miles of a known hibernaculum in the hibernating range. In addition, qualifying actions will not remove trees within 0.5-mile of a known NLEB hibernaculum. Some trees used in the fall by swarming bats may be removed while they are unoccupied. The limited studies on roosting habitats of NLEBs in fall have shown that roost switching occurs every two to three days

[5] Experts were asked the same forest loss question for NLEB; consequently, the expert's median best estimates were slightly lower for NLEB. For the combined NLEB/TCB DKey, we relied on the input for NLEB (i.e., the more conservative estimates) and applied the results for both NLEB and TCB tree removal thresholds.

(Kiser and Elliot 1996; Gumbert et al. 2002). The conservation measures limit the number of potential roost trees that may be removed, making it unlikely that any action would remove a significant portion of trees used during fall swarming. In addition, NLEB will also roost in the hibernacula during spring staging and fall swarming.

5.4.4 Avoiding Effects from Tree Trimming, Limbing and Cutting within a Currently Maintained Utility Corridor

Currently maintained utility ROW corridors are defined as a strip of land of varying widths that may contain any utility provider lines, systems, infrastructure or other facilities. Utility distribution structures could be composed of underground pipelines or utility lines, above-ground transmission towers and utility lines, or other structures associated with the distribution of utilities. The area within the utility ROW that we are considering for the purposes of this SA is the portion of the ROW that is routinely maintained, through mowing, brush and shrub removal to be a relatively open area with low vegetation. Maintained utility ROW corridors generally have very little woody vegetation within the maintained corridor but may have an established edge where the open habitat transitions to trees. In some cases, the legal ROW or easement extends into forested areas, but for the purposes of this SA, we are considering the maintained utility ROW to end at the forested edge. Maintained utility corridors range from 50 – 200 feet depending on the size of the pipeline, utility pole or tower infrastructure. Many rights-of-way contain more than one underground pipeline or utility and can be wider depending on the number of infrastructure assets located within the maintained corridor.

For NLEBs, the TOYR applied to tree cutting, trimming and limbing within a maintained utility ROW corridor allows additional cutting due to unique aspects of NLEB biology associated with the forest habitat located along established edges of maintained utility corridors. NLEBs are a forest-interior species (Caceres and Pybus 1997). Roosting and foraging habitat are typically within closed intact forest stands (Sasse and Perkins 1996; Foster and Kurta 1999; Lacki and Schwierjohann 2001; Owen et al. 2002). When available, NLEBs will use narrow lines of trees to move between forest patches to avoid crossing open fields and may “rarely venture more than a few meters from forest” (White et al. 2017, p. 8). Maintained utility ROWs often mimic open fields due to the removal of trees and shrubs and consistent maintenance performed to create an early successional habitat. As a result, NLEB individuals are unlikely to be found roosting within trees on the edges of routinely maintained utility ROW corridors as long as tree trimming, limbing or cutting is limited to trees within the established footprint of the ROW, with no tree cutting conducted to expand the established footprint. In the rare chance that a NLEB may be roosting in a tree along the edge of an established ROW, the implementation of a TOYR to avoid tree cutting, limbing or trimming during the pup season would provide an opportunity for volant NLEBs to rouse and flush from the tree before cutting.

TCBs may be more likely to be found roosting along established forest edges than NLEB because they are not as closely tied to forest interior. However, we expect TCBs capable of flight to flush from roosts when physically disturbed (see Section 5.4.2). As a result, the TOYR applied to TCB are equivalent to those applied for all tree cutting, trimming or limbing activities, without regard to the activity location.

In summer use areas and year-round active Zone 2, TOYR are applied to avoid direct effects during the pup season for both NLEB and TCB. In year-round active Zone 1, the winter torpor activity period is added to the pup season TOYR. The spring staging and fall swarming activity period TOYR are implemented within 5.0 miles of NLEB hibernacula and within 3.0 miles of TCB hibernacula.

The tree cutting acreage thresholds described in Section 5.4.3 will not apply within an established and maintained utility ROW. Utility ROW corridors are linear in nature and to qualify for additional conservation measures under this activity, tree cutting, limbing or trimming must occur within the footprint of the established and maintained utility corridor within the ROW without expanding that footprint. Tree cutting, trimming, and/or limbing conducted within these linear corridors is less likely to intersect with a NLEB or TCB home range, and if intersect, will impact a smaller portion of the home range. Impacts of limited tree limbing or trimming are unlikely to make entire trees unsuitable as roosts for TCB or NLEB. Tree cutting may result in the removal of a number of potentially suitable roosts trees for TCB, however, TCB capable of flight are expected to be able to switch roosts without adverse fitness consequences. NLEB are not expected to utilize trees along the established edge of a maintained utility ROW corridor as roost trees, therefore, they are unlikely to experience adverse fitness consequences as a result of tree removal in these locations.

5.5 Effects to Northern Long-Eared and Tricolored Bats using Bridges or Culverts

The following is adapted from the FWS' *Programmatic Biological Opinion for Transportation Projects in the Range of the Indiana Bat and Northern Long-Eared Bat* – as revised in 2024.

5.5.1 Occurrences of Bats in Transportation Structures

Twenty-four of the 45 U.S. species of bats have been documented using bridges, culverts, and other structures as artificial roosts (Keeley and Tuttle 1999), including Indiana bats, NLEBs and TCBs. Bats roosting in bridges during the day are often found in expansion joints and other crevices, in contrast, night bat roosts are often found in open areas between support beams that are protected from the wind (Keeley and Tuttle 1999). NLEBs have been documented using bridges in at least five states: Illinois (Feldhamer et al. 2003), Louisiana (Ferrara and Leberg 2005), Iowa (Benedict and Howell 2008), Tennessee (J. Griffith, FWS, pers. comm. 2014), and Mississippi (McCartney et al. 2024); culverts in at least five states: Indiana (Indiana (R. McWilliams, FWS, pers. comm. 2023), Oklahoma (Martin, K. pers. comm. 2005), Mississippi (McCartney et al. 2024), Missouri (Droppelman 2014), and Tennessee (J. Griffith, FWS, pers. comm. 2014). TCBs have been documented using bridges in at least three states: Louisiana (Ferrara and Leberg 2005), South Carolina (Newman 2020), and Minnesota (Christopher E. Smith, MnDOT, pers. comm. 2023), and culverts in southeastern states along the Gulf of Mexico and Atlantic coastlines. TCBs have been documented using bridges in at least four states: Louisiana (Ferrara and Leberg 2005), North Carolina (Susan Cameron, FWS, pers. comm), South Carolina (Newman 2020) and Minnesota (Christopher E. Smith, MnDOT, pers. comm. 2023), and culverts in southeastern states along the Gulf of Mexico and Atlantic coastlines.

NLEBs and TCBs have been found using bridges, including the following types of bridges: parallel box beam, pre-stressed girder, cast-in-place, and I-beam. Feldhamer et al. (2003) surveyed 232 bridges in southern Illinois and found four species of bats using 15 bridges. NLEBs comprised 3 percent of the bats found and TCBs comprised 18.4 percent of the bats found. In Louisiana, Ferrara and Leberg (2005) documented 7 NLEBs and 79 TCBs, during 902 bridge surveys, which were conducted from 2002 to 2003. TCB represented 4% of total bats detected, while NLEB represented 0.4% of total bats detected. Of 53 bridges surveyed at night, only 15 percent were occupied, and the only species was Rafinesque's big-eared bat (*Corynorhinus rafinesquii*) (i.e., the 7 NLEBs and 79 TCBs detected were using the bridges as day roosts). However, Kiser et al. (2002) reported NLEBs using bridges as night roosts as well. Analysis of guano in 2023 at a bridge in northern Indiana found NLEB DNA (R. McWilliams, FWS, pers. comm. 2023).

Of the 37 bridges visited in Benedict and Howell's study in 2005 and 2006 in Iowa (Benedict and Howell 2008), two NLEBs were found under two different concrete bridges (one was a lactating female; the sex of the other was not clear in the report). Also, a NLEB bachelor colony using a timber bridge was found in Iowa in 2013 (K. McPeek, FWS, pers. comm. 2014) At about the onset of WNS-associated declines in Minnesota, two bridges, including one being used as a maternity roost, were documented to have NLEBs in 2017 and 2018. NLEBs have not been verified using these two bridges since 2018 (Christopher E. Smith, MnDOT, pers. comm. 2023).

Katzenmeyer (2016) conducted a comprehensive assessment of transportation structures in Mississippi between November and March from 2010 to 2015. Although neither Indiana bats nor NLEBs were observed, the survey recorded five other bat species and their abundance in 16 caves and 214 culverts. Over the five-year period, 3,789 roosting bats were recorded in caves and 16,812 were detected in culverts, with TCBs most abundance in culverts. Southeastern myotis (*Myotis austroriparius*) was most abundant in caves, with TCBs second most abundant. More recently, as part of the 2023 Mississippi Bats and Bridges Initiative, 113 culverts and 33 bridges were surveyed in seven Mississippi counties from late August – October. Twenty-nine culverts and three bridges were occupied by NLEBs (representing a 26 percent and 9 percent occupancy rate respectively out of the total number of culverts/bridges surveyed) in six counties (McCartney et al. 2024). A total of 76 NLEBs were documented in the 29 culverts and three bridges, with 18 of the culverts containing one individual each. Thirteen of the sites contained two – five individuals each and one site (a bridge) contained 17 individuals.

In Missouri, a bat survey conducted for a mine tailings impoundment associated with the Brushy Creek Mine in Reynolds County documented two NLEBs using a 250 ft (76.2 m) long corrugated metal culvert pipe for roosting. This pipe culvert carries Lick Creek under County Road 908 and is 9 ft in diameter (Droppelman 2014). The survey results in Tennessee have indicated that NLEBs have showed no preference in roosting sites. In addition to bridges and culverts, the survey documented NLEBs in barns, porches, mobile homes, and telephone poles when potential roost trees were nearby and available (J. Griffith, FWS, pers. comm.). Data collected across the state of North Carolina show no evidence that NLEBs are using culverts in the state, though most surveys, until recently, were limited to culverts measuring 5 ft tall by 200 ft long. The following species were documented using culverts as roosting sites in North Carolina: gray bat, southeastern bat (*M. austroriparius*), TCB, big brown bat, Mexican free-tailed bats, and Rafinesque's big-eared bat. Further, five survey efforts for NLEBs in bridges and culverts in Eastern North Carolina have failed to detect the species roosting in these structures.

Visual diurnal and nocturnal surveys of selected culverts (>36-in diameter) were conducted along Dry Creek/Daytown Road in Delaware County, Oklahoma, on September 16, 2005. A solitary male NLEB was noted in one culvert (CD17) located in the northern portion of the project. No other bats were noted during the surveys (Martin, K. pers. comm. 2005). Additional assessments from 2010 through 2023 in 10 counties in Oklahoma have found NLEBs, TCBs, cave myotis, big brown bats, and gray bats roosting in culverts (P. Crawford, ODOT, pers. comm.)

TCBs utilize both bridges and culverts in many parts of the range, and they have been detected in both structure types at all times/seasons of the year. Bridges do not appear to be commonly used as hibernation sites throughout much of the range, although some states have detected TCBs in weepholes/plugged drains in the winter, on the edges of metal under decking, and occasionally in expansion joints. In the southern portion of the range where TCBs exhibit shorter torpor bouts and

remain active and feed year-round, most states have reported that TCBs are more common in culverts than bridges overall, but especially in the winter. Several other states have reported TCBs hibernating in culverts extensively, with rare instances of culvert use in the summer. However, most surveys are biased to colder months.

On cooler days, tree cavities are consistently colder than bridges due to poor insulation, and trees may pose a greater freezing risk than bridges to bats. TCBs that used tree roosts did so on warmer days, but often switched to bridges on cooler days. The daily mean temperature of tree roosts when occupied was 11 +/- 4.6 degrees Celsius (C) in accessible tree cavities, with temperature fluctuations of and 4.0 +/- 1.9 degrees C (Newman et al. 2021, p. 1335). Bridges likely were warmer than cavities during cold periods as a result of solar radiation and concrete's high thermal mass. Therefore, bridges could provide predictable microclimates for TCBs to use during periods of increased freezing risk (Newman et al. 2021, p. 1337).

TCBs usage of nontraditional roost sites such as bridges and cavities can vary with ambient temperatures and among roost structures (Newman et al. 2021). TCBs hibernating in Texas culverts are believed to select roosts based on microclimate (Meierhofer et al. 2022) and potentially proximity to other roosts and suitable summer habitat (Sandel et al. 2001). Meierhofer et al. (2022) suggested ambient weather conditions, including humidity, determine occupancy of culverts by TCBs. In culvert hibernacula in Texas, maximum and minimum temperatures ranged from -6 to 27 degrees C for 1995–1996 and -1 to 29 degrees C for 1996–1997 (Sandel et al. 2001, p. 175). TCBs were more likely to be present in culverts at lower elevations and lower temperatures (Meierhofer et al. 2019, p. 1276).

TCBs along the southeastern Gulf of Mexico and Atlantic coastlines exhibit different strategies in the winter when compared to northerly parts of their range, often roosting in roadway culverts in the states of North Carolina (Katherine Etchison, FWS, pers. comm. 2023); South Carolina (J.B. Kindel, South Carolina Department of Natural Resources, pers. comm. 2023); Georgia (Ferrall 2022; Lutsch 2019); Alabama (Jessica Anderson, unpublished data 2022); Florida (Lisa Smith, unpublished data 2022); Mississippi (Cross, 2019; Katzenmeyer 2016); Louisiana (Nikki Anderson, Louisiana Department of Wildlife and Fisheries, pers. comm. 2023); and Texas (Meierhofer et. al 2022, 2019; Sandel et. al 2001). A study in South Carolina also indicated that TCBs overwintering in bridges display skin temperatures similar to short-term torpor bouts rather than traditional hibernation.

Ferrara et al (2005) studied bridge use by bats in north-central Louisiana and reported that TCBs were rarely observed during the summer but represented approximately 5 percent of the bats during winter (November to March). Colony abundance in culverts can exceed 1,000 individuals, as observed in Mississippi and Texas, but other states report many, low abundance colonies at a high occupancy frequency, as observed by Ferrall (2022) in Georgia, with winter culvert occupancy rates of 32 percent (N=369) and as high as 52 percent in Mississippi (Katzenmeyer 2016). Considering the high exposure of culvert, tree, and bridge roosts during winter months, this behavior appears to be limited to areas with mild winters and few frost days. Generally, winter roosting in these exposed areas is contained within zones where mean minimum temperatures for December through February are generally warmer than 35-40 degrees F (1.7-4.4 degrees C) with some large culvert roosts located within 50-100 kilometers north of this zone. The TCB year-round active range (Figure 3) was defined by a team of FWS biologists,

where bat data was available, by cross-referencing documented "winter" activity (e.g., captures, acoustics, and culvert use) with the number of frost-free days >/= 200 (https://fws.maps.arcgis.com/home/item.html?id=edd2f5723d3a47df9c71ac8ddbf8f277). In the absence of bat data, the team of FWS biologists relied on the best information available from states with data and more loosely followed the number of frost-free days line (see Section 2.0).

5.5.2 Bridge/Culvert Characteristics

Many studies have documented the characteristics of bridges and culverts being used as artificial roosts by bats, to determine roosting potential. Kiser et al. (2002) identified bridges built with concrete girders being used by Indiana bats and NLEBs to range from 45.9 to 223 ft (14 to 68 m) in length, and 26.2 to 39.3 ft (8 to 12 m) in width. All the bridges were over streams and all but one bridge was bordered by forested, riparian corridors connected to larger forested tracts. The riparian forest was within 9.4 to 16.4 ft (3 to 5 m) of the bridges. Traffic across the bridges ranged from less than 10 vehicles per day to almost 5,000 vehicles per day.

In Keeley and Tuttle's (1999) study, most bat species using artificial roosts chose concrete structures with crevices that were sealed at the top, at least 6-12 in deep, 0.5 -1.25 in wide, 10 ft or more above the ground, and typically not located over busy roadways. The Feldhamer et al. 2003 study reported an average height for 9 of the roosts of 16.7 ft (5.1 m) above the ground. They did not note if any species showed a preference for a bridge type, or if any maternity or bachelor colonies were discovered.

Cleveland and Jackson (2013) reported bats (species unreported) roosting in 55 of 540 bridges examined in Georgia. Bats were found in 78 percent (43 of 55 roost bridges) of roost bridges with transverse crevices, but only 7.2 percent (4 of 55 roost bridges) were found in roost bridges with parallel crevices and 7.2 percent (4 of 55 roost bridges) of roost bridges with a combination of transverse and parallel crevices. All roost bridges either spanned water or were within 0.62 miles (1 km) of water. Roost bridges had open flyways with at least 6.56 ft (2 m) under their roost.

Ormsbee et al. (2007) noted that the largest numbers of night-roosting bats are often located in the warmest chambers of bridges, which tend to occur at either end and are located over land. Whereas central chambers over water are less suitable (as a result of greater exposure to air currents and convective heat loss) for night-roosting. Adams and Hayes (2000) also reported higher occupancy in end chambers than center chambers. Feldhamer et al. (2003) reported that when occupied bridges in Southern Illinois spanned flowing water, areas of the bridge that were occupied by bats were situated over land. However, the 2023 Mississippi Bats and Bridges Initiative survey documented three bridges occupied by the NLEB that were cement prestressed girder structures located over relatively wide rivers (> 100 ft) that are tributaries to the Mississippi River, with two of the bridges located over the same river four miles apart.

An evaluation of 44 culverts in the Netherlands determined lowest height and cross-sectional area amenable to bats are 0.4 m (1.3 ft) and 1.2 m^2 (3.9 ft^2), respectively (Boonman 2011). Also, 15 box culverts along Interstate Highway 45 in southeast Texas documented southeastern bat, , TCB, and big brown bat in culverts varying 1.2 – 2.2 m (3.9-7.2 ft) height, 1.2-1.8 m (3.9-5.9 ft) width, and 60-120 m (197-394 ft) length, commonly with standing water and entranceway vegetation (Smith and Stevenson 2015). In New Mexico, 2016 unpublished data from Smith and Stevenson documented minimum culvert heights of 0.6 m (2 ft) and .93 m (3 ft) for *Myotis* spp. and *Corynorhinus townsendii*, respectively.

The Katzenmeyer (2016) study of 214 culverts in Mississippi documented 111 of the culverts (smallest size being 30 ft [9.14 m] long and 2 ft [0.61 m] tall) being used for winter roosting by five different bat species: Rafinesque's big-eared bat, southeastern myotis, big brown bat, TCB, and Brazilian free-tail bat. All five species were detected in culverts as short as 109 ft (33.4 m) long, but only TCBs were found in smaller culverts (smallest being 30 ft [9.14 m] long and 2 ft [0.61 m] tall). The culverts occupied by NLEB in the 2023 Mississippi Bats and Bridges Initiative survey were all cement box culverts ranging in length from 40 – 400 ft long and 2 – 12 ft high and wide.

A July 2014 survey in Missouri found two NLEBs in a culvert with an entrance measuring approximately 9 ft in diameter and a Google Earth length estimate of 250 ft (76.2 m) (Droppelman, 2014; L. Droppelman, Eco Tech, pers. comm. 2022). Winter 2014 surveys in Louisiana by Richard Steven documented NLEBs in seven concrete tube and box culverts ranging in size from 4.5 ft to 10.5 ft (1.36 m to 3.2 m) tall and 131 ft to 476 ft (40 m to 145 m) long. NLEBs co-occurred in these culverts with southeastern myotis, TCBs, Rafinesque's big-eared bat, and big brown bats (Nikki Anderson, unpublished data, March 23, 2022). The Louisiana Department of Wildlife and Fisheries has surveyed more than 1,000 culverts over three winters and found TCBs in 21 percent of them. Summer surveys of a much smaller number of culverts found the species in about 4 percent of surveyed culverts. The shortest length culvert occupied by TCBs was 23.3 ft (7.1 m) long and 5 ft (1.52 m) tall (Nikki Anderson, unpublished data, March 24, 2022).

In 2020, the U.S. DOT Volpe National Transportation Systems Center (Volpe Center), on behalf of Federal Highway Administration, in collaboration with the FWS, conducted an analysis of bridge/culvert and structure bat assessment forms that had been uploaded through the Information for Planning and Consultation (IPaC) system between 2016-2019. Data were also provided by Georgia Department of Natural Resources from assessment forms across the state. The information from both sources was combined to create a "bats in structures assessment form database" that contains a total of 2,378 assessments. Evidence of bats (all species) was observed at 260 (11%) of these structures (see Table 3). Where evidence of bats was observed, 184 structures (71%) included information on the species present (Table 4). While Indiana bats and NLEBs have been observed using bridges and culverts, none were reported in this analysis[6]. However, TCBs were documented as a species found using both bridges and culverts.

Table 1. Evidence of Bats in Bridges and Culverts (2015-2019)

Structure Type	Total Bat Evidence Entries	% of Total Bat Evidence Entries	% of Structure Type with Bat Evidence	Total No Bat Evidence Entries	% of Total No Bat Evidence Entries
Bridge (total=1,148)	84	32%	7.3%	1,064	50%
Culvert (total=689)	140	54%	20.3%	549	26%
Unknown (n=541)	36	14%	6.7%	505	24%
Total:	*260*	*100%*		*2,118*	*100%*

[6] Not all Transportation Agencies identify the bat species when bat occupancy or signs of bat use are observed.

Table 2. Bat Species Identified from Volpe's Bats in Structures Assessment Form Database

Bat Species Name	Bat Species Acronym	# of Database Entries Identifying the Species
tricolored bat (*Perimyotis subflavus*)	PESU	101
southeastern myotis (*Myotis austroriparius*)	MYAU	64
big brown bat (*Eptesicus fuscus*)	EPFU	45
Mexican or Brazilian free-tailed bat (*Tadarida brasiliensis*)	**TABR**	**11**
Rafin'sque's big-eared bats (*Corynorhinus rafinesquii*)	CORA	7
gray bat (*Myotis grisescens*)	MYGR	5
eastern red bat (*Lasiurus borealis*)	LABO	2
little brown bat (*Myotis lucifugus*)	MYLU	1
evening bat (*Nycticeius humeralis*)	NYHU	1
	Total:	*237*

An additional analysis was conducted using the bats in structures assessment form database to assess how culvert size might influence the presence of bats. Of the 689 culverts assessed, 154 (23 percent) were associated with culvert size data, and—of those—53 indicated presence of bats (see Table 1 for more detail). Where evidence of bats was observed in culverts with a reported height, 100 percent also reported species information; as noted above, none of the species identified included Indiana bat or NLEB. TCBs were documented at 25 of the 53 culverts with presence of bats. Of the 53 culverts with bat use, the minimum culvert height was 2 ft (0.60 m) (one culvert), and the maximum was 9 ft (2.74 m). TCBs were found in the minimum and maximum culvert heights. Only three culverts of the 53 with evidence of bats were $\leq$3 ft (0.91 m) in height (southeastern myotis and TCB); three culverts were less than 4 ft (1.22 m) in height (southeastern myotis and TCB); the remaining 47 culverts with documented use of bats were $\geq$ 4 ft (1.22 m) in height (southeastern myotis, TCB, Rafinesque's big-eared bat, and gray bat).

Table 3. Culvert assessments with size data.

Culvert Assessment	Size Information Included?	Number of Culverts	Percent of Total
No Evidence of Bats	No	448	65%
No Evidence of Bats	Yes	101	15%
Evidence of Bats	No	87	13%
Evidence of Bats	Yes	53	8%
Total:		*689*	*100%*

Table 4. Evidence of Bats in Culvert with Reported Size.

Culvert size class (reported height)	Culverts with No Evidence of Bats	Culverts with Evidence of Bats	Percent of Size Class with Evidence of Bats	Total number of Culverts	Percent of Total
Under 4ft	34	6	15%	40	26%
4ft and above	67	47	41%	114	74%
Total:	*101*	*53*		*154*	*100%*

TCB surveys conducted in January, February, April, and August 2023 along 2.6 miles of road in Caldwell County, North Carolina, in the Grandfather Ranger District, Pisgah National Forest included an assessment of 29 culverts. Several culverts were made of dry-stacked rock/stone that are estimated to be about 100 years old. Some of these had collapsed inlets creating a cave/mine like environment. The inlet in others was retrofitted with a reinforced concrete pipe (RCP) to maintain water flow and function. The rest of the culverts were corrugated metal pipes (CMPs) or CMPs retrofitted with RCP inlets.

Of the 29 culverts assessed, 7 culverts contained TCBs in winter torpor across 7 survey dates in January - April. Six of the 9 stone culverts were occupied by TCBs. Only one of the 20 CMPs/RCPs were occupied by TCBs. Within the 6 stone culverts, 1-2 TCBs were observed. In the 7th CMP/RCP culvert, 12 TCBs were observed. The study documented that bats were awake and moving during some portion of the time between January 5 and January 24, 2023. The culvert that contained 12 bats in January 2023 still contained 3 TCBs on April 11th, some still apparently in winter torpor. Four of the winter occupied culverts along with four culverts not occupied in the winter were assessed in August 2023; no bats or signs of bat use were detected.

The largest entrance height in each occupied culvert ranged from 27'' to 56''. The smallest entrance heights of occupied culverts were as short as 10'' or were collapsed all together. Occupied culvert lengths varied from 36 to 83 ft. The CMP/RCP combo pipe containing 12 TCBs (9 TCBS on the CMP and 3 TCBSs on the RCP) was 83 ft long; its largest entrance, though only 29'' under field conditions due to fill and water, was a 3 ft diameter CMP/RCP. This culvert had limited airflow potentially due to a smaller inlet opening measuring 10'' by 24''.

Bektas et al. (2018) assessed 517 bridges in Iowa for evidence of bat roosting. The study showed that physical bridge characteristics alone could not be used to distinguish bat roost potential. Land cover and bat species distribution data combined with physical bridge characteristics help identify structures with the higher probability of bat roosting.

