# ANNEX A
# FISH AND WILDLIFE COORDINATION ACT & ENDANGERED SPECIES ACT COMPLIANCE

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# 1 BACKGROUND

The congressionally authorized Central Everglades Planning Project (CEPP) is part of the Comprehensive Everglades Restoration Plan (CERP) proposed by the United States Army Corps of Engineers (USACE) and the South Florida Water Management District (SFWMD). The project is intended to restore freshwater inflows to the central portion of the Everglades ecosystem and send additional water south (USACE 2014). The project features identified in CEPP have been designed to capture water otherwise lost to tide, and redirect the water to flow south to the central Everglades, Water Conservation Areas (WCAs), Everglades National Park (ENP), and Florida Bay. Implementation of CEPP, as authorized by Congress in 2016, would send an annual average of approximately 210,000-acre-feet of water south from Lake Okeechobee.

Restoration of more natural flows into and through the central Everglades, restoring depths and durations into and within the central Everglades will be achieved by:

- Increasing storage, treatment and conveyance of water south of Lake Okeechobee;
- Removing canals and levees within the central Everglades; and
- Retaining water within ENP and protect urban and agricultural areas to the east from flooding (USACE 2014).

CEPP was included in the Water Infrastructure Improvements for the Nation Act (WIIN Act) that was approved in 2016, which allowed the USACE to move forward with implementing construction of the project, which will occur in phases. Three different phases have been identified through separate Project Partnership Agreements (PPAs), including:

- PPA South, which consists of removing water flow barriers in the southern portion of the project's footprint that will set conditions to flow more water south;
- PPA North, which consists of constructing the features needed to store additional water; and
- PPA New Water, which consists of constructing features that will enable additional water to flow from Lake Okeechobee south into features constructed under PPA North and PPA South (USACE 2014).

The authorized CEPP and the incremental project components identified in the CERP were intended to reduce the risks and uncertainties associated with project planning and implementation. The term "increment" is used to underscore that CEPP formulated portions (scales) of individual components of the CERP. It was envisioned that later studies would investigate additional scales of components of the CERP to expand upon this initial "increment" to achieve the level of restoration envisioned for the CERP. This approach is consistent with the recommendations of the National Research Council to utilize Incremental Adaptive Restoration to both achieve timely, meaningful benefits of the CERP and to lessen the continuing decline of the Everglades ecosystem.

CEPP considered increments of the following components that were included in CERP (the assigned letter refers to its CERP designation):

- Everglades Agricultural Area Storage Reservoirs (Component G);

- Modified Holey Land Wildlife Management Area Operation Plan (Component DD);
- Flow to Northwest and Central WCA 3A (Component II);
- WCA 3 Decompartmentalization and Sheetflow Enhancement (Components AA, QQ and SS);
- Dade-Broward Levee/Pennsuco Wetlands (Component BB);
- Bird Drive Recharge Area (Component U);
- L-31N Improvements for Seepage Management and S-356 Structures (Components V and FF); and
- Everglades Rain-Driven Operations (Component H).

As authorized, CEPP is expected to deliver approximately 210,000 ac-ft of flow on an average annual basis to the central portion of the Everglades, which otherwise would be undesirably discharged to the Northern Estuaries, thus improving ecosystem conditions in both the central Everglades and Northern Estuaries.

## 1.1 Project Description