The data compiled from the publications above identifies culverts with day roosting bats to range from 1.3 ft (0.4 m) (Boonman, 2011) to 10 ft (0.4m – 3m) (Keeley and Tuttle, 1999) in height. However, the bat species identified varied widely and thus likely the wide range in size characteristics. Also, the Volpe Center analysis revealed only 15% of culverts (6 culverts) under 4 ft (1.2 m) had evidence of bat use, with neither Indiana bats nor NLEBs identified. Only 3 of the 6 culverts under 4 ft (1.2 m) had evidence of TCBs, only 1 of which was <3 ft (0.9 m).

Culverts less than 4.5 ft (1.2 m) in diameter/height and shorter than 23 ft (7.01 m) in length will be considered unlikely to provide suitable roosting habitat for the NLEB; and culverts less than 3 ft (0.9 m) in diameter/height and 23 ft in length will be considered unlikely to provide suitable roosting habitat for the TCB. TCBs have been documented in culverts as small as 2 ft in diameter (as reported above); however, instances of TCB in culverts this small are expected to be rare and present a potential safety concern for regular assessments. Thus, an assessment will not be required for culverts that do not meet the minimum diameter/height and length standard (refer to the FWS's current survey guidance for minimum culvert dimensions for determining NLEB and TCB suitability).

Until further data can rule out low bridges as potential roost sites, it is not possible to exclude them from requiring an assessment. Additionally, excluding broad categories of bridges based on their physical characteristics such as their composition does not seem feasible. It is possible that bridge

roosting characteristics change over time as concrete may begin to spall, which would in turn provide roosting sites. Smith and Stevenson (2016) further support the idea that the physical characteristics described by Keeley and Tuttle (1999) are a set of ideal characteristics and not a list of definitive criteria required by bats for roosting.

There may be instances where a bridge/culvert or structure bat assessment fails to initially identify NLEBs, or TCBs but later in time, prior to or during construction, these bats are observed. Also, NLEBs and TCBs may unexpectedly roost in smaller culverts than the minimum standard. In both situations, adverse effects (including harm, death or injury) to these bats may occur; therefore, project proponents required to cease activity that could result in take of the covered bat species and notify the local FWS Field Office within two working days of the discovery to determine how to proceed.

5.6 Effects of Roads

5.6.1 Risk of Collisions with Vehicles

Roads pose a risk of vehicle collisions for the NLEB, TCB and at least some other imperiled bats, although documenting roadkill is difficult, and a combination of factors influence the magnitude of the risk. Important factors include traffic volume and noise, proximity of the road to roosting and foraging sites, and vegetation height near the road. In at least one case, the threat of roadkill to an imperiled bat species prompted a collaboration between biologists and highway engineers to evaluate how the species crossed a highway, to and install safe crossing points (Wray et al. 2006).

Bats may be killed or injured if they collide with vehicles when traveling between roosting and foraging areas, and possibly during migration. Collision risk to bats varies depending on time of year, location of the road in relation to roosting and foraging areas, the characteristics of their flight, traffic volume, and whether young bats are dispersing (Lesinski 2007, Lesinski 2008, Russell et al. 2009, Bennett et al. 2011). In the Czech Republic, Gaisler et al. (2009) noted most bat fatalities were associated with a road section between two artificial lakes. Lesinski (2007) evaluated road kills in Poland and determined that the number of young-of-year bats killed was significantly higher than adults. Also, low-flying gleaners (*M. daubentonii*) were killed more frequently than high-flying aerial hawkers (*N. noctula*). Foraging behavior for the NLEB is hawking and gleaning (Brack and Whitaker 2001; Fenton and Bogdanowicz 2002, Ratcliffe and Dawson 2003, Feldhamer et al. 2009). TCBs exhibit slow, erratic, fluttery flight while foraging (Fujita and Kunz 1984). Some bat species choose to forage near streetlamps that emit ultraviolet light (white lamps). Bats are attracted to roads by lights independently of adjacent trees or houses (Blake et al. 1994). Lesinski et al. (2011) indicated that a review of previously published literature on factors causing bats to be killed at roads is not consistent and therefore it is difficult to predict exact sites where bats may be at risk.

Kerth and Melber (2009) studied barbastelle bats (*B. barbastellus*) and Bechstein's bats (*M. bechsteinii*) and found that roads restricted habitat accessibility for bats, but the effect was related to the species' foraging ecology and wing morphology. Foraging ecology of gleaning and woodland species was more susceptible to the barrier effect than high-fliers that feed in open spaces (Kerth and Melber 2009).

Russell et al. (2009) noted that when bats crossed at open fields, they flew much lower than canopy height (<2 m), and when adjacent canopy was low, bats crossed lower and closer to traffic. The NLEB forages at lower heights (3 to 10 ft [1 to 3 m]) than Indiana bats (6.5 to 98 ft. [2 to 30 m]) (FWS 2014).

Observations of TCBs report they emerge early in the evening and forage at treetop level or above (Davis and Mumford 1962, p. 397; Barbour and Davis 1969, p. 116), but may forage closer to ground later in the evening (Mumford and Whitaker 1982). To minimize bat collision, several studies suggested maintaining canopy connectivity across the road by restoring or establishing commuting routes (treelines, hedgerows) (Wray et al. 2006, Bennett and Zurcher 2013).

In Europe, efforts to study, design, and test measures to minimize bat roadkill seem to be common relative to the U.S. (e.g., Sołowczuk and Kacprzak 2022). Although risk of bat roadkill, in general, appears to be higher at locations with greater traffic volume (Fensome and Mathews 2016, p. 319), bat roadkill has been detected on roads with as few as 1,100 vehicles per day (Vuk et al. 2014) and bat roadkill is likely to occur even on unpaved roads. Ramalho et al. (2021) did not find bat carcasses along the dirt roads they surveyed but suspected that bat-vehicle collisions on dirt roads are "especially underestimated" due to low carcass detectability. The difficulty of finding bat carcasses may result in significant underestimates of roadkill of NLEB, TCB and other bats (Russell et al. 2009, p. 57).

The risk of vehicle collisions for NLEBs may be highest when forest suitable for foraging or roosting is present along both sides of a road and where traffic volume is not too high to discourage crossing (see Roads as Barriers to Commuting Bats, next section). Risk of collision appears to increase where canopy connectivity has been disrupted and there are no safe bat commuting routes across the road/rail corridor, or where bats use streams as travel corridors across roadways/railways. Collision risk may also be higher in areas with extensive existing road/rail networks where bats have few options but to cross roads/rails to reach their foraging areas.

In Pennsylvania, Indiana bats and little brown bats flew through or along the edge of forest when approaching a highway and fewer bats crossed where canopy cover was "lacking adjacent to the highway" (Russell et al. 2009, p. 49). The use of wooded corridors by Indiana bats were consistent with a study in Michigan where Indiana bats "did not fly over open areas" (Murray and Kurta 2004, p. 203). In France, increasing distance to trees and decreasing tree height were associated with a decrease in bat density at roads (Roemer et al. 2021, p. 1).

We are not aware of highway crossing studies like that of Russell et al. (2009) for the NLEB, but we would also expect NLEBs to remain under, within, or along the edge of forest when near roads. NLEBs are tied heavily to closed canopy and interior forest (Henderson and Broders 2008, p. 952, Pauli et al. 2017, p. 879). Tall canopy on both sides of the road may provide safe places for NLEBs to cross if the distance is not too great. Where the tree canopy was high (>20m), bats crossed well above traffic. Where it was low (≤6m), they crossed the highway lower and closer to traffic and were more likely to be struck by vehicles (Russell et al. 2009, p. 55). Based on their observations, Russel et al. (2009, p. 58) concluded that bats would fly from one high canopy to another without descending to vehicle height as long as the canopy to canopy crossing distance was 20 meters or less.

5.6.2 Roads as Barriers to Commuting Bats

Bats' avoidance of vehicle noise and vehicles themselves could result in roads becoming a barrier, restricting access of commuting bats to foraging habitats (Zurcher et al. 2010, p. 339). Bennett et al. (2011) indicated that three main road characteristics contribute to the barrier effects of roads: traffic volume, road width, and road surface. Roads with very few vehicles and only two lanes had little effect on Indiana bat movement (Bennett et al. 2013). Zurcher et al. (2010) concluded that bats perceive

vehicles as a threat and were more than twice as likely to reverse course if a vehicle was present than if it was absent. Berthinussen and Altringham (2012) found that bat activity and diversity was lower closer to roads, but that activity and diversity increased where there was continuity in trees and hedgerows. Simulations of bat activity based on Indiana bat data in related to road networks founds that roads with only moderate traffic volume (e.g., >10 vehicles/5-minutes) may act as "filters" where vehicle collisions may be the primary concern whereas those with high traffic volume (>200 vehicles/5-minutes) act as barriers to movement (Bennett et al. 2013, p. 979). For comparison, traffic volume at the time of the highway-crossing study discussed in the previous section was about 8,569 vehicles per day – about 30 vehicles/5-minutes (Russell et al. 2009, p. 58). Searches of a 5.5 mi section over a year's time documented 35 killed bats of at least 6 species, including 6 NLEBs and 4 TCBs (Russell et al. 2009, p. 58). In this study the road did not function as a barrier – but as a partially permeable filter.

NLEBs are likely to avoid or reduce time spent foraging near roads depending on the intensity of noise on the roads, which depends in part on traffic volume (Schaub et al. 2009, p. 3179). When vehicles were present, 60% of documented Indiana bats exhibited avoidance behavior, reversing course at an average of 10 m from automobiles, suggesting that bats perceive vehicles as a threat and are more likely to cross roads with low traffic volume (Zurcher et al. 2010, p. 337). Well-established major roads have been proven to have significant long-term negative impacts on bat populations such as a decline in species diversity and overall decline in bat activity (to a distance of at least 1-6 km) near roadways (Berthinussen and Altringham 2012, p. 88). The decline in activity and diversity of bats was only mitigated by roadsides where there was increased continuity in habitat including hedgerows and tree cover lining both sides of the road (Berthinussen and Altringham 2012, p. 85). Roads restricted habitat accessibility for barbastelle bats (*Barbastella barbastellus*) and Bechstein's bats (*Myotis bechsteinii*), but the effect was related to the species' foraging ecology and wing morphology (Kerth and Melber 2009, p. 270). Foraging ecology of gleaning and woodland species were more susceptible to the barrier effect than high-fliers that feed in open spaces (Kerth and Melber 2009, p. 270).

5.6.3 Effects of Roads and the Determination Key

NLEB

In the DKey, we assume that NLEBs are unlikely to fly across an unforested area that is greater than 1000 feet wide and that NLEBs are unlikely to inhabit forest unless it is present as a contiguously forested area of 10 acres or more. This is based on the propensity for NLEBs, a forest-interior species, to remain in or near forested habitat and to generally avoid open areas. It is consistent with studies along roads that have found evidence that clutter-adapted Myotis species "may be deterred by the road-gap due to risks associated with sensory limitations and preference towards flying close to vegetation" (Chapman 2022, p. 44-45).

We explain in the DKey that contiguous forest may consist of multiple forest patches that are separated by less than 1000 feet of non-forested area – for example, two forest patches of 5 acres each would constitute 10 acres of contiguous forest if the two patches were within 1000 feet of one another. If a new road, new travel lanes, or other actions that are likely to increase vehicle traffic are proposed for an area where suitably large, forested habitat patches are present, we assess whether NLEB would be able to cross the road safely by flying less than 33 feet between forest patches on either side of the road.

TCB

TCB are more likely to fly across an unforested area than NLEB. TCBs forage at treetop or above (Davis and Mumford 1962, p. 397; Barbour and Davis 1969, p. 116). TCB will forage along forested edges of larger forested openings, along edges of riparian areas and over water. TCBs avoid foraging in dense unbroken forests, and narrow road cuts through forests (Davis and Mumford 1962; Kurta 1995; Lacki and Hutchinson 1999; Ford et al. 2005; Menzel et al. 2005; Thames 2020). Therefore, assumptions made in the key about road or traffic proximity to forest and a bat's ability to successfully cross a road in forested areas have not been applied to TCB. As a result, projects that include new roads, new travel lanes on existing roads, or additional daily traffic on existing roads are referred to the FO for additional review.

5.7 Effects of Prescribed Fire

Forest-dwelling bats, including the wide-ranging NLEB and TCB, were presumably adapted to the fire driven disturbance regime that preceded European settlement and to the habitat types that resulted from fire suppression in many parts of the eastern U.S. The impact of fire suppression on populations of NLEBs and TCBs is unclear, but it is apparent that fire may affect individual bats adversely through exposure to heat, smoke, and carbon monoxide, and positively through habitat modifications and resulting changes in their food base. Prescribed fire is also necessary to maintain suitable habitat for these species in many parts of the range.

5.7.1 Effects of Prescribed Fire on Tree Roosting Bats

5.7.1.1 Direct Impacts of Fire

NLEB

Little is known about the direct effects of fire on cavity and bark roosting bats, such as the NLEB, and few studies have examined escape behaviors, direct mortality, or potential reductions in survival associated with fire. Bats roosting in snags may be impacted by direct disturbance from fire if roost trees burn (Boyles and Aubrey 2006, p. 109), but injury is not likely unless flames are intense enough to burn the roost quickly, at temperatures when the bat is in deep torpor (Carter et al. 2002, p. 139). Non-volant pups can be impacted by burning as they are not able to flush from burning roost sites (Carter et al. 2002, p. 139). Dickinson et al. (2009, p. 55-57) monitored two NLEBs (one male and one female) in roosts during a controlled summer burn. Within 10 minutes of ignition near their roosts, both bats flew to areas that were not burning. Among four bats they tracked before and after burning, all switched roosts during the fire, with no observed mortality. It was presumed that roosting sites (e.g., exfoliating bark, crevices) used by bats offer little protection from hot gases released by fire (Dickinson et al. 2009, p. 59; Guelta and Balbach 2005). By extrapolating from other species, carbon monoxide exposure would cause incapacitation at concentrations of >1000 PPM for 25 minutes or more (Dickinson et al. 2009, p. 59; Spietel 1996, p. 174). Rodrigue et al. (2001) reported flushing a Myotis bat from an ignited snag during an April controlled burn in West Virginia. Carter et al. (2002, p .139-140) suggested that the risk of direct injury and mortality to southeastern forest dwelling bats resulting from summer prescribed fire is generally low. Silvis et al. (2016) noted NLEBs aroused from short-term torpor in late April during prescribed fires; however, the authors acknowledged how non-volant bats and adults with pups respond to fire is unknown. Non-volant pups and NLEBs in torpor during cold temperatures are likely the most

vulnerable to death and injury from prescribed fire. NLEBs flushing from trees during the day may be exposed to greater risk of predation, however, the presence of heat and smoke during prescribed burning, is likely to displace predators from the area along with the bats. As a result, likelihood of predation of NLEBs flushed from trees during prescribed fire is expected to be discountable.

TCB

During spring, summer, and fall, TCBs typically roost in live and dead leaf clusters of live and recently dead deciduous hardwood trees (Veilleux et al. 2003, p. 1071; Perry and Thill 2007a, pp. 976-977; Thames 2020, p. 32). Although the species has been captured within a variety of forest types, studies on forest associations of this species are limited (Silvis et al. 2016, p. 32). Tricolored bats roost almost exclusively in hardwood trees and often roost in forest stands that contained abundant deciduous hardwoods (Perry et al. 2007, p. 164). TCBs switch roost trees regularly. In Indiana, 18 pregnant or lactating female tricolored bats monitored for an average of 9.1 days ± 1.7 used an average of 2.8 ± 1.7 roost trees and remained at roosts for an average of 3.9 ± 2.5 days (Veilleux et al. 2003, p. 1072). Young start flying at three weeks of age and achieve adult-like flight at four weeks of age (Lane 1946, p. 59; Whitaker 1998, pp. 654–655).

We expect TCBs capable of flight to flush from roosts when physically disturbed. While adult TCBs are capable of flushing during disturbance, impacts of smoke or heat from prescribed fire may result in direct injury or mortality when flightless young are present (i.e., pup season) or when temperatures when TCBs may be in prolonged torpor (i.e., winter torpor season). Flightless young are not capable of flight and cannot independently flush from a tree because of disturbance. Female TCBs typically have two pups and during the first few nights after birth females carry pups (Lane 1946, p. 60). When disturbed adult females will “carry much larger young” (Lane 1946, p. 60). Although mothers can carry/move young, pups may ultimately become too heavy to move as they grow, especially in the haste of escaping a prescribed fire. Similar to NLEB, injury is not likely unless flames are intense enough to burn the roost quickly, at temperatures when the bat is in deep torpor (Carter et al. 2002, p. 139). Non-volant pups and TCBs in torpor during cold temperatures are likely the most vulnerable to death and injury from prescribed fire. To avoid direct effects to TCB, prescribed fire will not be conducted when flightless young are present unless site-specific information (e.g., survey) demonstrates probable absence from the Action Area.

5.7.1.2 Effects of Heat and Smoke

During warm temperatures, bats can arouse from short-term torpor quickly. Most adult bats are quick, flying at speeds > 30 km/hour (Patterson and Hardin 1969, p. 153) and able to escape to unburned areas. NLEB and TCB use multiple roosts, switching roost trees often, and could likely use alternative roosts in unburned areas should fire destroy the current roost. Silvis et al. (2016, p. 16) noted NLEBs aroused from torpor in late April during prescribed fires; however, the authors acknowledged how non-volant bats and adults with pups respond to fire is unknown. Non-volant pups are likely the most vulnerable to death and injury from prescribed fire.

Exposure to heat and smoke can cause harm from death or injury directly or from predation that could occur when NLEBs or TCBs flee prescribed burns. We expect this to occur when NLEBs and TCBs are more concentrated during the maternity season and the swarming/staging season, but we only

anticipate direct harm from heat and smoke during the pup season or during cold temperatures (<4.5 degrees C or 40 degrees F) when bats are in deeper torpor.

At least some NLEBs or TCBs roosting in burned areas may be harmed by carbon monoxide or heat. Dickinson et al. (2010) used a fire plume model, field measurements, and models of carbon monoxide and heat effects on mammals to explore the risk to the Indiana bat and other tree roosting bats during prescribed fires in mixed-oak forests of southeastern Ohio and eastern Kentucky. Their research suggested that blood carboxyhemoglobin concentrations from CO exposure only approach critical levels just above flame heights in the most intense prescribed burns. However, if bats are in torpor during a fire and cannot arouse quickly enough to escape, thermal injury could occur up to the height of at which crown scorch occurs. Most prescribed fires for forest management are planned to avoid significant tree scorch.

5.7.1.3 Effect of Roost Availability

Fire can affect availability of roosting sites for NLEB (cavities, crevices, loose bark) by creating or consuming snags, which typically provide these features, or by creating these features in live trees. Although stand-replacing or other intense wildfires may create large areas of snags, the effects of multiple, low-intensity prescribed burns on snag density are less obvious, especially for forests consisting mostly of fire-adapted tree species. Low-intensity, ground-level fire may injure large hardwood trees, creating avenues for pathogens such as fungi to enter and eventually form hollow cavities in otherwise healthy trees (Smith and Sunderland 2006). Fire may scar the base of trees, promoting the growth of basal cavities or hollowing of the bole in hardwoods (Nelson et al. 1933, p. 829; Van Lear and Harlow 2002, p. 8). Repeated burning could potentially create forest stands with abundant hollow trees. Trees located near down logs, snags, or slash may be more susceptible to damage or death, and aggregations of these fuels can create clusters of damaged trees or snags (Brose and Van Lear 1999; Smith and Sutherland 2006). Bats are known to take advantage of fire-killed snags to roost in burned areas. Boyles and Aubrey (2006, p. 111- 112) found that, after years of fire suppression, initial burning created abundant snags, which evening bats (*Nycticeius humeralis*) used extensively for roosting. Johnson et al. (2010) found that after burning, male Indiana bats roosted primarily in fire-killed maples. In the Daniel Boone National Forest, Lacki et al. (2009) radio-tracked adult female NLEBs before and after prescribed fire, finding a greater percentage (74.3 percent) of roosts in burned habitats than in unburned habitats. NLEB behavior is consistent with being fire tolerant – that is, they frequently forage and roost in live trees and snags in early stages of decay in post-burn sites (Lacki et al. 2009, p. 1172). NLEB post-burn roost selection was based on bole condition – they selected trees with higher number of cavities and a higher percentage of bark cover on the bole than random snags, likely due to a wider range of roosting options within a tree (Lacki et al. 2009, p. 1172). Burning may create more suitable snags for roosting through exfoliation of bark (Johnson et al. 2009, p.240), mimicking trees in the appropriate decay stage for roosting bats. The extent to which preferred roosts are limiting in forested habitats is unclear (Lacki et al. 2009, p. 1172; Crampton and Barclay 1998, p. 1355; Kunz and Lumsden et al. 2003, p. 16). There is evidence, however, for competition for roost availability among similar and closely related species of tree-roosting bats (Lacki et al. 2009, p. 1172; Boonman 2000, p. 385; Lumsden et al. 2002, p. 207). In addition to creating snags and live trees with roost features, prescribed fire may enhance the suitability of trees as roosts by reducing adjacent forest clutter. Perry et al. (2007, p. 162) found that five of six species, including NLEB, roosted disproportionally in stands that were thinned and burned 1-4 years prior but that still retained large overstory trees.

5.7.2 Effects of Prescribed Fire on Bats Using Winter Roosts and Hibernacula

Fires conducted during the winter could affect hibernating NLEBs and TCBs if they generate gases that drift or are blown into hibernacula. Whether this occurs depends on local airflow characteristics and weather conditions (Carter et al. 2002, p. 141; Perry 2012, p. 178). Smoke from prescribed fire may not reach toxic levels in caves and mine, but introduced gases could arouse bats from hibernation, causing energy expenditure and reduced fitness (Dickinson et al. 2009, pp. 61- 62). Caviness (2003) observed smoke intrusion into hibernacula during winter burning in Missouri but did not observe any bat arousal. All bats present in caves at the beginning of the burn were still present and in "full hibernation" when the burn was completed, and bat numbers increased in the caves several days after the burn. There were minute changes in relative humidity and temperature during the burn and elevated short-term levels of some contaminants from smoke were noted (Caviness 2003).

Fire could also alter vegetation surrounding the entrances to caves and mines, which could indirectly affect temperature and humidity regimes of hibernacula by modifying airflow (Carter et al. 2002, p. 141; Richter et al. 1993). To avoid impacts to hibernacula, all projects within 0.5 mile of known hibernacula entrances will go to field offices for individual review. In addition, all projects within 0.25 of known occupied bridges and culverts will go to field offices for individual review. As a result, impacts to bats from prescribed fires in proximity to hibernacula and known roosts in structures will be avoided within the Dkey.

5.7.3 Effects of Prescribed Fire on Food Resources

Adult insects are the predominant prey of NLEB. On the Daniel Boone National Forest, Lacki et al. (2009, p. 1170) found that abundance of coleopterans (beetles), dipterans (flies), and all insects combined captured in black-light traps increased following prescribed fires. The mechanism of this increase is related to the insects' ability to use regrowth of ground vegetation stimulate by the burns (Swengel 2001, p. 1141). In NLEB fecal samples, lepidopterans (moths), coleopterans, and dipterans were the three most important groups of insect prey, with dipteran consumption increasing in the year after burning. NLEB appeared to track the observed changes in insect availability – home ranges were closer to burned habitats than to unburned habitats after fires, but home range size did not change.

6 ONGOING REVIEW OF THE DETERMINATION KEY'S ACCURACY AND VALIDITY

This SA will be reviewed annually and updated as needed to ensure the analysis contains the best scientific and commercial data available. This update process will include regular reviews to ensure that the analysis is accurate and valid, and that the SA still meets the Act's requirements. All updates will also ensure that the logic is sound and determinations are appropriate for covered activities. If there are changes, updates will be signed under an updated cover.

Projects reviewed under this SA must rely on the version that is current on the date consultation is completed. For reference, both current and previous versions of the SA will be maintained jointly by the lead field offices for the NLEB and TCB.

If we revise the SA and determine reinitiation is required for any ongoing activities that used the previous SA, the FWS will contact the respective action agencies that may be affected and advise them of their need to reinitiate.

6.1 Annual Review of the DKey – Ensuring Use of Best Available Information

6.1.1 Dkey Question Review

Each year, no later than March 31, the FWS will determine what questions need to be asked across the range of both species relative to any potential new information. We will record the answers in the administrative record for the DKey and take appropriate action to revise the key to ensure accurate outcomes, as needed. The DKey sponsor will send an email to each FWS ES Field Office with the questions needed. In addition to seeking out key information directly from FWS field offices, the DKey sponsor will also review published scientific literature for new and relevant information – see 6.1.3, below.

DKey sponsor will also ensure that appropriate revisions are made to the key considering any new information that indicates additional or more stringent conservation measures are needed to ensure correct conservation outcomes. The DKey sponsor will use this standing analysis to assess any new information for potential revisions to the DKey. The sponsor will evaluate new information during the annual reviews and revise the DKey, as needed.

6.1.2 Ensuring use of Accurate GIS Data

In addition to addressing each of the questions listed above, each year no later than March 31, the DKey sponsor will also reach out to each of the ESFOs in the range of the NLEB and TCB to determine whether the GIS data incorporated into the DKey is still accurate and based on the best available information. If revisions or updates are necessary, the sponsor will request the updated information from the ESFO and will incorporate it into the DKey. Updates to the underlying GIS data will also be made as needed throughout the year.

6.1.3 Ensuring the Use of an Accurate Consultation Range

The consultation range maps that indicate where NLEB or TCB may be present were determined using a combination of direct and modeled occurrence data. First, we buffered locations of known occurrences directly observed in recent years. We then developed species-specific occurrence predictions using the North American Bat Monitoring Program's (NABat) Integrated Summer Species Distribution Models (models) for each species. These multivariate models predict occupancy by integrating all available acoustic and capture presence/absence records with a variety of environmental factors to predict occupancy, while also accounting for survey effort and differences in detection. The models also account for significant declines in NLEB and TCB numbers due to WNS across much of their ranges. The FWS plans to incorporate new data annually to improve the NABat models over time.

6.1.4 Reinitiation of Consultation

Determinations obtained through the Northern Long-eared Bat and Tricolored Bat Range-wide Dkey do not expire unless reinitiation of consultation is required for actions where discretionary Federal involvement or control over the action has been retained or is authorized by law. The following "triggers" for reinitiation of consultation (50 CFR 402.16) apply to projects evaluated in the Dkey: 1) new

information reveals effects of the project that may affect listed species or critical habitat in a manner or to an extent not previously considered [50 CFR 402.16(a)(2)].”; or 2) the project is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered previously.

For the first trigger, the FWS will change the Dkey due to new information as needed annually. After we implement a major update to the Dkey, users will see a notification in IPaC that there has been a change in the DKey that may affect the accuracy of the prior determination. These notifications will be visible when users view their project list in IPaC or are looking directly at an individual project. For the second trigger, it is the responsibility of the action agency to re-evaluate the project in IPaC or contact the local ESFO if the project is modified. For example, if the scope or location of the project changes, you should re-evaluate the project in IPaC.

6.1.5 Field Office Auditing Use of the Key

Ecological Services Field Offices within the covered area will have the opportunity to audit Dkey submissions to ensure that users are answering Dkey questions accurately and that errors in the Dkey are not causing the wrong determinations to be delivered to users. The Dkey has established a 15-day waiting period associated with NLAA Concurrence letters to allow the appropriate ESFO to apply local knowledge to the evaluation of the Action. FWS will notify the user within 15 calendar days if the field office determines that the proposed action does not meet the criteria for a NLAA determination. If the FWS does not notify the user within that timeframe, the user may proceed with the Action under the terms of the NLAA determination provided in the concurrence letter. Each field office will establish their own process for auditing Dkey submissions, but across all field offices, a sufficient number of Dkey submissions will be audited to ensure accurate use. The auditing process will allow FOs to assess the aggregate effects of the projects that have used the Dkey.

6.1.6 Review of Cumulative Effects

The process of auditing Dkey submissions and FWS’s project tracking system will provide an opportunity for field office biologists to assess cumulative effects associated with the projects submitted through the Dkey. Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area. Future Federal actions that are unrelated to the proposed action are not considered because they require separate consultation pursuant to section 7 of the Act. EcoSphere reports will facilitate the review of Dkey submissions at the local, regional, or range-wide level to assess whether State, tribal, local or private actions that are reasonably certain to occur have been identified within the action area. Field Office biologists will be trained in the use of Ecosphere in order to facilitate their review of cumulative effects and ensure that Dkey submissions are considered appropriately.

7 SUMMARY AND CONCLUSION

After considering the relevant information pertaining to the species, reviewing the covered activities and associated required conservation measures, and evaluating their anticipated effects, we conclude that the actions subject to this SA will support a Federal action agency determination of NE or support a section 7(a)(2) determination pursuant to the Act of NLAA as appropriate, for the subject species as described above. This SA is based on the consultation provisions of section 7(a)(2) of the Act and the

information cited and will undergo review and revision, as needed, if any of the following conditions have been met: 1) If new information reveals the effects of the covered action(s) to the covered species or critical habitat are occurring in a manner or to an extent not considered in this SA based on applied use; or 2) If the species or critical habitat covered by the SA has a change in status.

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U.S. Fish & Wildlife Service

May 18, 2010, Wood Stork Effect Determination Key

Wood Stork

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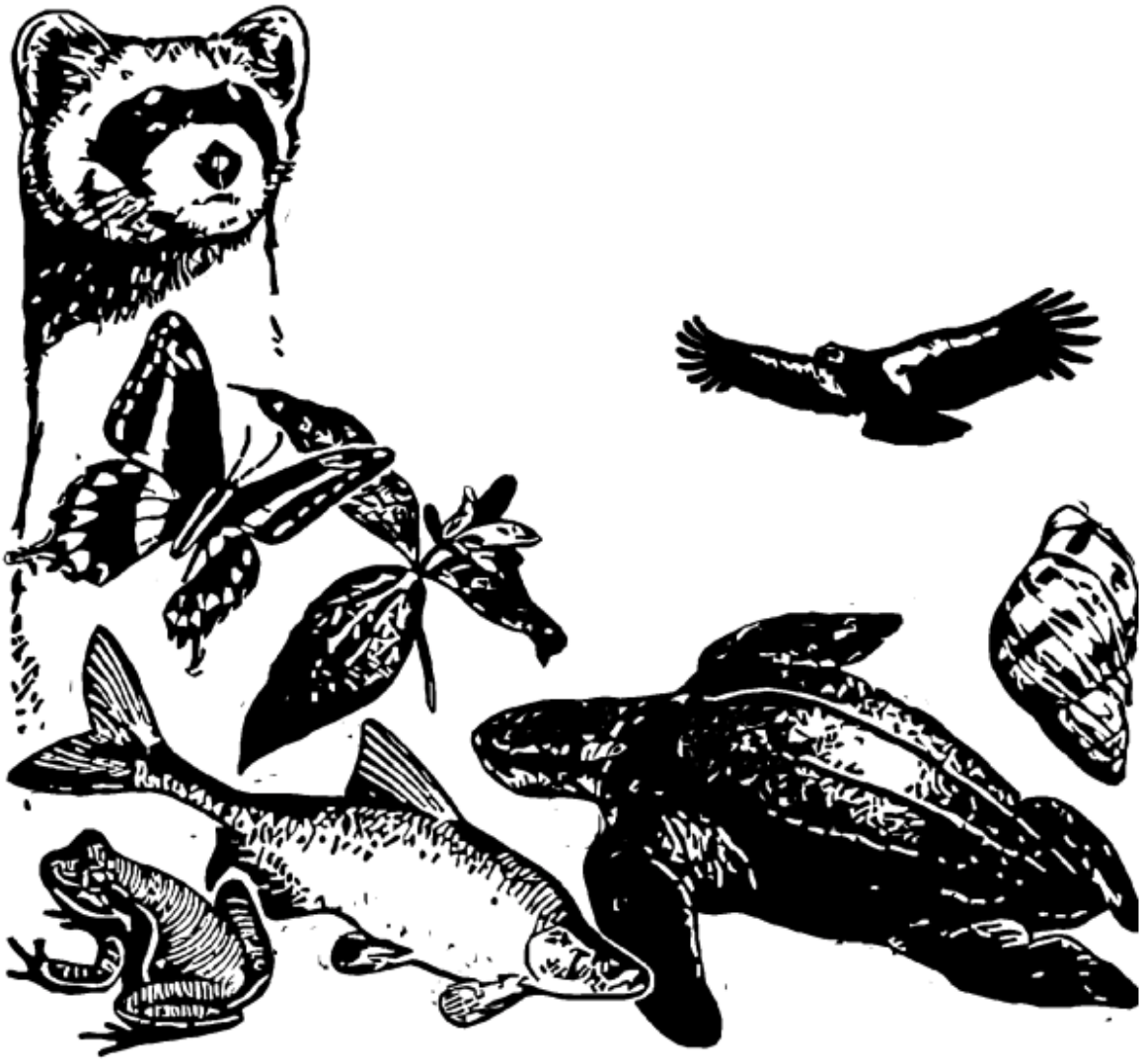

IPaC - Information for Planning and Consultation (https://ipac.ecosphere.fws.gov/): A project planning tool to help streamline the U.S. Fish and Wildlife Service environmental review process.

United States Department of the Interior

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May 18, 2010

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South Florida Ecological Services Office - Publication Date: May 18, 2010
Habitat Assessment Guidelines - Wood Stork

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

Dear Mr. Kinard:

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

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

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

Wood stork

Habitat

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

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

Southeast Region Wood Stork Habitat Assessment Guidelines - Wood Stork

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.

South Florida Ecological Services Field Office ; Publication Date: May 18, 2020
Habitat Assessment Guidelines - Wood Stork

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

The Key is as follows:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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Monitoring and Reporting Effects

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

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

Sincerely yours,

Paul Souza
Field Supervisor
South Florida Ecological Services Office

Enclosures

cc: w/enclosures (electronic only)
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EPA, West Palm Beach, Florida (Richard Harvey)
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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).

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Habitat Assessment Guidelines - Wood Stork

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.

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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.

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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.

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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.

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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:

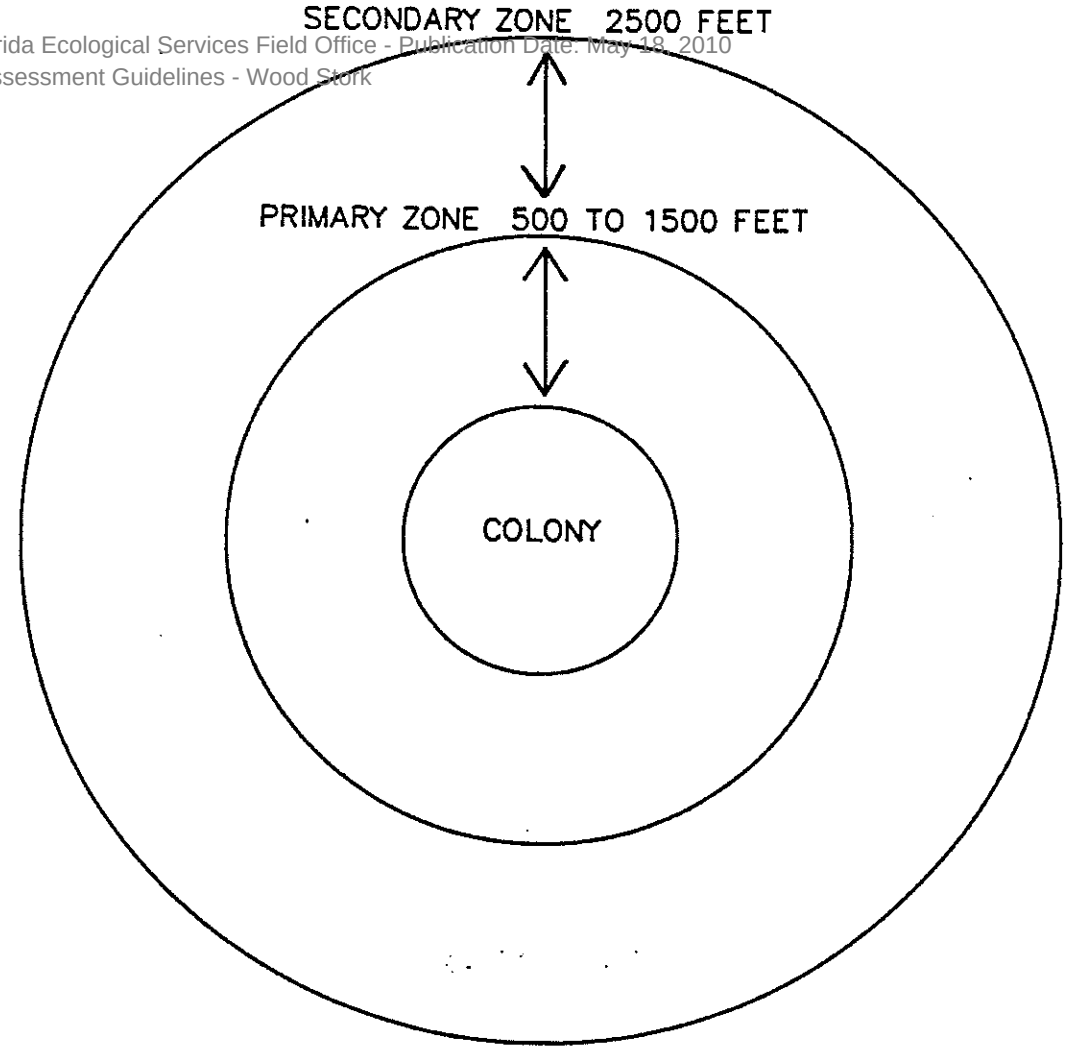
(1) Any lumbering or other removal of vegetation, and

(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.

South Florida Ecological Services Office Publication Date: May 16, 2008
Habitat Assessment Guidelines Book

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.

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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

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

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

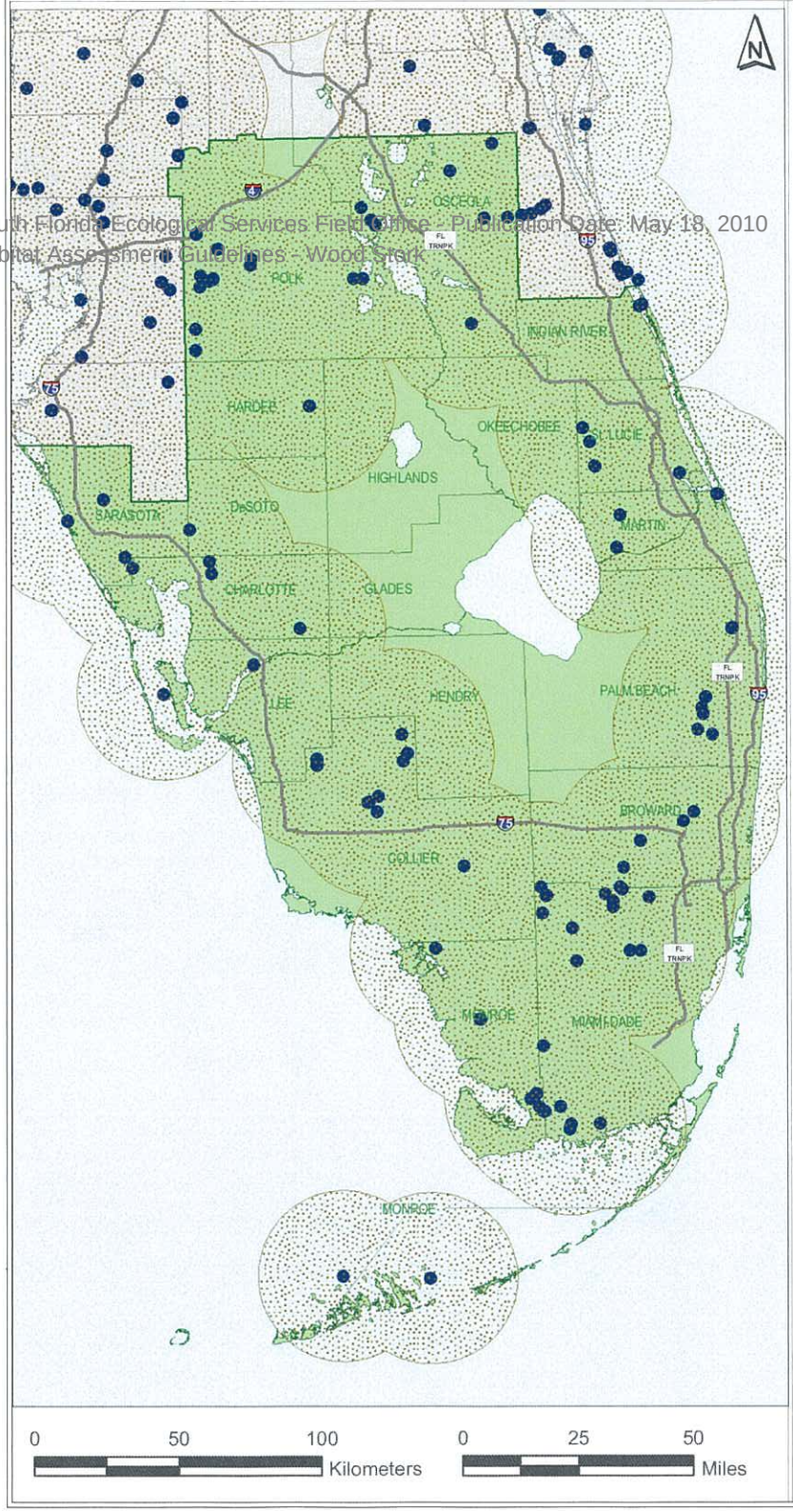
Section 27-3-22 states, in part, "It shall be unlawful for any person to hunt, trap, take, possess, sell, purchase, ship, or transport any hawk, eagle, owl, or any other bird or any part, nest, or egg thereof...".

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

4. State of South Carolina

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

Wood Stork



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Habitat Assessment Guidelines - Wood Stork

Nesting Colonies
Core Foraging Areas

1999 to 2005

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

U.S. FISH & WILDLIFE SERVICE

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

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

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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

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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).

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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).

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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:

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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

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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).

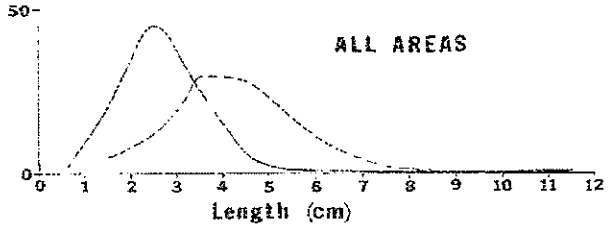

FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

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.

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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.

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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.

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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)

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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**

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*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**

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Habitat Assessment Guidelines - Wood Stork

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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United States Department of the Interior

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

August 1, 2017

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

Subject: Consultation Key for the Eastern Indigo Snake – Revised

Dear Mr. Kinard:

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

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

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

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

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

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

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

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

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

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

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

Scope of the Key

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

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

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

Habitat

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

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

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

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

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

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

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

Minimization Measures

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

Determinations

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

End Key

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

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

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

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

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

Sincerely,

Roxanna Hinzman
Field Supervisor
South Florida Ecological Services

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

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APPENDIX C
SFWMD STANDARD SPECIFICATION MEASURES

SECTION 01530 TEMPORARY BARRIERS AND CONTROLS

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: This SECTION includes General Requirements for:

1. Protection of the WORK
2. Protection of existing property
3. Barriers
4. Security
5. Environmental controls
6. Access roads and parking areas
7. Traffic control and use of roadways

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals

[NTS: The specification sections listed below may be related to the Project WORK. This list is not intended to be all-inclusive, but the specifier should consider reviewing and including these sections in the Contract Documents as appropriate.

2. **SECTION 01590 – Field Offices and Sheds**
3. **SECTION 01700 - Contract Closeout**
4. **SECTION 02435 - Turbidity Control and Monitoring]**

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 SAFETY AND PROTECTION OF WORK AND PROPERTY:

A. General:

1. The CONTRACTOR shall provide for the protection of the WORK as set forth in the GENERAL TERMS & CONDITIONS. Provide protection at all times against rain, wind, storms, frost, freezing, condensation, or heat so as to maintain all WORK and Equipment and Materials free from injury or damage. At the end of each day all new WORK likely to be damaged shall be appropriately protected.
2. The CONTRACTOR shall notify the DISTRICT immediately if at any time, operations are stopped due to conditions which make it impossible to continue or to obtain proper results.

3. The CONTRACTOR shall construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations, pits, and trenches dewatered sufficiently to permit continuous construction.

4. The CONTRACTOR shall protect floors from damage by proper covering and care when handling heavy equipment, painting, or handling mortar or other such materials. Use proper cribbing and shoring to prevent overloading of floors while moving heavy equipment. Provide metal pans under pipe-threading machines and other machines that may leak oil and clean such pans daily, keeping oil off of the floors. Restore floors to former condition where damaged or stained.

5. The CONTRACTOR shall not load concrete floors less than 28-days old without the written permission from the DISTRICT.

6. The CONTRACTOR shall restrict access to roofs except as required by the WORK. Where access is required, provide protection with plywood, boards, or other suitable materials.

B. Property Other than DISTRICT's:

1. The CONTRACTOR shall provide for the protection of property as set forth in the GENERAL TERMS & CONDITIONS. Report immediately to the owners thereof and promptly repair damage to existing facilities resulting from construction operations.

2. Names and telephone numbers of representatives of the power company having jurisdiction over power lines in the WORK area can be obtained from the DISTRICT. The CONTRACTOR shall contact the power company a minimum of seven (7) calendar days prior to performing WORK within 500' of power transmission line property, right-of-way or easement lines.

3. The applicable requirements specified for protection of the WORK shall also apply to the protection of existing property of others.

4. The CONTRACTOR shall restore all property affected by the CONTRACTOR's operations to the original or better condition, to the satisfaction of the DISTRICT.

3.02 BARRIERS:

A. General:

1. The CONTRACTOR shall furnish, install, and maintain suitable barriers as required to prevent public entry, protect the public, and to protect the WORK, existing facilities, trees, and plants from construction operations. Remove the barriers when no longer needed or at completion of the WORK.

2. The CONTRACTOR may use new or used materials, suitable for the intended purpose, but must not violate requirements of applicable codes and standards or of regulatory agencies.

3. Barriers shall be of a neat and reasonably uniform appearance, structurally adequate for the required purposes.

4. The CONTRACTOR shall maintain barriers in good repair and a clean condition for adequate visibility.

5. The CONTRACTOR shall relocate barriers as required by progress of the WORK.

6. The CONTRACTOR shall repair damage caused by the installation of barriers and restore damaged areas to original or better condition, to the satisfaction of the DISTRICT.

3.03 ENVIRONMENTAL CONTROLS:

A. Dust Control:

1. If appropriate and at the discretion of the DISTRICT, the CONTRACTOR shall provide and apply methods of positive dust control to minimize raising dust from construction operations.

2. The CONTRACTOR shall clean interior spaces and surfaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

3. The CONTRACTOR shall schedule operations so that dust and other contaminants will not fall on wet or newly-coated surfaces.

4. The CONTRACTOR shall cover materials transported to and from Site as necessary to prevent depositing material on offsite roadways or creating dust.

B. Water and Erosion Control:

1. The CONTRACTOR shall provide methods necessary to control surface water to prevent damage to the WORK, the Site, or adjoining properties as specified in SECTION 02435.

2. The CONTRACTOR shall control fill, grading, and ditching to direct surface water away from excavations and other construction areas, and to direct surface water to proper storage and/or conveyance facilities.

3. The CONTRACTOR shall control surface water and ground water as necessary to prevent flooding, erosion, or other damage to any portion of the Site and/or to adjoining areas.

C. Debris Control and Clean-Up:

1. The CONTRACTOR shall keep the premises free at all times from accumulations of debris, waste materials, and rubbish. The CONTRACTOR's responsibilities shall include, but not be limited to the following:

a. Adequate trash receptacles at the Site, emptied promptly when filled.

b. Periodic cleanup to avoid hazards or interference with operations at the Site and to maintain the Site in a reasonably neat condition.

c. The keeping of construction materials such as forms and scaffolding neatly stacked.

d. Immediate cleanup to protect the WORK by removing splattered concrete, oil, paint, corrosive liquids, and cleaning solutions from walls, floors, and other surfaces before the surfaces are marred.

2. The CONTRACTOR shall prohibit overloading of trucks to prevent spillages on access and haul routes. Provide periodic inspection of traffic areas to enforce requirements.

3. Final cleanup is specified in SECTION 01700.

D. Pollution Control:

1. The CONTRACTOR shall provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of hazardous or toxic substances from construction operations.

2. The CONTRACTOR shall provide equipment and personnel and perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-site in approved locations, and replace with suitable compacted fill and topsoil.

3. The CONTRACTOR shall take special measures to prevent harmful substances from entering public waters, sanitary sewers, or storm sewers.

4. If hazardous materials are discharged, report to authorities as required by applicable law or regulations and notify the DISTRICT, immediately.

3.04 TRAFFIC CONTROL AND USE OF ROADWAYS:

A. Traffic Control:

1. The CONTRACTOR shall provide, operate, and maintain equipment, services, and personnel, with traffic control and protective devices, as required to expedite safe vehicular traffic flow on haul routes, at Site entrances, onsite access roads, and parking areas. This includes barricades and other devices or personnel as necessary to adequately protect the public. Prepare and submit a Traffic Control Plan to DISTRICT for review.

2. The CONTRACTOR shall remove temporary equipment and facilities when no longer required. Restore grounds to original, better, or specified conditions.

3. The CONTRACTOR shall provide and maintain suitable detours or other temporary expedients if necessary.

4. Bridge over open trenches where necessary to maintain traffic.

5. The CONTRACTOR shall consult with applicable governing authorities to establish public thoroughfares which will be used for Site access. All operations shall meet the approval of owners or agencies having jurisdiction.

B. Maintenance of Roadways:

1. The CONTRACTOR shall repair off-site roads, water control and DISTRICT structures and levees damaged by operations. Keep traffic areas as free as possible of excavated materials and maintain in a manner to eliminate dust, mud, and hazardous conditions.

2. All operations and repairs shall meet the approval of owners or agencies having jurisdiction.

3.05 SECURITY:

A. The CONTRACTOR is solely responsible for initiating and maintaining security at the construction Site. CONTRACTOR shall take all necessary precautions for the security of, and shall provide the necessary protection to:

1. Materials and equipment incorporated into the WORK, or stored on-site prior to incorporation into the WORK.

[NTS: Designer or Project Manager to include the following if SECTION 01590 is applicable to the Project:

2. **Temporary field offices and sheds, and their contents including those listed in SECTION 01590.]**

3. Plant and equipment including any equipment furnished for use by the DISTRICT.

B. The CONTRACTOR shall replace, in kind, any materials or equipment lost, damaged or destroyed at no cost to the DISTRICT.

END OF SECTION

SECTION 02435 TURBIDITY CONTROL AND MONITORING

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all necessary equipment, labor and materials and utilize appropriate means and methods of turbidity controls necessary and sufficient to ensure that the more restrictive and protective of the following are achieved at all times: (1) all applicable State water quality standards, as prescribed in Chapter 62-302.530, Florida Administrative Code (F.A.C.), incorporated by reference, (2) all applicable environmental permit conditions, as prescribed in the permits appended to the Contract, and (3) all stormwater and erosion control shall be in accordance with the Florida Department of Environmental Protection (FDEP) Florida Stormwater Erosion and Sedimentation Control Inspector's Manual.

B. Related Work Specified Elsewhere:

1. SECTION 01300 Submittals

[NTS: The specification sections listed below may be related to the Project WORK. This list is not intended to be all-inclusive, but the specifier should consider reviewing and including these sections in the Contract Documents as appropriate.

2. **SECTION 01530 Temporary Barriers and Controls**

3. **SECTION 01531 Manatee Protection**

4. **SECTION 02100 Site Preparation**

5. **SECTION 02401 Dewatering and Cofferdam]**

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Florida Department of Environmental Protection (FDEP)

a. Florida Stormwater Erosion and Sedimentation Control Inspector's Manual

2. Florida Department of Transportation (FDOT)

b. Standard Specification for Road and Bridge Construction - Sections 104 - 1, 2, 3, 4, 6 and 7

3. U.S. Army Corps of Engineers (USACE)

B. The environmental protection rules and standards in the applicable sections of the Florida Administrative Code (F.A.C.) incorporated herein by reference are:

1. https://floridadep.gov/ogc/ogc/content/rules

2. Design and Performance Standards - 62-25.025 F.A.C.

3. Quality Assurance - 62-160 F.A.C.

4. Surface Waters of the State - 62-301 F.A.C.

5. Surface Water Quality Standards - 62-302 F.A.C.

6. Generic Permits - 62-621.300(2) & (4) F.A.C.

1.03 SUBMITTALS: The CONTRACTOR shall make submittals for the turbidity control and monitoring system in accordance with SECTION 01300 and the requirements herein.

A. Provide details of the turbidity controls proposed.

B. Provide proposed layout of the turbidity controls and monitoring system on the Site plan.

C. Obtain the monitoring data and prepare quarterly reports in accordance with Paragraph 3.03B.

1.04 QUALIFICATIONS: The CONTRACTOR shall have at least one (1) employee, on-site, certified by the Florida Department of Environmental Protection as a Stormwater Erosion and Sedimentation Control Inspector. The certification shall be submitted to the DISTRICT for review prior to the installation, inspection, maintenance, repair or replacement of any erosion or sedimentation control Best Management Practices, including but not limited to the turbidity controls. The turbidity monitoring shall be conducted according to the FDEP-approved procedures.

1.05 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice of its intention to begin new WORK activities.

PART 2 - PRODUCTS

2.01 FABRIC: The CONTRACTOR shall provide floating turbidity barriers with fabric that is flexible and of sufficiently fine mesh to prevent passage of suspended material through the fabric. The floating turbidity barriers shall extend to within a foot of the bottom of the canal except in the areas with the potential for the presence of manatees the barriers shall be two (2) feet above the bottom.

2.02 FLOATS: The CONTRACTOR shall provide floats for the turbidity barriers of sufficient buoyancy to prevent the top of the barrier from submerging under any water and wind conditions. If the top of the barrier becomes submerged for any reason, the CONTRACTOR shall suspend construction operations until the condition is corrected.

2.03 ANCHORS AND WEIGHTS: The CONTRACTOR shall provide and maintain an anchor system to secure the turbidity barrier in position. Attach weights to the barrier as necessary to keep the fabric at an angle to the vertical of thirty (30) degrees or less. Fabric material shall not be attached to the canal bottom.

2.04 REPORTS: The CONTRACTOR shall produce and maintain onsite records of Daily Turbidity Monitoring Logs.

PART 3 - EXECUTION

3.01 TURBIDITY BARRIERS:

A. The CONTRACTOR shall install and maintain the turbidity barriers as noted in the Drawings and where necessary to maintain turbidity releases at or below the permit compliance levels. Turbidity barriers shall be installed prior to any backfilling, clearing and grubbing, dredging, or excavation and maintained in place until construction is complete and turbidity from construction has dissipated. All barriers shall be adequately marked and appropriate signage erected to identify them as obstructions to navigation.

B. The turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. The barriers must not impede manatee movement.

C. The applicable U.S. Amy Corps of Engineers in-water work protection guidelines for the endangered West Indian Manatee incorporated herein by reference are: http://www.saj.usace.army.mil/Portals/44/docs/regulatory/sourcebook/endangered_species/Manatee/2011_StandardConditionsForIn-waterWork.pdf .

D. Any rips or tears that occur in the turbidity barrier material during use shall be repaired or replaced

immediately by the CONTRACTOR at its expense. Rips or tears that occur in the turbidity barrier material in use that are not repaired or replaced immediately by the CONTRACTOR will result in a suspension of excavation and/or construction operations, and shall require repairs and replacements as a prerequisite to the resumption of WORK.

E. The CONTRACTOR shall keep in place and maintain all barriers until the WORK is complete (construction areas stabilized with vegetation) and turbidity levels return to the background levels based on the monitoring results. Upon completion of use, the CONTRACTOR shall remove the turbidity barriers and associated items to an off-site location at its own expense.

F. The CONTRACTOR shall conduct its operations at all times in a manner that minimizes turbidity. The CONTRACTOR is required to conform to the State Water Quality standards as prescribed in Chapter 62-302.530, F.A.C., and to meet the special requirements of any environmental permits that have been issued.

G. The turbidity controls shall be inspected by the CONTRACTOR every work day, after every rainfall event of 0.5 inches or greater in a 24 hour period, and after every extreme weather event that could dislodge or damage the turbidity controls, to assure that the turbidity controls remain properly installed, undamaged, and fully functional at all times.

3.02 EROSION CONTROL: The CONTRACTOR shall prevent and control erosion, sedimentation and water pollution as per the Florida Department of Transportation (FDOT) Specification Sections 104-1, 2, 3, 4, 6 and 7 and FDEP regulations and permit conditions.

3.03 MONITORING:

A. The CONTRACTOR shall conduct and record the results of turbidity monitoring appropriate to the conditions and at the locations, times, and frequencies specified below. An FDEP approved Turbidity Monitoring Log is attached (Appendix A) for the CONTRACTOR's use.

1. Sampling and analyses shall be performed as required by Chapter 62-160, F.A.C., and in accordance with appropriate FDEP Standard Operating Procedures (FDEP-SOP), located at http://www.dep.state.fl.us/water/sas/sop/sops.htm. Turbidity monitoring equipment and personnel trained to use it shall be available on site at all times during construction or maintenance activities that could result in project-generated turbidity levels beyond the work area that have the potential to be discharged to a receiving water body.

2. During construction or maintenance activities, the Permittee shall monitor turbidity levels at least twice daily for the background and compliance samples, with samples taken a minimum of once every four hours, at the locations described within the project's approved Turbidity Control Plan.

   a. Approximately 100 feet upstream of the work sites and clearly outside the influence of construction activities. (This shall serve as the natural background sample against which other turbidity readings shall be compared.)

   b. Directly outside the turbidity curtains surrounding the work sites and within the densest portion of any visible turbidity plume. (This sample shall serve as the compliance sample.)

3. For monitoring purposes, work areas are defined by the turbidity curtains.

4. If there are multiple work areas where construction is creating a visible turbidity plume, each construction activity shall be monitored separately.

5. Equipment: The turbidity monitoring equipment shall meet the specifications and be calibrated, maintained, repaired, and replaced according to the methods, procedures, and frequencies set forth in Chapter 62-160, F.A.C.

6. Records Management: The individual conducting the turbidity monitoring shall transcribe the readings to the approved Daily Turbidity Monitoring Log form (Appendix A) and sign and date the form at the close of each monitoring day. The notebook containing the signed and dated daily

turbidity monitoring log forms shall be accessible at the construction Site during the work day.

B. The CONTRACTOR shall submit the quarterly monitoring data (Turbidity Monitoring Log forms), to the DISTRICT. Daily monitoring logs shall also be readily available on site and clearly identify the following information:

1. Project name and current permit number.
2. Dates and times of sampling and analysis.
3. Name of individual collecting samples.
4. Unique identification of the specific instrument unit(s) used for sample collection and analysis as required by FDEP-SOP-001/01 FT 1600 Field Measurement of Turbidity.
5. Measurement value and reporting units.
6. Water depth.
7. Depth of sample.
8. Weather conditions.
9. Water level stage in the canal or water body and direction of flow.
10. Clear description of project component activities taking place at the time of sampling that may have contributed to turbidity.
11. Signature and statement of authenticity by a properly trained individual indicating that the instrument meets the outlined specifications and has been calibrated in accordance with FDEP-SOP-001/01 FT 1600 Field Measurement of Turbidity and
12. A map indicating the sampling locations.

3.04 EXCEEDANCES OF WATER QUALITY STANDARDS:

A. Turbidity shall not exceed 29 Nephelometric Turbidity Units (NTUs) above background in Class III receiving waters, or greater than 0 NTU above background samples in receiving waters classified as OFW (Outstanding Florida Waters). If monitoring reveals project-generated turbidity exceeds the applicable Turbidity Standard the CONTRACTOR shall take the following measures:

1. Immediately cease all work contributing to the water quality exceedance(s).
2. Immediately report turbidity exceedance(s) to the DISTRICT Project Manager and DISTRICT Permit Compliance Representative;
    a. The CONTRACTOR shall submit a turbidity exceedance report to the DISTRICT within 24 hours of the exceedance(s). The report shall include a copy of the monitoring data sheets, which indicate the exceedance(s) and a description of the corrective actions taken or proposed.
    b. The DISTRICT Permit Compliance Representative is responsible to timely report the exceedance(s) to the regulatory agencies, as required by Permit(s).
3. The possible cause of the exceedance(s) shall be identified.
4. Modify work procedures that may have contributed to the exceedance(s) such as installing additional turbidity or erosion protection devices; repairing any non-functional turbidity containment devices, stabilizing exposed soils, and checking calibration of the meter.
5. Work shall not resume until the activities can be conducted in compliance with the turbidity standards and the DISTRICT indicates to the CONTRACTOR that WORK can resume.

END OF SECTION

APPENDIX A

DAILY TURBIDITY MONITORING LOG

Multiple work areas that may contribute to turbidity in receiving waters must be monitored separately. A Site map depicting sampling locations must accompany the quarterly turbidity monitoring reports.

Project Name:	Permit No.:
Collector Name:	Collection Date:
Meter/Sonde Identification No.	

Water Observations		Weather Observations
Water Level Stages		Temperature:
Direction of Flow		Conditions:
Water Depth		

Activity Taking Place During Sampling	Yes	No
Excavation or Filling within 50 ft radius of surface waters or wetlands?		
Please describe:		
Other In-Water Work? (e.g., dewatering; installing piling or forms; injecting concrete; sand blasting; painting)		
Please describe:		
Other Activity? (e.g., materials transfer; washdown; interim stabilization)		
Please describe:		

Turbidity Monitoring Data						
Background Location Description:	**Background**	**Compliance**	**Background**	**Compliance**	**Background**	**Compliance**
Compliance Location Description:	**A.M. Mid-Depth**		**Mid-Day Mid-Depth**		**P.M. Mid-Depth**	
Collection Time						
Analysis Time						
Turbidity (NTU)						
Did Compliance Sample exceed 29 NTU's above Background Sample?	☐ Yes* ☐ No		☐ Yes* ☐ No		☐ Yes* ☐ No	

***If the 29 NTU limitation is exceeded, please describe cause and corrective actions taken on reverse side of this form. Immediately stop activities contributing to turbidity and notify the SFWMD Construction Manager and Permit Compliance Staff.**

Explanation of gaps in sampling activity (e.g., rained out, phased activity, etc.):

Construction activity complete and slopes stabilized? ☐ Yes ☐ No

Statement of Authenticity	
I certify this test was performed as required by Chapter 62-160, F.A.C., conducted with an approved instrument calibrated in accordance with the appropriate FDEP-SOPs. The results are complete and accurate.	
Print Name:	
Signature:	Date:

Additional Comments:

***Explain turbidity water quality standard exceedance (>29 NTU above background for Class III or > 0 NTU above background for an Outstanding Florida Water (OFW)) and describe corrective actions taken.**

SECTION 01531 MANATEE PROTECTION

[NTS: not every canal / waterbody is accessible to manatees. Utilize this specification for all projects that have manatee access per the September 2006 "Central and Southern Florida Project Manatee Accessibility" map or other waterways where manatees are potentially able to access the Work area of the Project and verify accessibility with the DISTRICT's Ecosystem Restoration Permit Acquisition and Compliance Section to confirm.]

PART 1 - GENERAL

1.01 SCOPE:

A. The scope of this SECTION is to instruct all personnel associated with the Work of the potential presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. All construction personnel are responsible for observing water-related activities for the presence of manatee(s).

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Marine Mammal Protection Act of 1972
2. Endangered Species Act of 1973
3. Florida Manatee Sanctuary Act of 1978
4. Standard Manatee Conditions for In-Water Work 2011
5. Observer Guidelines for Protected Species Monitoring Programs in Florida State Waters 2024
6. Grates and Other Manatee Exclusion Devices for Culverts and Pipes 2024

B. Related Work Specified Elsewhere:

1. SECTION 01300 Submittals

[NTS: The specification SECTIONs listed below may be related to the Project Work. This list is not intended to be all-inclusive, but the specifier should consider reviewing and including these SECTIONs in the Contract Documents as appropriate.

2. **SECTION 01530 Temporary Barriers and Controls**
3. **SECTION 01580 Project IDs and Informational Signs**
4. **SECTION 02435 Turbidity Control and Monitoring**
5. **SECTION 02436 Environmental Protection**
6. **SECTION 02368 Shaped Steel Section Piles [high velocity locations] or SECTION 02455 Round Timber Piling**
7. **SECTION 02821 Security Fencing]**

1.03 SUBMITTALS: The following Compliance Submittals are required:

A. Submittals shall be in accordance with SECTION 01300.

B. Proposed Manatee Exclusion and/or Monitoring Plan: The CONTRACTOR shall provide a plan that will be reviewed by the DISTRICT, and any required third-party reviews, for compliance with the

requirements specified herein. The CONTRACTOR is responsible for plan implementation and effectiveness. Review and acceptance of the CONTRACTOR's plan shall not relieve CONTRACTOR from executing work activities in accordance with this or other parts of the Contract Documents, and any required federal, state, and local regulations and/or acceptable practices. In-water Work shall not commence until the Plan is accepted by the DISTRICT and any third-party stakeholders, and all permits have been acquired and submitted as specified. The Plan shall include as a minimum:

1. Identification of qualified manatee monitor(s) including representative experience, contact information and other pertinent details.
2. The qualified observer(s) must be identified and submit documentation proving observational experience with water-related activities for approval by the DISTRICT. Observers to be DISTRICT-approved should demonstrate hands-on experience in spotting and identifying the marine species as well as experience implementing marine species protection protocols on projects with similar work. Observers are typically considered to have relevant experience when they have conducted observational work that is similar to the work proposed for a specific project and who are experienced in identifying and monitoring Florida coastal marine and estuarine species that may be present during in-water activities. In addition to the Florida manatee, these species can also include the Atlantic bottlenose dolphin, all marine turtle species, and smalltooth sawfish. Projects with greater risks to listed species require observers to have a significant amount of previous experience with similar project types or environmental circumstances. Examples of these greater-risk projects include, but are not limited to, movement or operation of dredging equipment, work barges/tugboats/workboats/crew boats, pile driving, pipeline mobilization, blasting, and any other work in known areas where the species aggregate.
3. Proposed location(s) of manatee monitor(s) during each phase of the Work; defining locations which provide an unobstructed ability to visually observe the water way**[, including, but not limited to observation during installation and removal of manatee barrier, if used on the Project.**
4. **Location of exclusion barrier and details related to access to the barrier for debris removal that may collect against the barrier as well as access and methods to provide an opening for passage of a manatee if found on the protected side of the barrier]**.

C. The CONTRACTOR shall provide a submittal signed and sealed by a Florida Professional Engineer that includes the following:

1. Calculations that show the barrier adequately anchored and has sufficient support to resist potential maximum flow velocity and build-up of debris and vegetation during construction.
2. The design shall consider water level fluctuations.
3. The barrier shall always extend at least two (2) feet above the water line to prevent manatees from going over the barrier.
4. There shall be no gaps along the bottom, sides or overlapping parts of the barrier in the water column.
5. The design shall provide removable openings for release of manatees if barrier fails, and they enter the active Work area. The openings shall be at least four (4) feet by four (4) feet.
6. The design shall provide access for repair, maintenance and removal of debris and vegetation.

PART 2 - PRODUCTS

2.01 Sign materials shall be in accordance with this SECTION and SECTION 01580 Project IDs and Informational Signs.

2.02 Turbidity curtains shall be in accordance with SECTION 02435 Turbidity Control and Monitoring.

2.03 Piles shall be in accordance with SECTION **[02368 Shaped Steel Section Piles][02455 Round Timber Piling]**.

2.04 Chain link fence shall be per SECTION 02821 Security Fencing.

PART 3 - EXECUTION

3.01 CIVIL AND CRIMINAL PENALTIES: The CONTRACTOR shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and the Florida Manatee Sanctuary Act of 1978. The CONTRACTOR may be held responsible for any manatee harmed, harassed, or killed as a result of construction activities.

3.02 SILTATION BARRIERS: Siltation barriers shall be installed and shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be monitored regularly to avoid manatee entanglement or entrapment. Exclusion barriers shall be installed in accordance with the Design Drawings or other DISTRICT approved plan. Exclusion and Siltation Barriers (Barriers) shall not impede manatee movement or block manatee entry to or exit from essential habitat. The CONTRACTOR shall maintain Barriers in proper working conditions at all times; shall inspect barriers regularly to ensure they are working properly and as intended; and repair barrier deficiencies within 24 hours of identifying a deficiency.

3.03 NO WAKE/IDLE SPEEDS: The CONTRACTOR is responsible for ensuring that all vessels associated with the Work shall operate at "No Wake/Idle" speeds at all times while in the immediate area and while in water where the draft of the vessel provides less than four feet clearance from the bottom. All vessels shall follow routes of deep water whenever possible.

3.04 VESSELS MUST BE SHUTDOWN: The CONTRACTOR and all on-site Project personnel are responsible for observing water-related Work activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the Project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

3.05 COLLISION WITH AND OR INJURY TO A MANATEE: Any collision with and/or injury to a manatee shall be reported immediately to the DISTRICT's representative and to the "Florida Fish and Wildlife Conservation Commission (FWC) Manatee Hotline" at 1-888-404-FWCC (1-888-404-3922). Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for North Florida Ecological Services Office or to Vero Beach (1-772-562-3909) for South Florida Ecological Services Office.

3.06 TEMPORARY MANATEE AWARENESS SIGN: The CONTRACTOR shall post temporary signs concerning manatees prior to and during all in-water Project activities, including construction/dredging activities. Awareness signs that have already been approved for this use by the FWC must be used. Samples of manatee signage are included at the end of this specification. All temporary manatee signs posted by CONTRACTOR in the Work area shall be removed upon completion of the Project. At least one (1) sign which reads Caution Boaters: Watch for Manatees shall be posted in a location where it is prominently visible to water related construction crews. A second sign measuring at least 8 ½ inches by 11 inches explaining the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations shall be posted by CONTRACTOR in a location prominently visible to all personnel engaged in water-related activities. The second sign shall read:

> **Caution: Manatee Habitat. Idle speed is required if operating a vessel in the construction area. All equipment must be shut down if a manatee comes within 50 feet of the operation. A collision with and/or injury to a manatee shall be reported immediately to the Florida Marine Patrol on channel 16 or at 1-888-404-FWCC (1-888-404-3922).**

3.07 PERMANENT MANATEE AWARENESS SIGN: The CONTRACTOR shall install and maintain a permanent manatee awareness sign at the docking facility. The sign shall be three feet by four feet, 125 gauge 61TS aluminum, covered with white and blue, engineer grade, reflective sheeting: black and white, painted lettering: black screened design: and black, engineer grade, reflective tape border. The 3 feet wide by 4 feet long sign shall conform to the Florida Uniform Waterway marking System in accordance with F.S. 327.40-1. The installation of the permanent sign shall be made in accordance with DEP Specification for such signs.

3.08 VERIFICATION: Verification (photos) that permanent signs have been installed at designated locations shall be provided by the CONTRACTOR to the DISTRICT before the docking facility begins operations. Signs and pilings remain the responsibility of the owner(s) and are to be maintained for the life of the docking facility.

3.09 OBSERVATION: To protect marine species, the Project requires at least one qualified observer **[upstream and one qualified observer downstream of the Work Site]** to monitor the Project area during water-related (in-water/over-water) activities. The number of required observers is site and activity specific. Observer survey locations may include aerial, boat-based, and/or land-based positions. An observer is required to be in their predetermined survey location with an optimum view of activities prior to and during water-related activities and must not perform any other duties while actively observing. Refer to the Florida Fish and Wildlife Conservation Commission's Observer Guidelines for Protected Species Monitoring Program in Florida State Waters dated July 25, 2024, for additional information regarding observer qualifications and responsibilities. CONTRACTOR shall provide a manatee monitoring plan that includes a map depicting the manatee observer locations, qualifications of the proposed observer(s), and work schedule for DISTRICT review and approval prior to the commencement of the in-water activities which may impact manatee.

[NTS: Designer shall determine if manatee exclusion devices are applicable to the Project and modify this SECTION as needed. The current version of DISTRICT design detail drawing C6 in Documentum dated December 2022 does not reflect revisions that are underway, regarding manatee exclusion devices. If DISTRICT design detail drawing C6 is not to be adapted to the site-specific conditions and presented in the Drawings and if the area is a low flow condition, use Figure 1 below, do not use both Figure 1 and details in the Drawings.

3.10 **MANATEE EXCLUSION DEVICE: The CONTRACTOR shall install manatee exclusion devices where necessary to prevent manatees from entering the active Work area (Figure 1). The device(s) shall be installed and relocated as necessary based on Project demand or progression.**

CONTRACTOR shall, in coordination with the DISTRICT's Ecosystem Restoration Permit Acquisition and Compliance Section, conduct a survey one (1) hour prior to and one (1) hour following the installation of the manatee exclusion device to verify and avoid entrapment of manatee or other protected marine species within the construction work zone. This will be performed by the CONTRACTOR in addition to, not as a substitute for, the CONTRACTOR required observer(s) for the in-water Work associated with the installation of the barrier. Allow at least two (2) weeks advance notice for scheduling of DISTRICT personnel for each survey. [NTS: Discuss increasing or decreasing this quantity depending on whether the Work area is likely to require a separate manatee exclusion barrier upstream and downstream of the Work, or at multiple separate sites.] If the CONTRACTOR's sequence of work would require more than the [four (4)] surveys which would be performed as follows: one each at initial installation upstream of the construction zone, downstream of the construction zone, and subsequent separate survey for removal from each of these installation locations, [reinstallation at another location and the subsequent removal to accommodate the progression of the Work]. Removals shall be completed within the same day, or if in phases, shall be performed in a manner that does not create circumstances of entrapment/entanglement.

A. **Regular dive inspections by the CONTRACTOR are required to assure that the barrier is properly anchored at the bottom and that there are no gaps. These inspections shall occur at installation as well as after all storm events with canal flow, all debris removal activities, and/or any manatee release activities, but not less than one inspection per [thirty] day period.]**

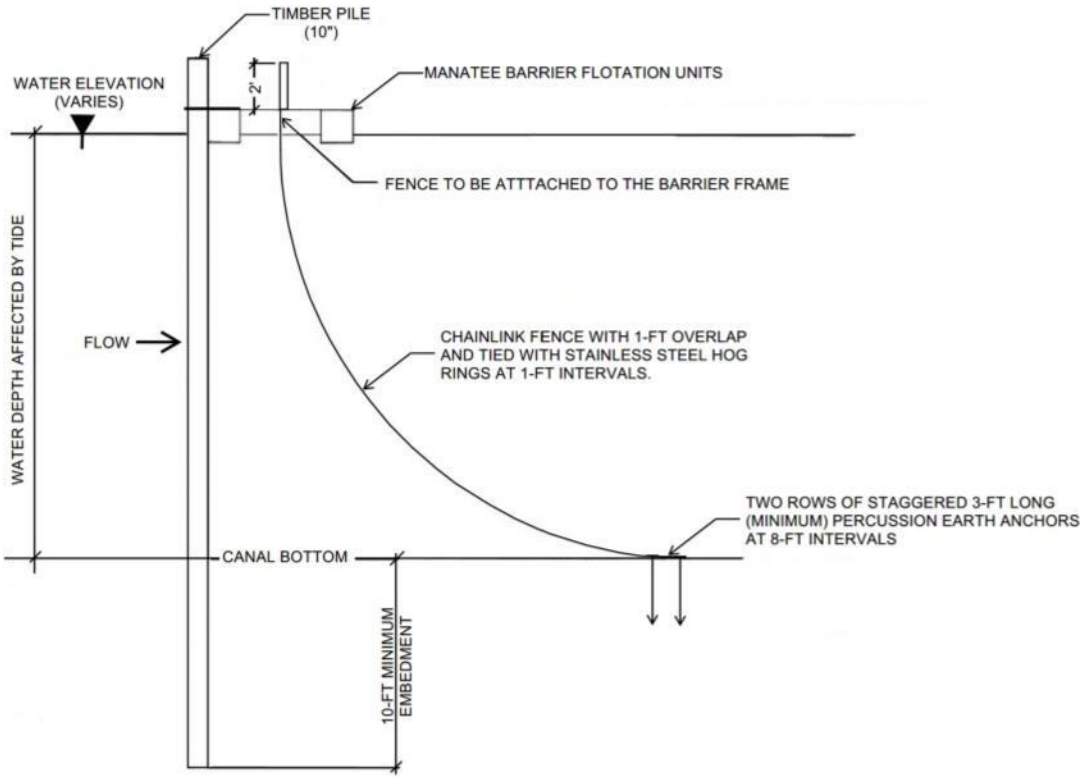

Figure 1. Typical Manatee Exclusion Device]

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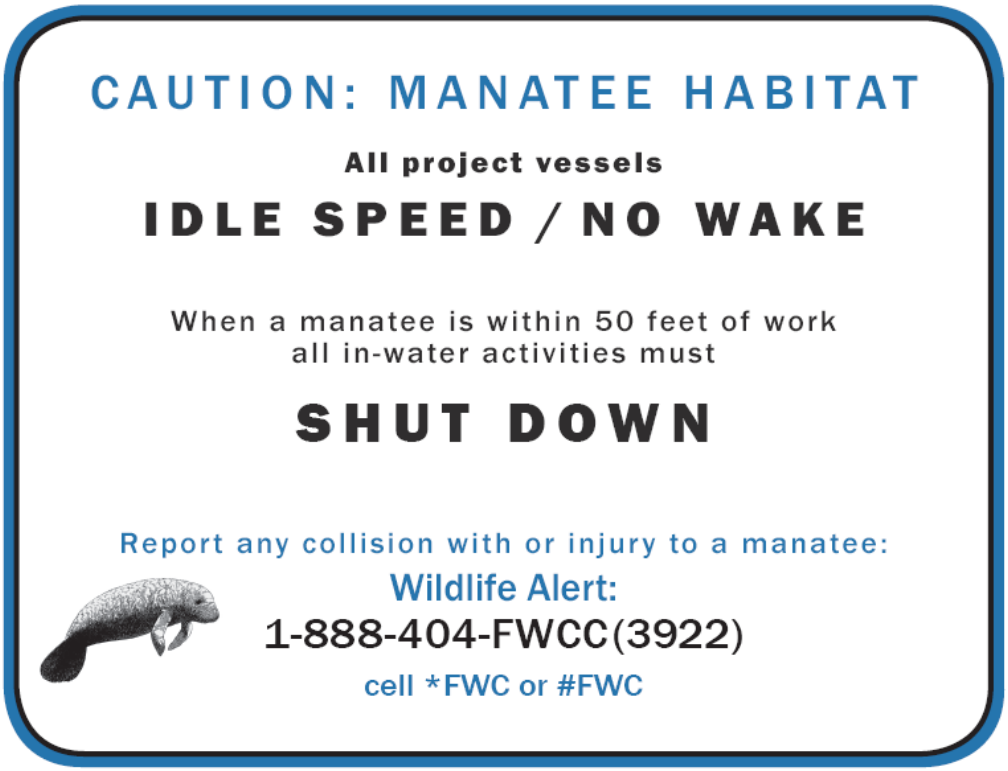
Sign 1: Caution Manatee Area

Sign 2: Idle Speed/No Wake



END OF SECTION

SECTION 02436 ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall provide all labor, equipment and materials necessary for the prevention of environmental damage as the result of construction operations under this Contract and for those measures set forth in other requirements of the Technical Specifications.

B. Related Work Specified Elsewhere:

1. SECTION 01300 Submittals

[NTS: The specification sections listed below may be related to the Project Work. This list is not intended to be all-inclusive, but the specifier should consider reviewing and including these sections in the Contract Documents as appropriate.

2. **SECTION 01531 Manatee Protection**

3. **SECTION 02435 Turbidity Control and Monitoring]**

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Environmental Protection Agency (EPA):
   a. Clean Air Act (CAA)
   b. Clean Water Act (CWA)
   c. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
   d. Executive Orders and EPA requirements, as appropriate; and all general and specific Federal Permit Conditions as applicable.
   e. Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
   f. National Environmental Laboratory Accreditation Conference (NELAC)
   g. National Environmental Policy Act (NEPA)
   h. National Pollutant Discharge Elimination System (NPDES)
   i. Resource Conservation and Recovery Act (RCRA)
   j. Safe Drinking Water Act
   k. Toxic Substance Control Act (TSCA)
2. Code of Federal Regulations (CFR):
   a. 40 CFR - Parts 109, 261.10, 260-268, 273, 279
3. Florida Department of Environmental Protection (FDEP):
   a. Florida Administrative Code (FAC)
      i. 62-770, 62-780
   b. Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual
4. Florida Department of Transportation (FDOT):
   a. Standard Specification for Road and Bridge Construction - Sections 104-1, 2, 3, 4, 6 and 7
5. Florida Statutes
   a. Chapter 403
6. National Oceanic and Atmospheric Administration (NOAA):
   a. Coastal Zone Management Act (CZMA)
7. National Park Service (NPS):
   a. Native American Graves Protection and Repatriation Act (NAGPRA)

b. National Historic Preservation Act (NHPA)

8. U.S. Army Corps of Engineer (USACE)

9. U.S. Fish & Wildlife Service (FWS):

a. Endangered Species Act (ESA)

b. Fish and Wildlife Coordination Act (FWCA)

c. Migratory Bird Treaty Act (MBTA)

B. State and local codes, permits, regulations and ordinances as applicable.

1.03 DEFINITIONS: For the purpose of this SECTION, environmental damage is defined as the presence of hazardous, physical, or biological elements or agents which alter the physical, chemical or biological integrity of the environment in such a way that it represents an unacceptable risk to public health, safety or welfare; unfavorably alter ecological balances; affect other species, biological communities, or ecosystems; or degrade the quality of the environment for aesthetic, cultural, and/or historical purposes. The control of environmental damage requires consideration of land, water, and air, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

1.04 SUBMITTALS: Within 20 calendar days after the Notice to Proceed (NTP), the CONTRACTOR shall submit an Environmental Protection Plan (Plan) for review and acceptance by the DISTRICT in accordance with SECTION 01300. Approval of the Plan shall not relieve the CONTRACTOR of its responsibility for adequate and continuing control of pollutants and appropriate environmental protection measures. Approval of the Plan is conditional and predicated on satisfactory performance during construction. The DISTRICT reserves the right to require the CONTRACTOR to modify the Plan if it is determined that environmental protection requirements are not being met. No physical Work at the Site shall begin prior to acceptance of the Plan. The Plan shall include, but not be limited to the following:

A. Submittals shall be in accordance with SECTION 01300.

B. A list of the Federal, State and Local laws, regulation and permits concerning environmental protection, pollution control and abatement that are applicable to the CONTRACTOR's proposed operations and the requirements imposed.

C. Methods for protection of features to be preserved within the authorized Work areas: The CONTRACTOR shall prepare a listing of methods to protect resources needing protection (trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil and historical, archeological and cultural resources).

D. Procedures to be implemented are to provide all necessary environmental protection and to comply with permits and applicable laws and regulations: The CONTRACTOR shall provide written assurance that immediate corrective action will be taken to correct any environment damage due to accident, natural causes or failure to follow the procedures set out in accordance with the Plan.

E. Environmental monitoring plans, if applicable.

F. Traffic control plan, if applicable.

G. Drawings showing locations of proposed temporary activities, such as material storage areas or stockpiles of excess spoil or materials.

H. Erosion and sediment control methods, for protecting surface waters, wetlands, and groundwater during construction. All stormwater and erosion control methods shall be in accordance with the FDEP Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual. The CONTRACTOR shall prevent and control erosion and water pollution as per FDOT Specification Sections 104-1, 2, 3, 4, 6 and 7 and all applicable FDEP regulations and permit conditions.

I. Spill Prevention Methods: The CONTRACTOR shall identify any hazardous or potentially hazardous substances to be used on the Site and indicate intended actions to prevent accidental or intentional introduction of these materials into the air, ground, water, wetlands or drainage areas. The Plan shall specify the actions that will be taken to meet the federal, state and local laws regarding labeling, storage, removal, transport and disposal of all hazardous or potentially hazardous substances.

J. Spill Contingency Plan for hazardous, toxic or petroleum material.

K. A Work area plan, showing proposed activities and identifying areas of limited use or non-use, and including measures that will be taken for field identification of these areas.

L. Identification of the person who shall be responsible for implementation of the Plan. This person shall have authority to respond for the CONTRACTOR in all environmental protection matters.

M. A recycling and waste management plan. The CONTRACTOR shall include waste minimization efforts in the Plan.

1.05 QUALIFICATIONS:

A. The CONTRACTOR shall provide access to the Work for the DISTRICT as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice of its intention to begin new Work activities.

B. When the Eastern Indigo Snake is identified as a species of concern in the environmental permits the CONTRACTOR shall supply qualified eastern indigo snake observers during ground clearing activities. Qualified Observers are defined as individuals who have been instructed by the DISTRICT on proper techniques and protocols for protection of the Eastern Indigo Snake during Site activities. The observer's names and documentation showing completion of the DISTRICT's instruction shall be provided to the DISTRICT at least 2 weeks prior to the commencement of ground clearing activities.

1.06 RESPONSIBILITIES:

A. Quality Control: The CONTRACTOR shall establish and maintain quality control for the environmental protection of all items set forth herein. The CONTRACTOR shall record on daily quality control reports or attachments thereto, any problems in complying with applicable laws, regulations and ordinances, and corrective action(s) taken.

B. Permits and Authorizations: The CONTRACTOR shall apply for and obtain all necessary permits or licenses unless the DISTRICT has already acquired them. The CONTRACTOR shall be responsible for implementing and complying with all terms, conditions and requirements of all permits issued for construction of the Project, including conditions, restrictions, or work limitations as specified in permit documents, including but not limited to, Biological Opinions and Mitigation Plans. The CONTRACTOR shall install speed limit signs for off-road and improved road travel for construction equipment and employee vehicles that identify speeds protective of wildlife. The CONTRACTOR shall also provide all necessary signage describing all Threatened and/or Endangered species which are identified in applicable environmental permits.

C. Training: Prior to the onset of construction activities the CONTRACTOR and all personnel shall be trained on how to identify and implement the Standard Protection Measures and Guidelines for Threatened and Endangered Species and ground-nesting birds. The Standard Protection Measures for the Eastern Indigo Snake dated August 12, 2013, is attached in Appendix C.

1.07 CERTIFICATIONS AND TESTINGS: All physical, chemical, and biological measurements and analyses that are necessary to comply with the monitoring requirements in all applicable permits or in this Contract must be performed according to approved methods and procedures by a commercial laboratory that is certified to perform the required analyses according to the approved methods and procedures by the National Environmental Laboratory Accreditation Conference (NELAC).

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the Work for the DISTRICT as requested for inspection. The CONTRACTOR shall provide to the DISTRICT at least 48 hours advance notice of its intention to begin new Work activities.

PART 2 - PRODUCT (ENVIRONMENTAL PROTECTION PLAN)

2.01 NOTIFICATION:

A. In the event that the DISTRICT notifies the CONTRACTOR of any non-compliance with federal, state or local laws, permits or other elements of the CONTRACTOR's Environmental Protection Plan, the CONTRACTOR shall without delay inform the DISTRICT of the proposed correction action and take such action as approved.

B. The CONTRACTOR shall notify the DISTRICT immediately of any warnings or notices of noncompliance, fines, citations or tickets issued directly to the CONTRACTOR by any federal, state, or local environmental protection, waste management, code enforcement, or fire, police, or public health agency.

C. If the CONTRACTOR fails to comply, the DISTRICT may order all Work to cease until corrective action has been taken. No time extensions shall be granted or damages allowed for the suspension of Work under this circumstance.

D. A Notice of Termination (NOT) shall be sent to the applicable federal, state, and local permit-issuing authorities with a copy to the DISTRICT within 14 days of final stabilization

2.02 SUMMARY: The CONTRACTOR shall submit a written report within 30 days of completion of the Project. This report shall delineate the absence, or occurrence, of reported or unreported environmental incidents during the course of the Project.

2.03 TRAINING:

A. The CONTRACTOR shall train its personnel in relevant phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, and careful installation and monitoring of the Project to ensure continuous environmental pollution control.

B. Due to the probability that wildlife species of concern, including but not limited to Threatened and/or Endangered species and Protected Migratory Bird species may be present within or adjacent to construction sites, it is the CONTRACTOR(s) responsibility to ensure that all personnel working on the Project receive Threatened and Endangered Species Training, Qualified Eastern Indigo Snake Training, and Ground Nester Training obtained from the DISTRICT's Permitting and Compliance Section, or DISTRICT's approved designee, as necessary and in accordance with applicable laws or regulations.

PART 3 - EXECUTION (PROTECTION OF ENVIRONMENTAL RESOURCES)

3.01 GENERAL: During the entire period of the Contract, the CONTRACTOR shall protect environmental resources within the Project boundaries and those affected outside the limits of construction. The CONTRACTOR shall confine its activities to the areas defined by the Drawings and specifications. Any deviations from the Drawings including, but not limited to borrow areas, disposal areas, staging areas, and alternate access routes will require additional review by the DISTRICT to ensure compliance with applicable environmental rules and regulations prior to implementation/or commencement of those deviations.

3.02 PROTECTION OF LAND RESOURCES: Prior to the beginning of any construction the CONTRACTOR shall delineate, install protection and be responsible for preservation of all land resources that are to be preserved or avoided within the Work area. The CONTRACTOR shall not remove, cut, deface, injure, or destroy any land resources (trees, shrubs, vines, grasses, topsoil, or land-forms) unless indicated in the Drawings or specifically authorized by the DISTRICT. All damaged areas shall be restored to original or better condition, to the satisfaction to the DISTRICT.

3.03 DISTURBED AREAS: The CONTRACTOR shall effectively prevent erosion and control sedimentation through approved materials and methods as identified in the Environmental Protection Plan. Disturbed areas will include areas of ingress and egress, construction materials storage, staging, washdown areas, and toxic, hazardous, and solid materials/waste storage areas. Disturbed areas shall be temporarily stabilized within 7 days of cessation of phased construction activity and permanently stabilized within 14 days of cessation of all phases of construction activity. Temporary Best Management Practices (BMPs) shall remain in place and in effect until the final Site inspection is complete and Site is certified as stabilized.

3.04 PROTECTION OF WATER RESOURCES:

A. The CONTRACTOR shall conduct all activities in a manner to avoid pollution of surface water, ground water and wetlands. The CONTRACTOR's construction methods shall protect wetland and surface water areas from damage due to mechanical grading, erosion, sedimentation and turbid discharges. No storage or stockpiling of equipment shall be allowed within any wetland area unless specifically authorized under a permit for the Project.

B. Water directly derived from construction activities shall not be allowed to directly discharge to water areas, but shall be collected in retention areas to allow settling of suspended materials. The CONTRACTOR shall monitor water quality of dewatering discharge into water bodies or leaving the Site in accordance with applicable environmental permits. All monitoring of any water areas that are affected by construction activities shall be the responsibility of the CONTRACTOR.

3.05 OIL, FUEL AND HAZARDOUS SUBSTANCE SPILL PREVENTION:

A. The CONTRACTOR shall prepare a spill contingency plan in accordance with 40CFR, Part 109. The CONTRACTOR shall prevent oil, fuel or other hazardous substances from entering the air, ground, drainage, and local bodies of water or wetlands. In the event that a spill occurs, despite design and procedural controls, the CONTRACTOR shall take immediate action to contain and clean up the spill and report the spill immediately to the DISTRICT and to other appropriate federal, state, and local agency contacts. Reportable quantities (greater than 25 gallons) of petroleum-based fluids must be reported within 1 hour to the National Response Center (800-424-8802) and State Warning Point (800-320-0519) if it reaches the waters of the state or, if not, within 24 hrs to State Warning Point. Toxic and hazardous substance spills directly into waters of the state, in any quantity, must be reported immediately to the DISTRICT and those federal and state points of contact listed above.

B. The CONTRACTOR shall submit a written report to the DISTRICT and to the State of Florida Bureau of Emergency Response providing certification of commitment of manpower, equipment and materials necessary to prevent the spread and effect expeditious cleanup and disposal. This report shall be submitted within 48 hours of the spill event.

3.06 MATERIALS AND WASTE MANAGEMENT:

A. For sanitary waste management, the CONTRACTOR shall ensure that portable restrooms will be anchored on level ground with at least a 15-foot set-back from water bodies or banks or slopes thereto. For solid waste management, dumpster(s) will either be outfitted with a water-tight cover or be covered with a tarpaulin when not in use to minimize infiltration and leaching of rain with at least a 15-foot set-back from water bodies, conveyances thereto, or banks or slopes thereto. Hazardous materials storage areas and liquid refuse and hazardous waste collection and storage areas shall be denoted on the Plan.

B. The CONTRACTOR shall ensure toxic substances and hazardous materials are stored in a locked, blast-resistant shed anchored to a bermed concrete or asphalt pad on level ground with at least a 15-foot setback from any water bodies, conveyances thereto, or banks or slopes thereto.

C. For solid and/or hazardous waste disposal involving lead-based paint, the CONTRACTOR shall ensure containers with Toxicity Characteristic Leaching Procedure – Tetraphenylborate (TCLP TPb) concentrations in excess of the Resource Conservation and Recovery Act (RCRA) action level will be transported by a licensed hazardous waste hauler to a licensed hazardous waste disposal facility within the time limit appropriate to the generation rate and accumulated volume of hazardous waste material. Containers with TCLP TPb concentrations less than the RCRA action level shall be transported by a licensed solid waste hauler to a licensed Class I solid waste disposal facility. In either case, the CONTRACTOR shall obtain and transmit signed and dated copies of the transport and disposal manifests to the DISTRICT's for records retention.

D. The CONTRACTOR is prohibited from the on-site burning of hazardous wastes (aerosol cans, oil filters, etc.). All hazardous wastes shall be disposed of as required by law. Copies of relevant Material Safety Data Sheets (MSDSs) shall be appended to the Environmental Protection Plan, Safety Plan, Spill Prevention Plan, and Stormwater Pollution Prevention Plan (SWPPP).

E. The CONTRACTOR is responsible for the materials and processes where wastes may be generated under the contracted activities. The CONTRACTOR is responsible for providing the materials in order to implement the Contract and is responsible for operating and maintaining any processes from which waste material may be generated.

F. The CONTRACTOR is deemed to be the "generator" as defined in 40 CFR 261.10 for any hazardous wastes or spill residue that is generated during the activities encompassed in this Contract. It is recognized that it is the CONTRACTOR's or a subcontractor of the CONTRACTOR whose act first causes a hazardous waste to become subject to regulation. The CONTRACTOR is a different legal entity from the owner/operator of the physical location/property where the contracted activities will be conducted. CONTRACTOR is a "person" within the meaning of Section 403.031(5), Florida Statutes.

G. The CONTRACTOR is responsible for compliance with applicable standards of 40 CFR 260-268 and 40 CFR 273 and 279 and state regulations which adopt or reference these federal standards.

H. The CONTRACTOR is responsible for the generation and retention of records associated with waste management practices and disposition. All records shall be maintained for a minimum of 3 years from the date of generation. All records will be made available to the DISTRICT or regulatory agencies upon request.

I. In the event of any chemical discharges associated with CONTRACTOR's or subcontractor's activities, CONTRACTOR shall be responsible for reporting, assessment and remediation of such discharges in accordance with applicable federal, state or local regulations and/or guidelines including, but not limited to, 40 CFR 264/265, Chapter 62-770, Florida Administrative Code (F.A.C.) and Chapter 62-780, F.A.C.

3.07 INVASIVE AND NUISANCE SPECIES:

A. Prevention of Invasive and Nuisance Species Transfer

1. CONTRACTOR shall thoroughly clean equipment prior to and following Work on the Site to ensure that items/materials including, but not limited to, soil, vegetative debris, eggs, mollusk larvae, seeds, and vegetative propagules are not transported from a previous work location to this Project Site, nor transported from this Project Site to another location. Prevention protocols require cleaning all equipment surfaces, including but not limited to, undercarriages, tires and sheet metal. All equipment, including but not limited to heavy equipment, vehicles, trailers, ATVs, and chippers shall be cleaned. Smaller equipment, including, but not limited to, chainsaws, loppers, shovels, and backpack sprayers, shall be cleaned and inspected to ensure they are free of eggs, vegetative debris, vegetative propagules, etc. CONTRACTOR may utilize any method accepted by the DISTRICT; common accepted methods include pressure washing and steam cleaning/washing equipment. Prevention protocols shall also address clothing and personal protective equipment.
2. Prior to the commencement of Work, CONTRACTOR shall complete and provide an invasive and nuisance species transfer prevention plan to the DISTRICT for approval. This plan shall be part of the Environmental Protection Plan as defined in paragraph 1.04 of this SECTION. The invasive and nuisance species transfer prevention plan shall identify specific transfer prevention procedures and designated cleaning sites/locations. Prevention protocols may vary depending upon the nature of the Project Site. Ensure all equipment coming onto and leaving the Project Site is inspected and not harboring materials that would spread, or potentially spread, invasive and nuisance species onto or off the Project Site. Provide a report verifying equipment brought on Site was cleaned and shall provide a report verifying equipment was cleaned prior to removal from the Project Site.
3. Work delays due to the fault and/or negligence of the CONTRACTOR or the CONTRACTOR's failure to comply with this specification shall not be compensable.

B. Invasive and Nuisance Species Reporting

1. Report sightings of invasive and nuisance species not identified and documented in the pre-construction condition within 24 hours. The reporting shall include the date, time, location (latitude and longitude preferred), environmental conditions, circumstances surrounding the sighting, disposition/behavior of the species, and any other notable observations. Pictures of the reported species are desirable. Reporting shall be made to the DISTRICT __
2. Within 30 calendar days following completion of Work, provide a report with photographs verifying equipment brought on Site was cleaned. Provide a report with photographs verifying equipment was cleaned prior to removal from the Project Site.

3.08 FISH AND WILDLIFE RESOURCE PROTECTION: The CONTRACTOR shall control and minimize interference with, disturbance to, and damage of fish and wildlife resources.

A. If adverse impacts occur to fish and wildlife species of concern, including but not limited to Threatened and/or Endangered Species and Protected Migratory Bird Species, the CONTRACTOR shall immediately notify the DISTRICT and provide details of adverse impacts for determination of further action that may be required. Adverse impact is defined as any harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such activity. Threatened and/or Endangered Species that require specific protection measures as identified in the environmental permits shall be listed in the Environmental Protection Plan.

B. In the event that the DISTRICT determines that an adverse impact to species of concern, including but not limited to Threatened and/or Endangered Species and Protected Migratory Bird Species occur as a result of the construction activities, the DISTRICT shall notify the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service for determination of further action and possibly to determine if seasonal or daily timing restrictions on construction activities is needed.

C. The CONTRACTOR and all personnel shall be familiar with the Plan shall be able to identify the threatened and endangered species listed in the Plan. Any activity observed by the CONTRACTOR that may result in

adverse impact to threatened or endangered species shall be reported immediately to the DISTRICT, who shall have sole authority for any Work stoppages, creation of a buffer area, or restart of construction activities.

D. Any Threatened and/or Endangered Species and species of concern observed at the Site will be recorded and logged. The logs shall be provided to the DISTRICT on a bi-weekly basis. See attached Wildlife Log, Appendix A. If nesting activity is detected within and/or adjacent to the Site, the CONTRACTOR shall immediately contact the DISTRICT for determination of further action and possibly to determine if seasonal or daily timing restrictions on construction activities is needed.

E. The CONTRACTOR shall keep construction activities under surveillance, management, and control to prevent impacts to migratory birds and their nests. The CONTRACTOR may be held responsible for harming or harassing the birds, their eggs or their nests as a result of the construction. Any nesting activity observed by the CONTRACTOR shall be reported immediately to the DISTRICT's Construction Manager who shall have sole authority for any Work stoppages, creation of the buffer area, or restart of construction activities.

[NTS: The following sentence is an example and should be modified for the specific Site conditions. The CONTRACTOR shall be aware that the Crested Caracara, indigo snake, and gopher tortoise, though not known to inhabit the Site, have been known to inhabit and nest in County.]

[NTS: The following sentence is an example and should be modified for the specific Project. The CONTRACTOR shall conduct the Work consistent with permit and Biological Opinions requirements and recommendations for the protection of species.]

3.08 ENVIRONMENTAL PROTECTION RETENTION RECORD RETENTION: The CONTRACTOR shall retain a copy of all required permits, the Plan, the SWPPP, the Spill Prevention Plan, and all associated reports, records and documentation required by these permits or the Contract at the construction Site or an appropriate alternative location as specified in the Notice of Intent (NOI) from NTP through Notice of Termination (NOT). Such documentation includes but is not limited to soil disturbance and stabilization logs, inspection and corrective action logs, turbidity monitoring logs, wildlife observation logs and reports, TCLP and Synthetic Precipitation Leaching Procedure (SPLP) assay results, sanitary, solid, and hazardous waste transport and disposal manifests, spill reports, material safety data sheets, and any warnings, citations or notices of noncompliance, or fees, levees, fines or penalties. A copy of all such records shall be submitted to the DISTRICT at the time of Contract close-out.

3.09 PROTECTION OF AIR RESOURCES: The CONTRACTOR shall minimize pollution of air resources. All activities, equipment, processes and Work operated or performed in accomplishing the specified construction shall be in strict accordance with the applicable air pollution standards of the State of Florida (F.S. Chapter 403 – Environmental Control and F.A.C. Section 200 – Recirculation Chiller) and all Federal emission and performance laws and standards as applicable. This includes, but is not limited to, control of particulates, dust generated by or incidental to construction activities, burning and odors.

3.10 PRESERVATION AND RECOVERY OF HISTORIC, ARCHEOLOGICAL, AND CULTURAL RESOURCES: If applicable, known historic, archeological and cultural resources within the CONTRACTOR's Work area(s) will be designated as a "Sensitive Environmental Area" on the Drawings or other documents. If so designated, the CONTRACTOR shall install protection for these resources and shall be responsible for their preservation during the Contract's duration. The CONTRACTOR shall not distribute maps or other information on these resource locations except for distribution among the CONTRACTOR's staff with a "need to know" technical responsibility for protecting the resources.

A. Inadvertent Discoveries: If, during construction or other activities, the CONTRACTOR observes items that may have historic or archeological value, such observations shall be reported immediately to the DISTRICT so that the appropriate staff may be notified and a determination made for what, if any, additional action is needed. Examples of historic, archeological and cultural resources are bones, remains, artifacts, shell, midden, charcoal or other deposits, rocks or coral, evidences of agricultural or other human activity, alignments, and constructed features. The CONTRACTOR shall cease all activities that may result in the destruction of these resources and shall prevent his employees from further removing, or otherwise damaging, such resources.

B. Claims for Downtime due to Inadvertent Discoveries: Upon discovery and subsequent reporting of a possible inadvertent discovery of cultural resources, the CONTRACTOR shall seek to continue Work well away from, or otherwise protectively avoiding, the area of interest, or in some other manner that strives to continue productive activities in keeping with the Contract. Should an Inadvertent Discovery be of the nature that substantial impact(s) to the Work schedule are evident; such delays shall be coordinated with the DISTRICT.

END OF SECTION

Appendix A
Wildlife Log

For Threatened and/or Endangered Species and Species of Concern Listed in Permit

Wood Storks Sightings, since they are so abundant, will be logged on a bi-weekly basis in coordination with Bi-weekly Construction Progress Meetings and will be reported quarterly along with other sightings.

☐ **Eastern Indigo Snake** ☐ **Bald Eagle** ☐ **Wood Stork** ☐ **Florida Panther** ☐ **Caracara** ☐ **Gopher Tortoise** ☐ **Other**_____	
Project Name	
Date of Sighting	
Time of Sighting	
Temperature	
Wind (mph)	
Weather Conditions (ex: note sky cover, raining, humid, cloudy, sunny, cool, hot, etc)	
Construction Activity Occurring	
Equipment being Used	
Condition of Animal (ex: injured, unharmed, etc)	
Behavior of Animal (ex: disoriented, aggressive, etc)	
Actions taken after sighting	
Size of Animal	
GPS Coordinates/Specific Location	
Pictures Taken (Attach pictures)	
Date this form was completed	
Observers Company/Agency	
Observers Name	Print Name:
	Signature:
Observers Contact Info	Office:
	Cell:
	Email:

EXAMPLE FORM
Wildlife Log

For Threatened and/or Endangered Species and Species of Concern Listed in Permit

Wood Storks Sightings, since they are so abundant, will be logged on a bi-weekly basis in coordination with Bi-weekly Construction Progress Meetings and will be reported quarterly along with other sightings.

☑ **Eastern Indigo Snake** ☐ **Bald Eagle** ☐ **Wood Stork** ☐ **Florida Panther** ☐ **Caracara** ☐ **Gopher Tortoise** ☐ **Other**_____	
Project Name	C-44 Reservoir
Date of Sighting	Tuesday, January 29, 2008
Time of Sighting	0900
Temperature	75°
Wind (mph)	5-10 mph
Weather Conditions (ex: note sky cover, raining, windy, humid, cloudy, sunny, cool, hot, etc)	Partial cloud/Sunny
Construction Activity Occurring	Demobilization of Construction Trailers, nothing near the area snakes were sighted
Equipment being Used	n/a
Condition of Animal (ex: injured, unharmed, etc)	Good
Behavior of Animal (ex: disoriented, aggressive, etc)	under a door in an abandoned citrus office
Actions taken after sighting	Determined sex, took photos, estimated size
Size of Animal	Approx 6’
GPS Coordinates/Specific Location	N 27 05 33.59 W 80 26 59.90 NE Corner of Project along Eastern Levee
Pictures Taken (Attach pictures)	Yes, attached
Date this form was completed	Tuesday, February 5, 2008
Observers Company/Agency	Land Clearing Inc.
Observers Name	Print Name:
	Signature:
Observers Contact Info	Office:
	Cell:
	Email:

EXAMPLE

Appendix B

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

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

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

August 12, 2013

ATTENTION:

THREATENED EASTERN INDIGO SNAKES MAY BE PRESENT ON THIS SITE!!!

Please read the following information provided by the U.S. Fish and Wildlife Service to become familiar with standard protection measures for the eastern indigo snake.

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

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

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

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

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

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

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

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

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

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

ATTENTION:
THREATENED EASTERN INDIGO SNAKES MAY BE PRESENT ON THIS SITE!!!

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

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

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

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

USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:
North Florida Field Office – (904) 731-3336
Panama City Field Office – (850) 769-0552
South Florida Field Office – (772) 562-3909

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

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

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

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

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

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

August 12, 2013

G.1.3 U.S. Fish and Wildlife Service Informal Consultation Response

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BOULEVARD
JACKSONVILLE, FLORIDA 32207

November 21, 2025

Planning and Policy Division
Environmental Branch

Florida Ecological Services Field Office

Service Project Code No. 2026-0020163

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

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

Digitally signed by CHRISTOPHER PUTNAM
Date: 2026.02.26 14:03:13 -05'00'

Environmental Review Supervisor

Mr. Jose Rivera
Supervisor, Environmental Review and Consult
Florida Ecological Services Field Office
777 37th Street, Suite D-101
Vero Beach, Florida 32960

Dear Mr. Rivera:

In accordance with provisions of Section 7 of the Endangered Species Act (ESA) of 1973, as amended, the Jacksonville District, U.S. Army Corps of Engineers, (USACE), is hereby initiating informal consultation with the U.S. Fish and Wildlife Service (USFWS) concerning the Central and Southern Florida (C&SF) Flood Resiliency (Section 203) Study for Broward Basins (Section 203 Study) and the resulting Tentatively Selected Plan (TSP). The South Florida Water Management District (SFWMD) is undertaking a Section 203 Study pursuant to Section 203 of the Water Resources Development Act (WRDA) of 1986, as amended, and is preparing a feasibility report for a C&SF Flood Resiliency (Section 203) Broward Basins project. The Section 203 Study for Broward Basins is located within the Broward and Palm Beach Counties, Florida.

The purpose of the SFWMD Section 203 Study is to develop and evaluate continued and improved flood risk management and resiliency solutions that align with the Federal Objective, as described in Section 2031 of the WRDA of 2007. The need for the SFWMD Section 203 Study is driven by several factors: significant physical, hydrological, climatological, demographic, and economic changes; and increasing flood risks in the 420-square-mile Section 203 Study Area. The enclosed document contains additional information about the SFWMD 203 Study for Broward Basins and supporting information for ESA effects determinations for threatened and endangered species and critical habitats within the action area.

The USACE has determined that the proposed action “may affect, but is not likely to adversely affect” Florida bonneted bat (*Eumops floridanus*), West Indian manatee (*Trichechus manatus latirostris*; manatee), Eastern black rail (*Laterallus jamaicensis jamaicensis*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*; snail kite), wood stork (*Mycteria americana*), Eastern indigo snake (*Drymarchon corais couperi*), monarch butterfly (*Danaus plexippus*), American crocodile (*Crocodylus acutus*), and tricolored bat (*Perimyotis subflavus*; proposed endangered). The USACE has also

determined that the proposed action will not result in adverse modification of proposed critical habitat for the manatee. The USACE requests concurrence from the USFWS on the effects determinations for listed species and critical habitat within 30 days of receipt of this letter If you have any questions or concerns, please contact Mr. Jacob Thompson by email at Jacob.s.thompson@usace.army.mil or by telephone at 904-232-1893 regarding this letter.

Sincerely,

EHLINGER.GRETCHEN.SARAH.1286927234

Digitally signed by EHLINGER.GRETCHEN.SARAH.1286927234
Date: 2025.11.21 08:34:47 -05'00'

Gretchen S. Ehlinger, Ph.D.
Chief, Environmental Branch

Enclosure

cc:
FW4FLESRegs@fws.gov

G.1.4 National Marine Fisheries Service Informal Consultation Letter

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
701 SAN MARCO BOULEVARD
JACKSONVILLE, FLORIDA 32207

February 10, 2026

Planning and Policy Division
Environmental Branch

Mr. Dennis Klemm
Acting Assistant Regional Administrator
Protected Resources Division
National Marine Fisheries Service, Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701

Dear Mr. Klemm:

The U.S. Army Corps of Engineers (USACE) is providing technical and federal activities assistance for the South Florida Water Management District's (SFWMD) Central and Southern Florida Flood Resiliency (Section 203) Study for Broward Basins which could result in a proposal to Congress for a federal project. We request initiation of informal consultation under section 7(a)(2) of the Endangered Species Act (ESA) for the Central and Southern Florida Flood Resiliency (Section 203) Study for Broward Basins. We have determined that the proposed activity will have no effect or may affect but is not likely to adversely affect certain listed species and will have no effect on the critical habitat or proposed critical habitat included in the table below. Our supporting analysis is provided below. We request your written concurrence with our determinations.

Pursuant to our request for expedited informal consultation, we are providing enclosing, or otherwise identifying the following information:

- A description of the action to be considered;
- A description of the action area;
- A description of any listed species or critical habitat that may be affected by the action; and
- An analysis of the potential routes of effect on any listed species or critical habitat.

Proposed Action

The SFWMD is undertaking a Section 203 Study pursuant to Section 203 of the Water Resources Development Act of 1986, as amended, and is preparing a feasibility report for a C&SF Flood Resiliency (Section 203) Broward Basins project. The SFWMD Section 203 Study evaluates continued and improved flood risk management and

resiliency solutions for the existing federally authorized and constructed C&SF Project throughout the period of analysis from 2035 to 2085. The federally authorized and constructed C&SF Project is a large multipurpose water resource project authorized under the Flood Control Act of 1948 that is operated and maintained by the SFWMD.

The purpose of the SFWMD Section 203 Study is to develop and evaluate continued and improved flood risk management and resiliency solutions that align with the Federal Objective, as described in Section 2031 of the Water Resources Development Act of 2007 (Public Law 110-114). The Federal Objective specifies that water resources planning shall reflect national priorities, encourage economic development, and protect the environment by seeking to maximize sustainable economic development, avoiding the unwise use of floodplains, and protecting and restoring natural ecosystems. The planning process informs an implementable suite of measures to address flood risk damages and involves parallel efforts across managed watershed basins, primary canals, and water control structures (WCS).

The need for the SFWMD Section 203 Study is driven by several factors: significant physical, hydrological, climatological, demographic, and economic changes; and increasing flood risks in the 420-square-mile Section 203 Study Area (Study Area). There is a critical need to improve upon the existing USACE federally authorized and constructed C&SF Project.

The SFWMD Section 203 Study examines several problems in the Study Area that are expected to occur within the period of analysis from 2035 to 2085, which include:

Compound Flooding: Combination of inland and coastal flood drivers exacerbate flooding.

Limitations of Existing Infrastructure: The existing flood control infrastructure was designed for conditions that have changed profoundly since construction.

Changing Conditions: Conditions are expected to worsen over the 50-year period of analysis:

- Urbanization (land development and projected population in the Study Area);
- Sea level rise (low, intermediate, and high scenarios);
- Increased total flood water depths and surface area inundation due to extreme rainfall intensification (frequency and intensity) compounded with storm surge and sea level rise and its effects on flooding;

o Increased total flood water depths and surface area inundation due to the highest tidal cycles compounded with sea level rise; and
o Increased total flood water depths and surface area inundation due to higher groundwater tables compounded with sea level rise.

Flood Damages to Communities: Flood damage attributable to ongoing C&SF Project reduction in capacity, diminished water conveyance, and changed conditions at the WCS exacerbated by sea level rise and extreme rainfall events compounded with storm surge and/or high tides.

Public Safety Risks: Public safety risks attributable to diminished water conveyance near C&SF Project WCS caused by flooding during extreme rainfall events compounded with storm surge, sea level rise, and/or high tides.

The SFWMD Section 203 Study includes a Tentatively Selected Plan (TSP) that maximizes flood resiliency and flood risk management benefits for the population, property, and critical infrastructure within the Study Area. Specifically, the Section 203 Study advances the feasibility assessment and initial engineering designs for adapting water/flood control structures in areas of Broward County and a small portion of southern Palm Beach County most vulnerable to flood risk. The SFWMD Section 203 Study TSP, which is the subject of this letter, uses a combination of structural measures, which are outlined in detail below.

The proposed federal action analyzed in this letter is implementing the SFWMD Section 203 Study TSP. The SFWMD Section 203 Study advances initial engineering designs and formulates and evaluates alternatives for adapting water control structures that are part of the C&SF Project. To achieve improved flood risk management and resilience solutions, the SFWMD Section 203 Study TSP includes a combination of structural measures, described below. An overview of the SFWMD Section 203 Study TSP features is shown in Figure 1. Areas to be dredged or excavated around each WCA and canals are shown in Figure 2 through Figure 5. Excavation may occur approximately 100' upstream and downstream of the WCS to harmonize the new construction with the canal bottom.

Canal Conveyance Improvements: Canal conveyance improvements include excavating segments of canals (i.e., increasing depth and/or width via dredging or similar means) where flow is currently restricted to increase flow capacity. In addition, new culverts would be constructed parallel to an existing 10-foot-diameter culvert upstream of the G-57 Gated Spillway to increase flow capacity in this area. In general, dredging will be

performed in a combination of long reach excavator, or excavator from barges. Dredge material will be hauled off and disposed of at a landfill. Some may be used along banks where land elevation needs to be raised.

Pumps and Gates at Structures: These structural measures include adding pumps where none currently exist, deploying additional pumps, and/or upgrading pumps to higher capacity at a WCS. Constructing additional gates or expanding the width of existing gates at a WCS to increase the volume of water that can pass through them may also occur. These structural measures will typically involve demolishing the existing WCS and rebuilding a new one with upgraded gates. Demolition activities include the use of temporary sheetpile cofferdams, turbidity curtains, and turbidity controls. The coffer dams will be used to dewater the area around the structure for removal and/or demolition. Debris will be hauled off site and disposed of at the nearest local landfill. Reference Table 1 below for locations of proposed WCS.

Operational Activities: Operational activities include drawing down water in the SFWMD-managed primary canals upstream of the WCS prior to a storm by pumping water in these canals from the upstream side of the WCS to the downstream side of the WCS, resulting in water from the canals being moved downstream to the Intracoastal Waterway prior to the storm. Additionally, local water management entities would likely draw down water in secondary managed canals and move it into SFWMD-managed primary canals prior to storm events. This additional volume of water would be moved downstream to the Intracoastal Waterway through operation of the WCS. Pre-storm drawdowns are already part of regular SFWMD operations, but with implementation of the SFWMD Section 203 Study TSP, these drawdown events will be more efficient, allowing for improved water conveyance and thus reducing the time it takes to move water through the system.

Table 1. Locations of proposed water control structures for each site in the Study for Broward Basins.

Site	Canal	Description of Proposed Water Control Structures	Location of Proposed Water Control Structures
G-56	G-08 (Hillsboro)	New Gated Spillway	Lat: 26°19'40.30"N Long: 80° 7'56.40"W
G-57	G-16 (Pompano)	New Gated Spillway	Lat: 26°13'51.40"N Long: 80° 7'19.00"W
S-37B	C-14 (Cypress Creek)	New Gated Spillway	Lat: 26°13'27.80"N Long: 80°10'13.80"W

S-37A	C-14 (Cypress Creek)	New Gated Spillway w/ Pump Station	Lat: 26°12'22.00"N Long: 80° 7'54.00"W
S-36	C-13 (Middle River)	New Gated Spillway w/ Pump Station	Lat: 26°10'23.30"N Long: 80°10'44.80"W
S-33	C-12 (Plantation)	New Gated Spillway w/ Pump Station	Lat: 26° 8'9.00"N Long: 80°11'41.90"W
G-54	G-15 (North New River)	New Gated Spillway w/ Pump Station	Lat: 26° 5'41.40"N Long: 80°13'47.10"W
S-13	C-11 (South New River)	New Gated Spillway w/ Pump Station	Lat: 26° 3'57.90"N Long: 80°12'35.40"W

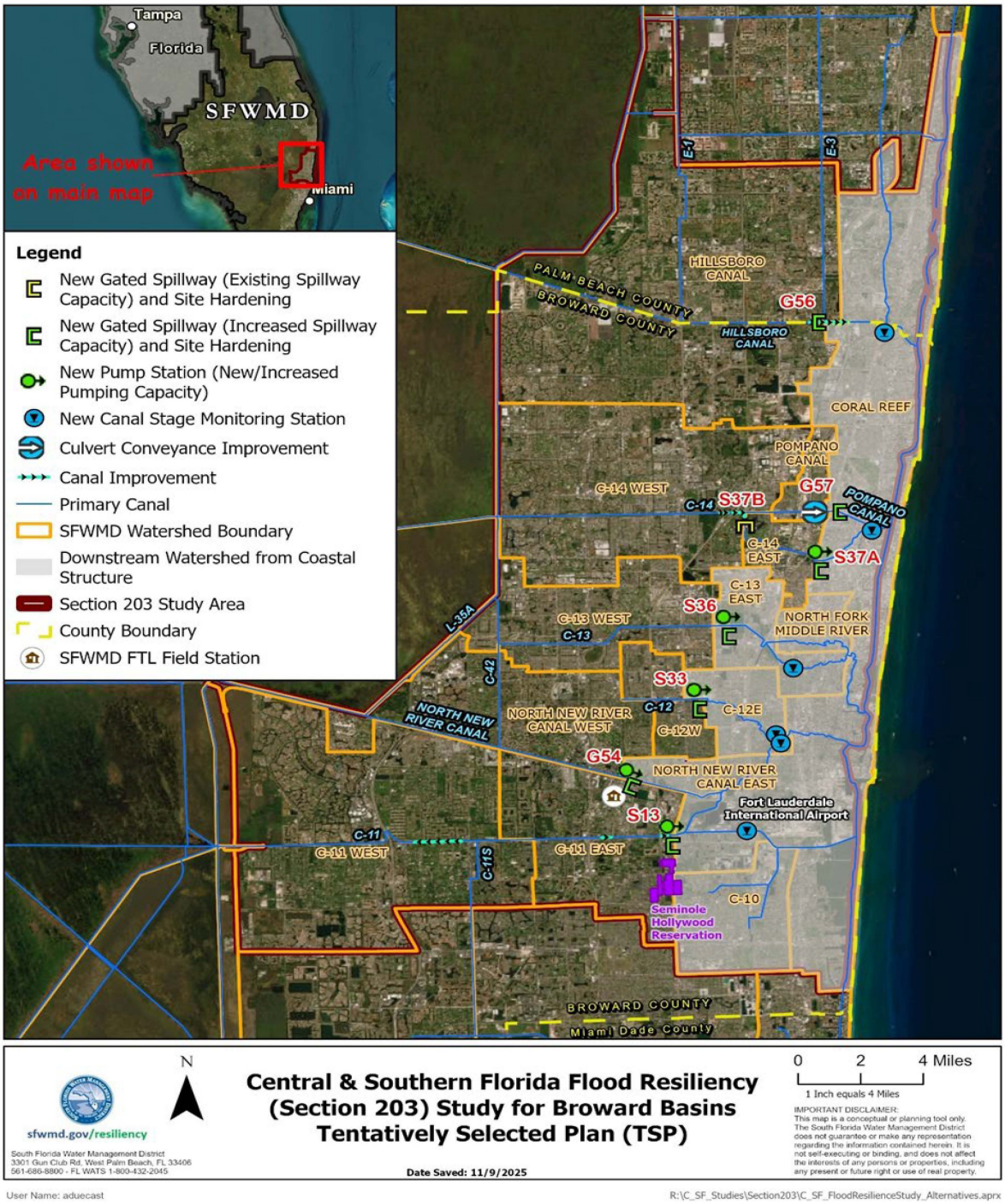


Figure 1. SFWMD Section 203 Study Tentatively Selected Plan.

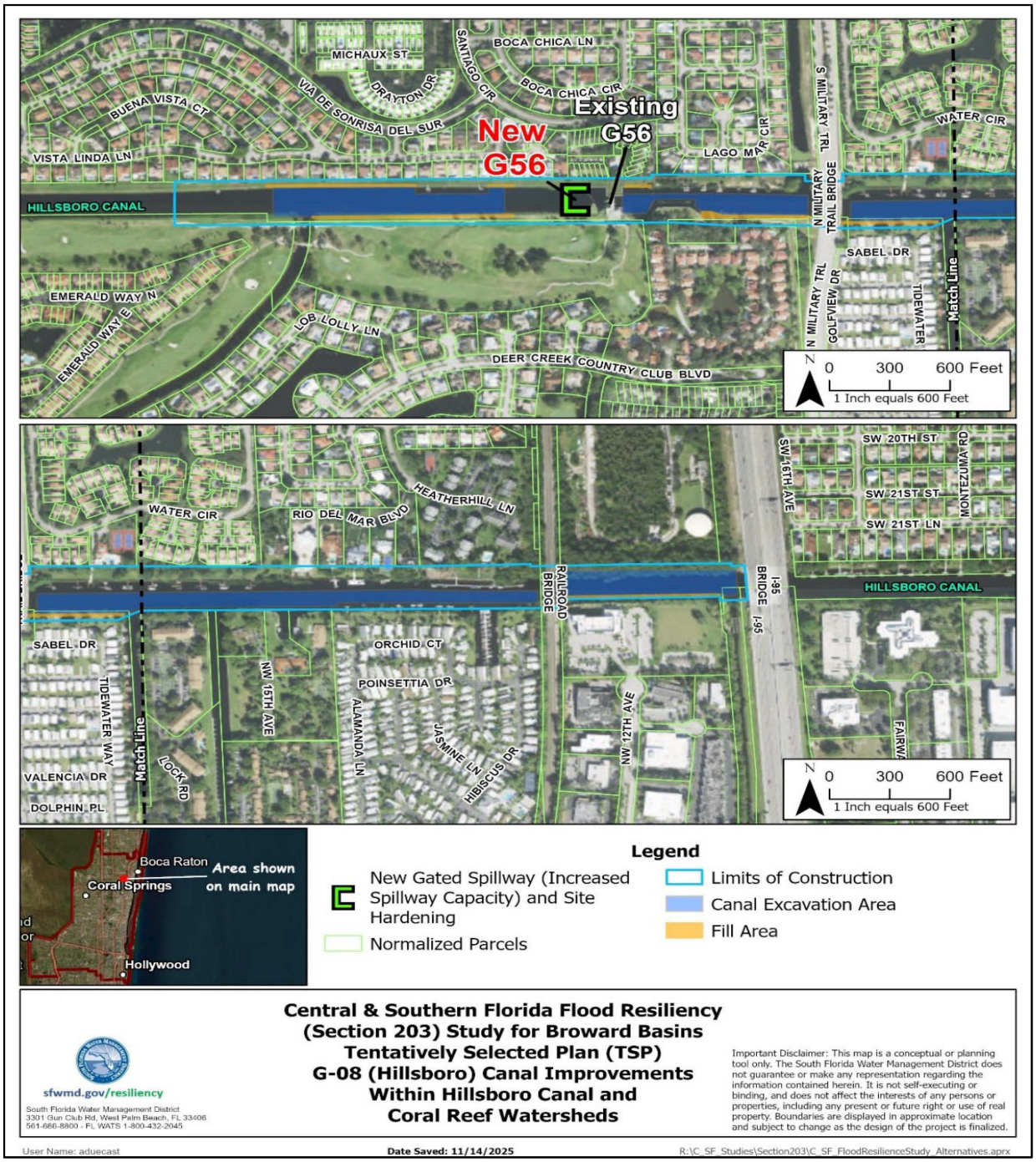


Figure 2. Location of the new G56 structure and proposed limits of construction including excavation and fill areas for the G-08 Canal.

Figure 3. Location of the new S37B structure and proposed limits of construction including excavation and fill areas for the C-14 Canal.

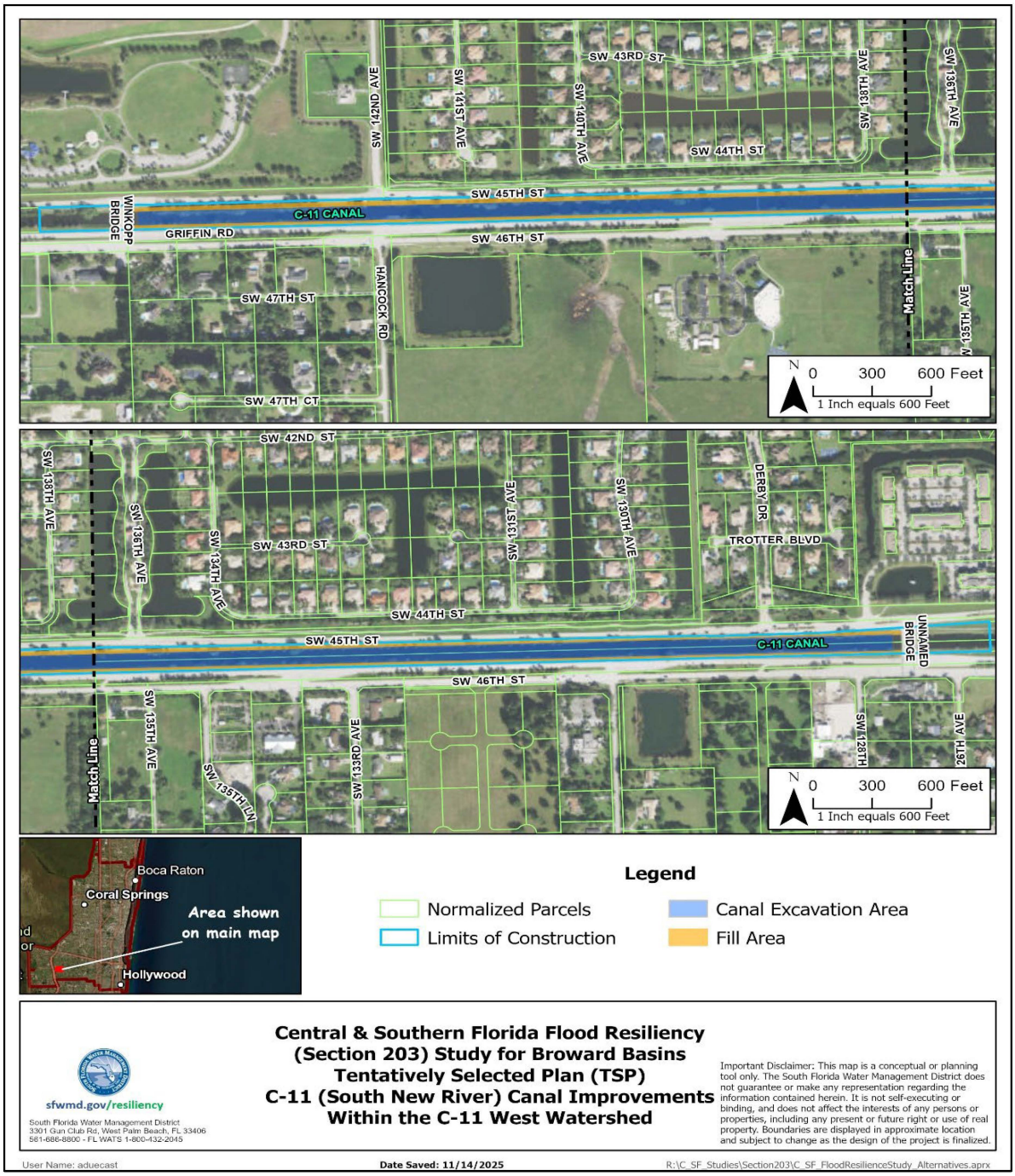


Figure 4. Proposed limits of construction including excavation and fill areas for the C-11 (West) Canal.

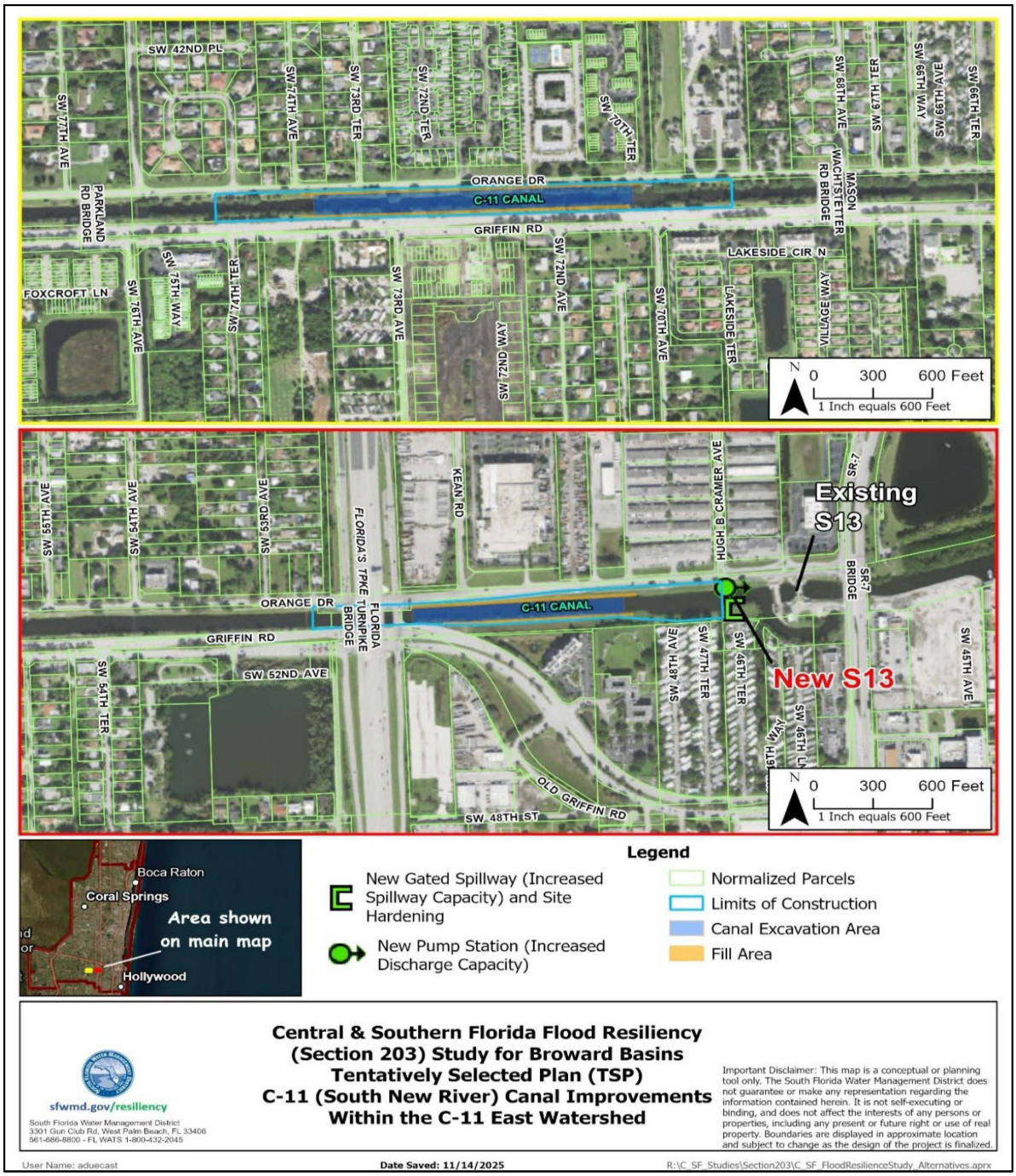


Figure 5. Location of the new S13 structure and proposed limits of construction including excavation and fill areas for the C-11 (East) Canal.

A detailed description of the TSP is found below. All replacement spillway structures included in the TSP have increased capacity relative to the current capacity (for an assumed design headwater and tailwater) except for S-37B, which has the same capacity as the current structure.

Hillsboro Canal Basin: The Hillsboro Canal Basin watershed is primarily controlled by the G-56 Gated Spillway (26.327972°N, 80.131583°W) on the G-08 (Hillsboro) Canal. The existing G-56 Gated Spillway consists of three 20-foot-wide gates. The SFWMD Section 203 Study proposed TSP structural measures would include the construction of a new, replacement gated spillway with four 25-foot-wide roller gates approximately 75 feet west (upstream) of the current G-56 Gated Spillway and demolition of the old spillway. Approximately 17,278 neat cubic yards of soil excavation would be required to construct the new WCS and connect the WCS intake and discharge bays to the existing canal.

Additionally, an approximately 1.1-linear-mile section of the G-08 (Hillsboro) Canal would be excavated (i.e., dredged) to enlarge the canal cross section, improving water conveyance. Reference Figure 2. Approximately 0.2 miles of canal, beginning approximately 500 feet west of the existing G-56 Gated Spillway and proceeding west, would be excavated to a maximum depth of 5 feet below the existing canal bottom, removing an estimated 23,868 neat cubic yards of soil. Additionally, approximately 0.9 miles of canal beginning on the east side of the spillway would be similarly dredged to a depth not exceeding 5 feet below the existing canal bottom, with 25,485 neat cubic yards of soil excavated. Dredged material from all areas would be placed, compacted, graded, and sodded within the existing access corridors along the canal ROW, with any excess soil disposed of at permitted landfills or other SFWMD-approved sites. All work would occur within the existing canal ROW and proposed perpetual easement.

Pompano Canal Basin: The Pompano Canal Basin watershed is primarily controlled by the G-57 Gated Spillway (26.230850°N, 80.121525°W) on the G-16 (Pompano) Canal. The G-57 Gated Spillway consists of two 14-foot-wide gates. A 1,400-foot long, 10-foot diameter culvert is located approximately 350 feet northwest (upstream) of the existing structure, parallel to Atlantic Boulevard (State Road 814), between South Dixie Highway (State Road 811) and Cypress Road, for the purposes of stormwater conveyance.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new replacement gated spillway with two 21-foot-wide roller gates approximately 250 feet northwest (upstream) of the current G-57 Gated Spillway and demolition of the old spillway. Approximately 6,511 neat cubic yards of soil excavation

would be required to construct the new WCS and connect the WCS intake and discharge bays to the existing canal. Dredged material would be placed, compacted, graded, and sodded within the existing access corridors along the canal ROW, with any excess soil disposed of at permitted landfills or other SFWMD-approved sites. All work would occur within the existing canal ROW, proposed fee estate acquisition, perpetual easements, and temporary easements.

In addition, two new 10-foot diameter culverts (or a double 10-foot-span by 9-foot-rise concrete box culvert) would be constructed parallel to and on the south side of the existing 10-foot-diameter culvert. Construction of culverts will be completed by open cut trenching to the greatest extent practicable. A trenchless method via micro-tunneling or jack-and-bore method may be used below the railroad crossing and Dixie Highway. The existing culvert would remain to maintain flow during construction of the new culvert(s). New concrete support walls would be built at both ends of the site to support installation of the new parallel culverts. The end walls for the culverts will be cast in place reinforced concrete walls. Construction of the new culverts would occur by jack and bore or similar trenchless installation methods under South Dixie Highway (State Road 811), the Florida East Coast Railroad, and SW 1st Avenue and Cypress Road, and via trenching in the remaining areas.

C-14 West Basin: The C-14 West Basin watershed is primarily controlled by the S-37B Gated Spillway (26.223689°N, 80.170163°W) located on the C-14 (Cypress Creek) Canal. The S-37B Gated Spillway consists of two 25-foot-wide gates.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new replacement gated spillway with two 25-foot-wide roller gates approximately 215 feet north (upstream) of the current S-37B Gated Spillway and demolition of the old spillway. Approximately 4,311 neat cubic yards of soil excavation would be required to construct the new WCS and connect the WCS intake and discharge bays to the existing canal. The SFWMD Section 203 Study proposed TSP also includes conveyance improvements by excavating and enlarging the canal cross section of 1.2-linear miles of the C-14 (Cypress Creek) Canal, extending north and then west of the S-37B Gated Spillway. Reference Figure 3. Approximately 1.2 miles of canal north of the S-37B Gated Spillway would be excavated to a maximum depth of 5 feet below the existing canal bottom, removing an estimated 26,631 neat cubic yards of sediment. All dredged material would be placed, compacted, graded, and sodded within the existing access corridors along the canal ROW, with any excess soil disposed of at permitted landfills or other SFWMD-approved sites. All work would occur within the existing canal ROW.

C-14 East Basin: The C-14 East Basin watershed is primarily controlled by the S-37A Gated Spillway (26.206246°N, 80.131641°W) located on the C-14 (Cypress Creek) Canal. The S-37A Gated Spillway consists of two 25-foot-wide gates.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new gated spillway with three 25-foot-wide roller gates and demolition of the old spillway. A new pump station would be constructed adjacent to the new gated spillway, which would house three 400-cubic-foot-per-second (cfs) pumps and one 400-cfs auxiliary pump, for a total design discharge capacity of 1,200 cfs. Although the new WCS would be in the same location as the existing one, it would encompass a larger footprint to accommodate the new pump station.

Approximately 85,456 neat cubic yards of soil excavation would be required to construct the new gated spillway and pump station and connect the WCS intake and discharge bays to the existing canal. Dredged material would be placed, compacted, graded, and sodded within the existing access corridors along the canal ROW, with any excess soil disposed of at permitted landfills or other SFWMD-approved sites. All work would occur within the existing canal ROW, proposed fee estate acquisition, and temporary easement.

C-13 West Basin: The C-13 West Basin watershed is primarily controlled by the S-36 Gated Spillway (26.173183°N, 80.179122°W) located on the C-13 (West Middle River) Canal. The S-36 Gated Spillway consists of one 25-foot-wide gate.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new gated spillway with two 16-foot-wide roller gates to replace the current S-36 Gated Spillway and demolition of the old spillway. Although the new WCS would be in the same location as the existing WCS, it would encompass a larger footprint to accommodate the new gates and would meet current SFWMD design standards. A new pump station would be constructed adjacent to the new gated spillway, which would house three 170-cfs pumps for a total design discharge capacity of 510 cfs.

Approximately 43,305 neat cubic yards of soil excavation would be required to construct the new gated spillway and pump station and connect the WCS intake and discharge bays to the existing canal. Dredged material would be placed, compacted, graded, and sodded within the existing access corridors along the canal ROW, with any excess soil disposed of at permitted landfills or other SFWMD-approved sites. All work

would occur within the existing canal ROW, proposed fee estate acquisitions, and temporary easement.

C-12 West Basin: The C-12 West Basin watershed is primarily controlled by the S-33 Gated Spillway (26.135942°N, 80.194494°W) located on the C-12 (Plantation) Canal. The S-33 Gated Spillway consists of one 20-foot-wide gate.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new gated spillway with two 20-foot-wide roller gates and demolition of the old spillway. A new pump station would also be constructed, which would house three 170-cfs pumps and one 170-cfs auxiliary pump for a total design pump discharge capacity of 510 cfs. The width of the new WCS would necessitate excavation of the south canal bank and the existing box culvert downstream of the current WCS. The pump station and the excavation of the canal bank are co-located immediately southwest of the existing S-33 gated spillway, aligned with NW 35th Avenue. A new headwall would be constructed to tie the new WCS into the existing canal sidewalls.

Approximately 53,706 neat cubic yards of soil excavation would be required to construct the new gated spillway and pump station and connect the WCS intake and discharge bays to the existing canal. Dredged material would be placed, compacted, graded, and sodded within the existing access corridors along the canal ROW, with any excess soil disposed of at permitted landfills or other SFWMD-approved sites. All work would occur within the existing canal ROW.

North New River Canal West Basin: The North New River Canal West Basin watershed is primarily controlled by the G-54 Gated Spillway (26.095082°N, 80.229682°W) located on the G-15 (North New River) Canal. The G-54 Gated Spillway consists of three 16-foot-wide gates.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new gated spillway with four 20-foot-wide roller gates approximately 30 feet west northwest (upstream) of the current G-54 Gated Spillway and demolition of the old spillway. A new pump station would be constructed adjacent to the new gated spillway. The pump station would house three 270-cfs pumps for a total design pumping capacity of 810 cfs. The abandoned boat lock downstream of the existing WCS would be demolished. For demolition of the boat lock (located immediately downstream of G-54) a temporary cofferdam will be placed around the remains of the boat lock. The coffer dam will be dewatered, and the boat lock will be demolished in a dry condition. Debris will be hauled off site and disposed of at the nearest local landfill.

Approximately 42,064 neat cubic yards of soil excavation would be required to construct the new gated spillway and pump station and connect the WCS intake and discharge bays to the existing canal. Dredged material would be placed, compacted, graded, and sodded within the existing access corridors along the canal ROW, with any excess soil disposed of at permitted landfills or other SFWMD-approved sites. All work would occur within the existing canal ROW.

C-11 West Basin: The C-11 West Basin watershed is primarily controlled by the S-13AW Gated Culvert (26.064633°N, 80.281512°W) located on the C-11 (South New River) Canal. The S-13AW Gated Culvert consists of two 10-foot-wide gates.

The SFWMD Section 203 Study proposed TSP features include the excavation of 1.5 miles of the C-11 (South New River) Canal in the C-11 West Basin watershed to improve conveyance. Reference Figure 4. Excavation would begin approximately 50 feet east of the east side of the Winkopp Bridge and proceed east along the canal. Excavation would occur to a maximum depth of 5 feet below the existing canal bottom, removing an estimated 85,039 neat cubic yards of soil. Dredged material would be placed, compacted, graded, and sodded within the existing access corridors along the canal ROW, with any excess soil disposed of at permitted landfills or other SFWMD-approved sites. The excavated north and south side slopes of this 1.5-mile canal section would be stabilized with riprap (approximately 66,124 neat cubic yards) underlaid by bedding stone (approximately 16,762 neat cubic yards) and filter fabric. All work would occur within the existing canal ROW.

C-11 East Basin: The C-11 East Basin watershed is primarily controlled by the S-13 Pump Station and Gated Spillway (26.066360°N, 80.208858°W) located on the C-11 (South New River) Canal. The S-13 Pump Station and Gated Spillway consists of a single 16-foot-wide spillway gate with a pump station with three 180-cfs pumps for a total design discharge capacity of 540 cfs.

The SFWMD Section 203 Study proposed TSP structural measures would include construction of a new gated spillway approximately 200 feet west (upstream) of the current S-13 Pump Station and Gated Spillway and demolition of the old spillway. A new gated spillway with two 14-foot-wide roller gates would be constructed. A new pump station with four main pumps (including two 180-cfs pumps and two 360-cfs pumps) and one 360-cfs auxiliary pump would be constructed, which would increase the total design discharge capacity to 1,080 cfs. Approximately 64,687 neat cubic yards of soil excavation would be required to construct the new gated spillway and pump station and connect the WCS intake and discharge bays to the existing canal. Dredged

material would be placed, compacted, graded, and sodded within the existing access corridors along the canal ROW, with any excess soil disposed of at permitted landfills or other SFWMD-approved sites.

In addition, an approximately 13,000-square-foot portion of the remnant bypass channel located southeast of the existing WCS would be partially backfilled with soil, and a smaller channel would be left in place to maintain existing drainage flows from State Road 7 (US 441) and the stormwater system for the residential community south of the S-13 site. The portion of the bypass channel will be filled with the spoil produced from the excavation of two temporary cofferdams located at the existing S-13 Pump Station and Spillway. Upland soil material from the new S-13 Pump Station and Gated Spillway excavation would be used as backfill for the remnant channel; excavated material would be tested for compliance prior to use as backfill. The material would be properly graded and stabilized and would incorporate a small pilot channel to carry existing drainage.

To improve conveyance, 0.5 miles of the C-11 (South New River) Canal in the C-11 East Basin watershed would be excavated in two places. Reference Figure 5. First, approximately 0.3 miles of canal excavation, beginning at the centerline of SW 74th Avenue and proceeding east along the canal, would occur to depths not exceeding 5 feet below the existing canal bottom and would result in approximately 17,752 neat cubic yards of soil removal. Then, approximately 0.2 miles of canal excavation, beginning 50 feet east of the east side of the Florida Turnpike northbound offramp bridge and proceeding east along the canal, would occur to depths not exceeding 5 feet below the existing canal bottom and would result in approximately 11,427 neat cubic yards of soil removal. Dredged material would be placed, compacted, graded, and sodded within the existing access corridors along the canal ROW, with any excess soil disposed of at permitted landfills or other SFWMD-approved sites.

Downstream Monitoring Stations: The TSP includes the installation of six canal stage monitoring stations (each consisting of a pile-supported steel platform, steel stilling well pipe, solar powered remote data logger, and staff gauge) within the downstream watersheds in the Study Area. The downstream monitoring stations would be in addition to monitoring stations that would be installed approximately 150 to 200 feet downstream of each new WCS. Concrete piles will be used to support the monitoring stations.

The SFWMD is preparing the Section 203 feasibility report for submission to the Assistant Secretary of the Army (Civil Works). The Assistant Secretary of the Army

(Civil Works) will review and determine recommendations for Congress for authorization of the SFWMD Section 203 Study TSP under the authority of Section 216 of the Flood Control Act of 1970. Assuming the SFWMD Section 203 Study TSP is authorized, construction would occur across several years. The total construction timeline is estimated to be seven years.

Conservation Measures and Best Practices

During construction, conservation measures designed to minimize impacts to terrestrial ESA-listed species will incidentally benefit tidal habitat and any organisms downstream of the WCS. Conservation measures will be employed to protect water quality, prevent erosion, and protect manatees. Conservation measures relevant to tidal waters would include the use of in-water silt curtains (with visual monitoring for entanglement or entrapment by manatees and other protected species), terrestrial stormwater erosion controls, and turbidity monitoring. The following standard will be followed during construction - SFWMD Standard Specification Section 02435, Turbidity Control & Monitoring. The applicant/permittee will implement and adhere to NMFS SERO's *Protected Species Construction Conditions* (NMFS 2021). The applicant/permittee will implement and adhere to NMFS SERO's *Vessel Strike Avoidance Measures* (NMFS 2021).

Description of the Action Area

The SFWMD Section 203 Study Area consists of approximately 420 square miles within the eastern portion of Broward County and a small portion of southern Palm Beach County (Figure 6).

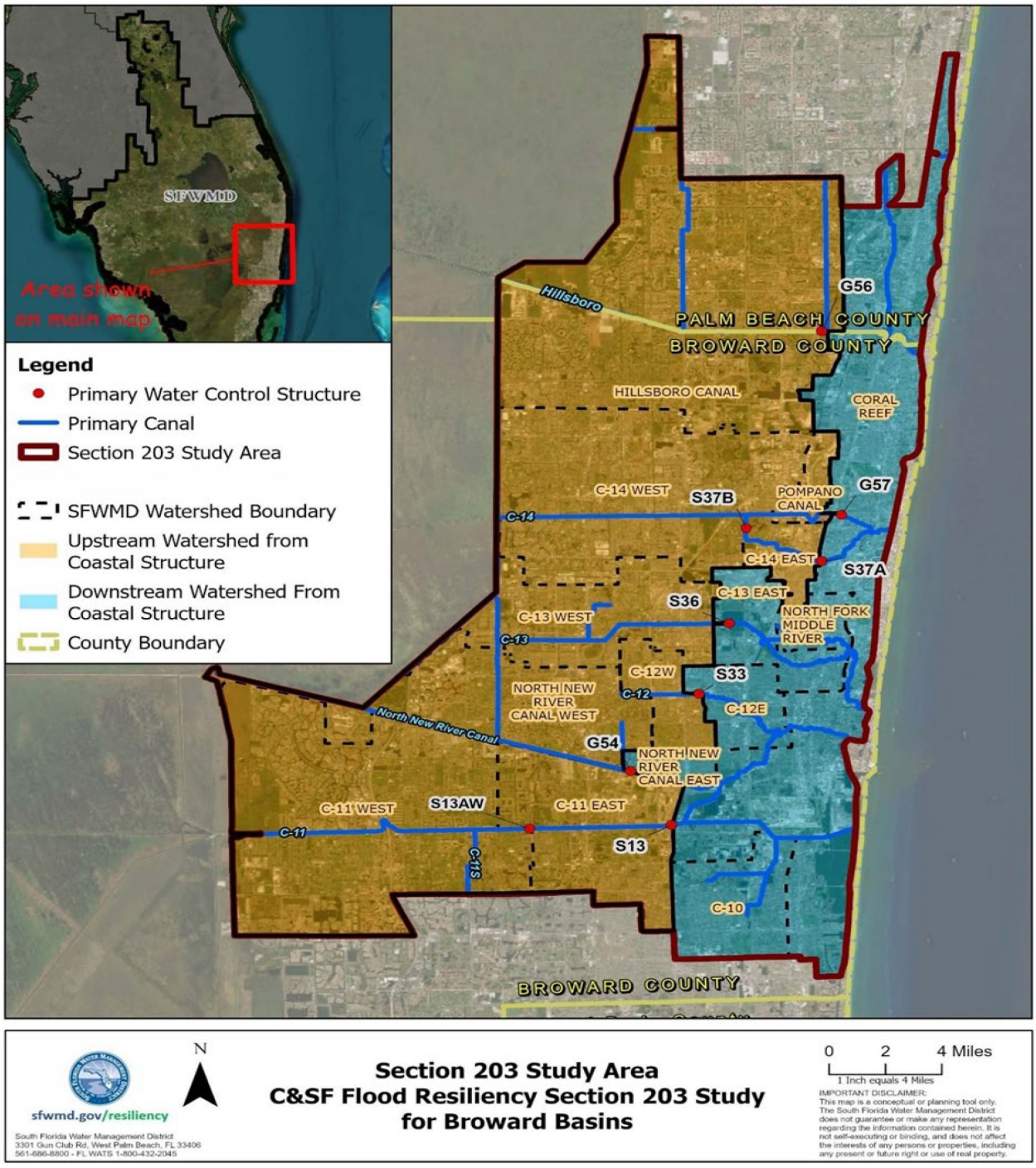


Figure 6. SFWMD Section 203 Study Area and ESA Action Area.

The Study Area encompasses nine managed watersheds that are upstream of nine C&SF Project WCS owned and operated by the SFWMD. The Study Area also includes six watershed basins downstream of the WCS and a network of seven primary canals. The SFWMD Section 203 Study focused on urban areas within the Section 203 Study Area's inland watersheds that are exposed or vulnerable to flooding. This area includes flood-prone urbanized areas upstream of the coastal WCS located between the eastern side of the East Coast Protective Levee and coastal WCS. The Section 203 Study Area delineation is based on existing watersheds, contiguous urban areas, and previous studies (SFWMD's Flood Protection Level of Service [SFWMD 2021a] and USACE's South Atlantic Coastal Study [USACE 2021]).

The ESA defines "Action Area" as all areas that will be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR § 402.02). In this letter, the Action Area includes the entire Study Area (420 square miles, Figure 6) as the region where both direct and indirect effects resulting from the SFWMD Section 203 Study TSP may occur.

Potentially Affected NMFS ESA-Listed Species and Critical Habitat

We have assessed the listed species that may be present in the action area and our determination of the project's potential effects to them as shown in Table 2 below.

Please note abbreviations used in Table 2: E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect; NE = no effect

Table 2. ESA-listed Species in the Action Area and Effect Determination(s)

Species	ESA Listing Status	Listing Rule/Date	Most Recent Recovery Plan/Outline Date	Effect Determination (Species)
Sea Turtles				
Green (South Atlantic distinct population segment [DPS])	T	81 FR 20057/ April 6, 2016	October 1991	NLAA
Kemp's ridley	E	35 FR 18319/ December 2, 1970	September 2011	NLAA

Species	ESA Listing Status	Listing Rule/Date	Most Recent Recovery Plan/Outline Date	Effect Determination (Species)
Loggerhead (Northwest Atlantic [NWA] DPS)	T	76 FR 58868/ September 22, 2011	December 2008	NLAA
Fish				
Smalltooth sawfish (U.S. DPS)	E	68 FR 15674/ April 1, 2003	January 2009	NLAA
Giant manta ray	T	83 FR 2916/ January 22, 2018	2019	NE
Invertebrates				
Queen conch	T	89 FR 11208/February 14, 2024	A Recovery Plan is currently being developed.	NE

There is no designated critical habitat in the Action Area. NMFS has issued a proposed rule to designate critical habitat for the green sea turtle (88 Federal Register 46572; July 19, 2023). Near the Action Area, this proposed critical habitat includes nearshore waters (from the mean high-water line to 20 meters depth) and sargassum habitat (from 10 meters depth to the U.S. Exclusive Economic Zone). Fragments of proposed critical habitat extend west of the Intracoastal Waterway into the Action Area. Seagrass beds are the only physical or biological feature essential for the conservation of the species ("essential features") that are present in the extreme eastern margin of the Action Area. The Corps has determined that the proposed action is not likely to adversely affect proposed green sea turtle critical habitat.

Effects of the Action

The purpose of the SFWMD Section 203 Study and resulting TSP is to achieve improved flood risk management and resilience solutions. The SFWMD Section 203 Study TSP consists of canal conveyance improvements, adding and improving pumps and gates at WCS, and operational activities, such as pumping water from canals prior to storm events.

Tidal Waters of the Action Area: Tidal waters of the Action Area (seven square miles) provide only a limited number of habitat constituents. These constituents include tidal creeks, estuarine scrub/shrub (mangrove fringe), attached macroalgae, submerged rooted vascular plants (seagrasses), estuarine emergent vegetated wetlands (saltmarshes, brackish marsh), oyster reefs and shell banks, and flood tide shoal complexes. Mapped submerged aquatic vegetation (including seagrass) is generally limited to the vicinity of the ICW at the easternmost margin of the Action Area because the ICW has more tidal flux and is more marine saline than the freshwater conveyance canals or dead-end canals.

Effects During Construction: During construction of the SFWMD Section 203 Study TSP, the only tidal waters affected are those on the downstream side of the WCS. The WCS are situated at the inshore-most ends of their associated canals, at the inshore-most limit of tidal influence. The nine WCS, their approximate distance from the ICW, and approximate length of in-water work that would occur within tidal waters at each WCS are as follows:

- G-56 Gated Spillway located 4 miles upstream of the ICW, tidal footprint of in-water work is 870 linear feet
- G-57 Gated Spillway located 2 miles upstream of the ICW, tidal footprint of in-water work is 200 linear feet
- S-37A Gated Spillway located 2.9 miles upstream of the ICW, tidal footprint of in-water work is 360 linear feet
- S-37B Gated Spillway located 6 miles upstream of the ICW, tidal footprint of in-water work is 660 linear feet
- S-36 Gated Spillway located 6.8 miles upstream of the ICW, tidal footprint of in-water work is 1,000 linear feet
- S-33 Gated Spillway located 6 miles upstream of the ICW, tidal footprint of in-water work is 1,600 linear feet
- G-54 Gated Spillway located 8.5 miles upstream of the ICW, tidal footprint of in-water work is 330 linear feet
- S-13AW Gated Culvert located 10.7 miles upstream of the ICW, tidal footprint of in-water work is 260 linear feet
- S-13 Pump Station and Gated Spillway located 6.2 miles upstream of the ICW, tidal footprint of in-water work is 900 linear feet

Using an average canal width of 100 feet, the maximum footprint of construction in-water work within these tidal waters under the SFWMD Section 203 Study TSP is approximately 0.002 square miles. Additionally, the habitat quality within the tidal

footprint of in-water work is lowest relative to all other tidal waterways because the tidal footprint of in-water work contains highly altered substrates (control structures and erosion controls) and is most proximate to undiluted freshwater inputs. Effects to ESA-listed species could include direct habitat disturbance and indirect habitat degradation, and behavioral changes due to temporarily increased turbidity and noise transmitted in-air or through-ground to the waterways.

Effects During Operations: During operations of the SFWMD Section 203 Study TSP structural improvements, water conveyance will be improved, reducing the time it takes to move water through the system. Increased gravity flows from heavy rain events or pre-storm drawdown events may result in short-term, localized changes in water temperature, turbidity, velocity, and salinity downstream of the WCS. While the volume of water moved through the C&SF system will be dependent on specific inputs unrelated to project operations (e.g., storm events), the SFWMD Section 203 Study improvements will increase the ability to moderate freshwater inputs to downstream tidal waters. Effects on ESA-listed species could include behavioral changes due to temporary changes in water conditions.

ROUTES OF EFFECT TO ESA-LISTED SPECIES

The tidal footprint of in-water work during construction is confined to the immediate vicinity of the nine WCS. As shown in Figure 1 and Figure 6, the WCS are very far upstream (the nearest is 2 miles from the ICW) in waters that are typically fresh or slightly brackish. In the unlikely chance that ESA-listed species are found far upstream near the WCS, they would exhibit avoidance behavior, moving away from areas of construction to avoid unfavorable conditions. Therefore, it is not probable that any life stage of the ESA-listed marine species in Table 2 (Adult, Juvenile, Young of Year, Eggs and Larvae) would be exposed to construction-related stressors (e.g., habitat disturbance, increased turbidity) at the WCS.

Construction of the SFWMD Section 203 Study TSP features will also include equipment that generates noise. These acoustic sources include generators and the typical equipment associated with excavation (e.g., bulldozers, excavators, dump trucks, front-end loaders, and graders). A terrestrial acoustic analysis estimates that maximum in-air noise levels of 90 A-weighted decibels Lmax at 50 feet may occur during grading and excavation. In-water work at the WCS may include pile driving. While pile driving may occur in-water under certain limited circumstances, it would occur infrequently and sporadically during the period of construction (potentially 2028 to 2034, depending on authorization). Additionally, in-water acoustic effects from through-

ground transmission would be greatly minimized by changes in depth and bends in the waterways. Both bathymetry and waterway shape have strong minimizing effects to noise propagation (Popper and Hawkins 2016; Graham et al. 2017). It is not probable that any of the ESA-listed marine species will be found near the WCS construction footprints. Additionally, it is not probable that in-water acoustic effects via through-ground transmission would extend miles downstream to marine waters nearer the ICW, where such species may occasionally occur. The duration of construction and in-water work at the WCS would be short-term (in stages over several years across discrete locations).

Routes of effect during project operations could include short-term, localized changes in hydrology immediately downstream of the WCS. Any freshwater inputs downstream of WCS during drawdown events would be equivalent to the fresh stormwater pulse of a natural (unmanaged) flood event. Effects may also include shorter duration of flooding resulting in improved water quality downstream of the WCS. ESA-listed species, including green, Kemp's ridley, and loggerhead sea turtles, and smalltooth sawfish, may experience neutral or beneficial downstream consequences of improved flood management, though any such benefits are expected to be negligible given the distance from the WCS to tidal waters where these ESA-listed species are typically present. As such, project operations result in a May Affect Not Likely to Adversely Affect determination for green sea turtle, Kemp's ridley sea turtle, loggerhead sea turtle, and smalltooth sawfish. It is highly improbable that giant manta ray or queen conch would be found in drainage canals due to the typically unsuitable habitat conditions these canals provide, such as altered water quality and flow regimes and a lack of quality benthic substrates and food sources, resulting in a No Effect determination for these species during project operations.

The duration of improved flood risk management and resilience solutions would be long-term (decades).

ROUTES OF EFFECT TO CRITICAL HABITAT

There are no potential routes of effect to any designated critical habitat as a result of implementation of the SFWMD Section 203 Study TSP. Because green sea turtle proposed critical habitat is located approximately two miles downstream from the closest proposed WCS improvements, there will not be any adverse effects from the proposed federal action to the essential features of this proposed critical habitat.

Conclusion

The USACE has reviewed the proposed project for its effects to ESA-listed species and their critical habitat. Based on the analysis above, we have determined that the proposed federal action, implementation of the SFWMD Section 203 Study TSP, May Affect but is Not Likely to Adversely Affect the green sea turtle, Kemp's ridley sea turtle, loggerhead sea turtle, and smalltooth sawfish. The proposed federal action will have No Effect on giant manta ray and queen conch. Additionally, there would be No Adverse Modification of proposed critical habitat for green sea turtle from any of the SFWMD Section 203 Study TSP measures. We have used the best scientific and commercial data available to complete this analysis. We request your concurrence with this determination. Please contact Mr. Jacob Thompson by email at Jacob.S.Thompson@usace.army.mil or telephone at 904-232-1893 regarding this informal consultation request.

Sincerely,

EHLINGER.GRETCHEN.SARAH.1286927234

Digitally signed by EHLINGER.GRETCHEN.SARAH.1286927234
Date: 2026.02.10 09:58:09 -05'00'

Gretchen S. Ehlinger, Ph.D.
Chief, Environmental Branch

Enclosure

cc:

nmfs.ser.esa.consultations@noaa.gov

Literature Cited

Graham, I.M., Enrico Pirotta, Nathan D. Merchant, Adrian Farcas, Tim R. Barton, Barbara Cheney, Gordon D. Hastie, Paul M. Thompson. 2017. Responses of bottlenose dolphins and harbor porpoises to impact and vibration piling noise during harbor construction. 25 May 2017 https://doi.org/10.1002/ecs2.1793

Popper, A. N., & Hawkins, A. D. 2016. The effects of noise on aquatic life, II. New York, NY: Springer Science+Business Media

SFWMD (South Florida Water Management District). 2021a. Flood Protection Level of Service Provided by Existing Infrastructure for Current and Future Sea Level Conditions in Nine Broward County Watersheds Final Comprehensive Report. October 5, 2021

USACE (U.S. Army Corps of Engineers). 2021. South Atlantic Coastal Study. Retrieved from https://www.sad.usace.army.mil/SACS/. Accessed April 2025

G.1.5 National Marine Fisheries Service Informal Consultation Response

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
https://www.fisheries.noaa.gov/region/southeast

03/09/2026

F/SER31:DPO
SERO-2025-03154

Gretchen S. Ehlinger
Chief, Environmental Branch
Jacksonville District Corps of Engineers
Department of the Army
701 San Marco Boulevard
Jacksonville, FL 32207

Ref.: South Florida Water Management District, Flood Resiliency Study for Broward Basins, Broward County and Palm Beach County, Florida – EXPEDITED TRACK

Dear Gretchen S. Ehlinger,

This letter responds to your February 10, 2026, request and your February 25 and 27, 2026 clarifying responses pursuant to Section 7 of the Endangered Species Act (ESA) for consultation with the National Marine Fisheries Service (NMFS) on the subject action.

We reviewed the action agency's consultation request document and related materials. Based on our knowledge, expertise, and the action agency's materials, we concur with the action agency's conclusions that the proposed action is not likely to adversely affect the NMFS ESA-listed species and/or designated critical habitat.

We would like to offer the following clarifications to complement your incoming request for Consultation. Please include this information as applicable in future consultation requests.

We believe the proposed action will have No Effect on the South Atlantic Distinct Population Segment (DPS) of green sea turtles. Limited information previously indicated that benthic juveniles from both the North Atlantic and South Atlantic DPSs may be found in waters off the mainland United States. However, additional research has determined that juveniles from the South Atlantic DPS are not likely to occur in these waters, including the action area for this project.

Effects to sea turtles (Green [North Atlantic DPS], Kemp's ridley, loggerhead [Northwest Atlantic DPS]) and smalltooth sawfish include the risk of direct physical injury from dredging and other in-water construction activities. We believe the risk of physical injury is extremely unlikely to occur due to the species' ability to move away from the project site and into adjacent suitable habitat, if disturbed. NMFS has previously determined in dredging Biological Opinions that, while oceangoing hopper-type dredges may lethally entrain protected species, including sea turtles, non-hopper-type dredging methods, such as the land-based and barge-mounted excavator proposed in this project, are slower and extremely unlikely to overtake and adversely affect them. Additionally, the applicant's implementation of NMFS Southeast Region Protected Species Construction Conditions (Revised May 2021) will require all construction workers to observe in-water related activities for the presence of these species. Operation of any mechanical

construction equipment would cease immediately if a protected species is seen within a 150-ft radius of the equipment. Activities would not resume until the protected species has departed the project area of its own volition.

NMFS updated the Multi-Species Pile Driving Calculator on September 22, 2025. We used the updated calculator to analyze the pile driving effects to the listed species in this consultation and the results were consistent with your effect determinations. Please use the updated calculator for future consultation requests: https://www.fisheries.noaa.gov/southeast/consultations/section-7-consultation-guidance

Noise created by pile driving activities can physically injure animals or change animal behavior in the affected areas. Animals can be physically injured in 2 ways. First, immediate adverse effects can occur if a single noise event exceeds the threshold for direct physical injury. Second, adverse physical effects can result from prolonged exposure to noise levels that exceed the daily cumulative sound exposure level for the animals. Noise can also interfere with an animal's behavior, such as migrating, feeding, resting, or reproducing and such disturbances could constitute adverse behavioral effects.

Vibratory pile driving produces continuous, non-pulsed sounds that can be tonal or broadband. In terms of acoustics, the sound pressure wave is described by the peak sound pressure level (PK, which is the greatest value of the sound signal), the root- mean-square pressure level (RMS, which is the average intensity of the sound signal over time), and the sound exposure level (SEL, which is a measure of the energy that takes into account both received level and duration of exposure). Further, the cumulative sound exposure level (SELcum) is the measure of energy that takes into account the received sound pressure level over a 24-hour period. For underwater sounds, a reference pressure of 1 micropascal (µPa) is commonly used to describe sounds in terms of decibels (dB). Thus, 0 dB on the decibel scale would be a measure of sound pressure of 1 µPA. NMFS has determined that there are no PK potential effects to ESA-listed sea turtles, fishes, and marine mammals resulting from continuous, non-pulsed sounds associated with vibratory pile-driving. Further, NMFS has determined that there are no SELcum potential effects to ESA-listed fishes resulting from continuous, non-pulsed sounds associated with vibratory pile driving.

NMFS considers U.S. Navy Phase 4 criteria for all noise thresholds (U.S. Department of the Navy, 2025). Potential effects to ESA-listed species in the Southeast Region may occur when impact or vibratory pile driving produces sounds that exceed the thresholds in the following table. Below, PK (which is the greatest value of the sound signal and typically is a metric only used for impulsive sound sources, such as impact pile driving) and RMS (which is the average intensity of the sound signal over time) are referenced to dB re: 1 µPa, the relative unit used to specify the intensity of sound underwater. Further, SEL (which is a measure of the energy that takes into account both received level and duration of exposure) and SEL24h (which is measure of the energy that takes into account the received sound pressure level over a 24-hour period) are referenced to dB re: 1 µPa2-second. For underwater sounds, a reference pressure of 1 micropascal (µPa) is commonly used to describe sounds in terms of decibels (dB). Thus, 0 dB on the decibel scale would be a measure of sound pressure of 1 µPa.

Table 1. Pile Driving Sound Measurement Thresholds for ESA-listed Species in the Southeast Region

Type of Sound Pressure Effect	Type of Pile Driving	Threshold By ESA-listed Species
Peak Pressure Injury (PK)	Vibratory	• None for all fish species, sea turtles, and cetaceans
Cumulative Exposure Injury (SEL_{24h})	Vibratory	• None for all fish species • 198 dB for sea turtles • 197 dB for low-frequency cetaceans (i.e., Rice's, North Atlantic Right, Sei, and Fin whales) • 201 dB for high-frequency cetaceans (i.e., Sperm whale)
Behavioral Disturbances (RMS)	Vibratory	• 150 dB RMS for all fish species, regardless of size • 175 dB RMS for sea turtles • 120 dB RMS for all cetaceans

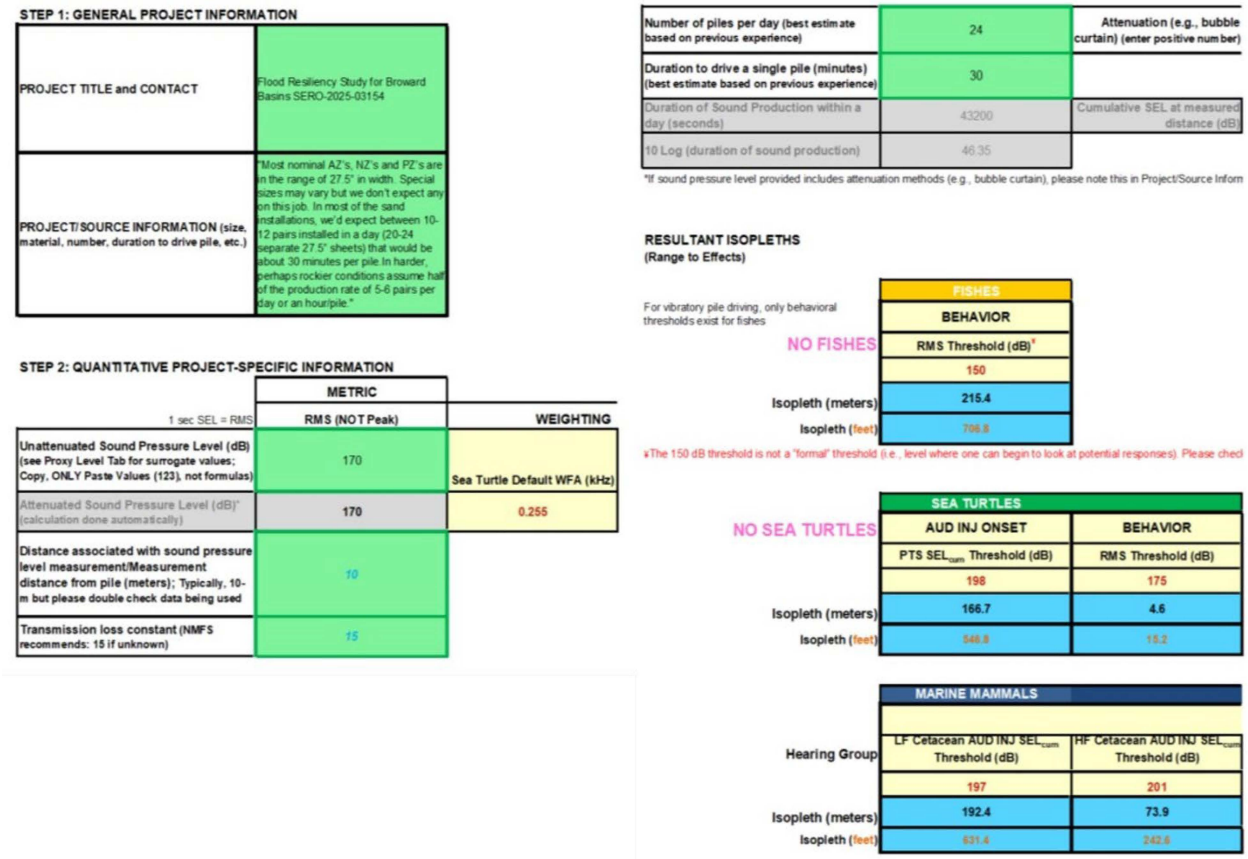
We use the NMFS Multi-species Pile Driving Tool (dated September 2025) to calculate the radii of physical injury and behavioral effects on ESA-listed species that may be located in the action area based on the above measurements of underwater sound. The applicant proposes to carry out vibratory pile driving of up to twenty-four 27.5-inch steel sheet piles per day during primarily daylight hours. Each pile will require approximately 30 minutes to install. The noise analysis in this consultation evaluates the potential for physical injury and behavioral effects to the ESA-listed species listed in consultation request letter Table 2 that NMFS believes may be affected by the proposed action. The proposed action occurs in a confined space environment. Because 27.5-inch steel sheet piles unattenuated pile driving proxy sound levels are not available within the NMFS Multi-species Pile Driving Tool, we use the proxy sound levels of next largest size pile of the same material in order to estimate sound impacts. In this case, we use pile driving proxy sound levels for 36-inch steel pipe piles installed by vibratory hammer available within the calculator tool.

The installation of up to 24 metal sheet piles (surrogate values based on 36-inch steel pipe piles) per day by vibratory hammer and not using noise abatement measures will not cause PK injurious noise effects to sea turtles or ESA- listed fishes.

However, the SELcum may cause injury to sea turtles at a radius of up 546.8-feet (166.7- meters) away from the pile-driving operations over a 24-hour period. We believe SELcum injurious noise effects are extremely unlikely to occur due to the mobility of these species. That is, we expect these species to move away from the noise disturbances before the exposure to the noise causes physical injury. Movement away from the injurious sound radius is a behavioral response, which is discussed below.

The installation of up to 24 metal sheet piles (surrogate values based on 36-inch steel pipe piles) by vibratory hammer and not using noise abatement measures could result in behavioral effects to ESA-listed fishes at a radius of up to 706.8-feet (215.4-meters) away from the impact pile driving operations and effects to ESA-listed sea turtles at a radius of up to 15.2-feet (4.6-meters)

away from the impact pile driving operations. We believe behavioral noise effects to these species will be insignificant. Although we generally expect mobile species to move away from noise disturbances, the proposed action will occur in a confined space. If an animal remains within the project area, it could be exposed to behavioral noise effects during pile installations. Because pile installations will occur intermittently during daylight hours only, these species will be able to resume normal activities during quiet periods between pile installations and at night.



STEP 1: GENERAL PROJECT INFORMATION

PROJECT TITLE and CONTACT	Flood Resiliency Study for Broward Basins SERO-2025-03154
PROJECT/SOURCE INFORMATION (size, material, number, duration to drive pile, etc.)	"Most nominal AZ's, NZ's and PZ's are in the range of 27.5" in width. Special sizes may vary but we don't expect any on this job. In most of the sand installations, we'd expect between 10-12 pairs installed in a day (20-24 separate 27.5" sheets) that would be about 30 minutes per pile In harder, perhaps rockier conditions assume half of the production rate of 5-6 pairs per day or an hour/pile."

STEP 2: QUANTITATIVE PROJECT-SPECIFIC INFORMATION

1 sec SEL = RMS	METRIC: RMS (NOT Peak)	WEIGHTING
Unattenuated Sound Pressure Level (dB) (see Proxy Level Tab for surrogate values; Copy, ONLY Paste Values (123), not formulas)	170	Sea Turtle Default WFA (kHz)
Attenuated Sound Pressure Level (dB)* (calculation done automatically)	170	0.255
Distance associated with sound pressure level measurement/Measurement distance from pile (meters); Typically, 10-m but please double check data being used	10	
Transmission loss constant (NMFS recommends: 15 if unknown)	15	

Number of piles per day (best estimate based on previous experience)	24	Attenuation (e.g., bubble curtain) (enter positive number)
Duration to drive a single pile (minutes) (best estimate based on previous experience)	30	
Duration of Sound Production within a day (seconds)	43200	Cumulative SEL at measured distance (dB)
10 Log (duration of sound production)	46.35	

*If sound pressure level provided includes attenuation methods (e.g., bubble curtain), please note this in Project/Source Inform

RESULTANT ISOPLETHS
(Range to Effects)

For vibratory pile driving, only behavioral thresholds exist for fishes

NO FISHES

	FISHES: BEHAVIOR
	RMS Threshold (dB)*
	150
Isopleth (meters)	215.4
Isopleth (feet)	706.8

*The 150 dB threshold is not a "formal" threshold (i.e., level where one can begin to look at potential responses). Please chec

NO SEA TURTLES

	SEA TURTLES: AUD INJ ONSET	BEHAVIOR
	PTS SEL_{cum} Threshold (dB)	RMS Threshold (dB)
	198	175
Isopleth (meters)	166.7	4.6
Isopleth (feet)	546.9	15.2

	MARINE MAMMALS	
Hearing Group	LF Cetacean AUD INJ SEL_{cum} Threshold (dB)	HF Cetacean AUD INJ SEL_{cum} Threshold (dB)
	197	201
Isopleth (meters)	192.4	73.9
Isopleth (feet)	631.4	242.6

Figure 1. Vibratory Pile Driving Report, generated using the NMFS Multi-species Pile Driving Tool

Updates to the regulations governing interagency consultation (50 CFR part 402) were effective on May 6, 2024 (89 Fed. Reg. 24268). We are applying the updated regulations to this consultation. The 2024 regulatory changes, like those from 2019, were intended to improve and clarify the consultation process, and, with one exception from 2024 (offsetting reasonable and prudent measures), were not intended to result in changes to the Services' existing practice in implementing section 7(a)(2) of the Act. 84 Fed. Reg. at 45015; 89 Fed. Reg. at 24268. We have considered the prior rules and affirm that the substantive analysis and conclusions articulated in this letter of concurrence would not have been any different under the 2019 regulations or pre-2019 regulations.

This concludes your consultation responsibilities under the ESA for species and/or designated critical habitat under NMFS's purview. Reinitiation of consultation is required and shall be requested by the action agency where discretionary Federal action agency involvement or control

over the action has been retained or is authorized by law and: (a) take occurs; (b) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in this consultation; (c) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not previously considered in this consultation; or (d) if a new species is listed or critical habitat designated that may be affected by the action.

We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions on this consultation, please contact Daniel Owen, Consultation Biologist, at (727) 209-5961 or by email at Daniel.Owen@noaa.gov.

Sincerely,

KLEMM.DENNIS.LANDON.1365899572 Digitally signed by KLEMM.DENNIS.LANDON.1365899572 Date: 2026.03.09 08:11:46 -04'00'

3/9/26

Dennis Klemm
Acting Assistant Regional Administrator
for Protected Resources

File: 1514-22.f.4

Literature Cited

U.S. Department of the Navy. 2025. Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase 4) Revision 2025.1. San Diego: NIWC Pacific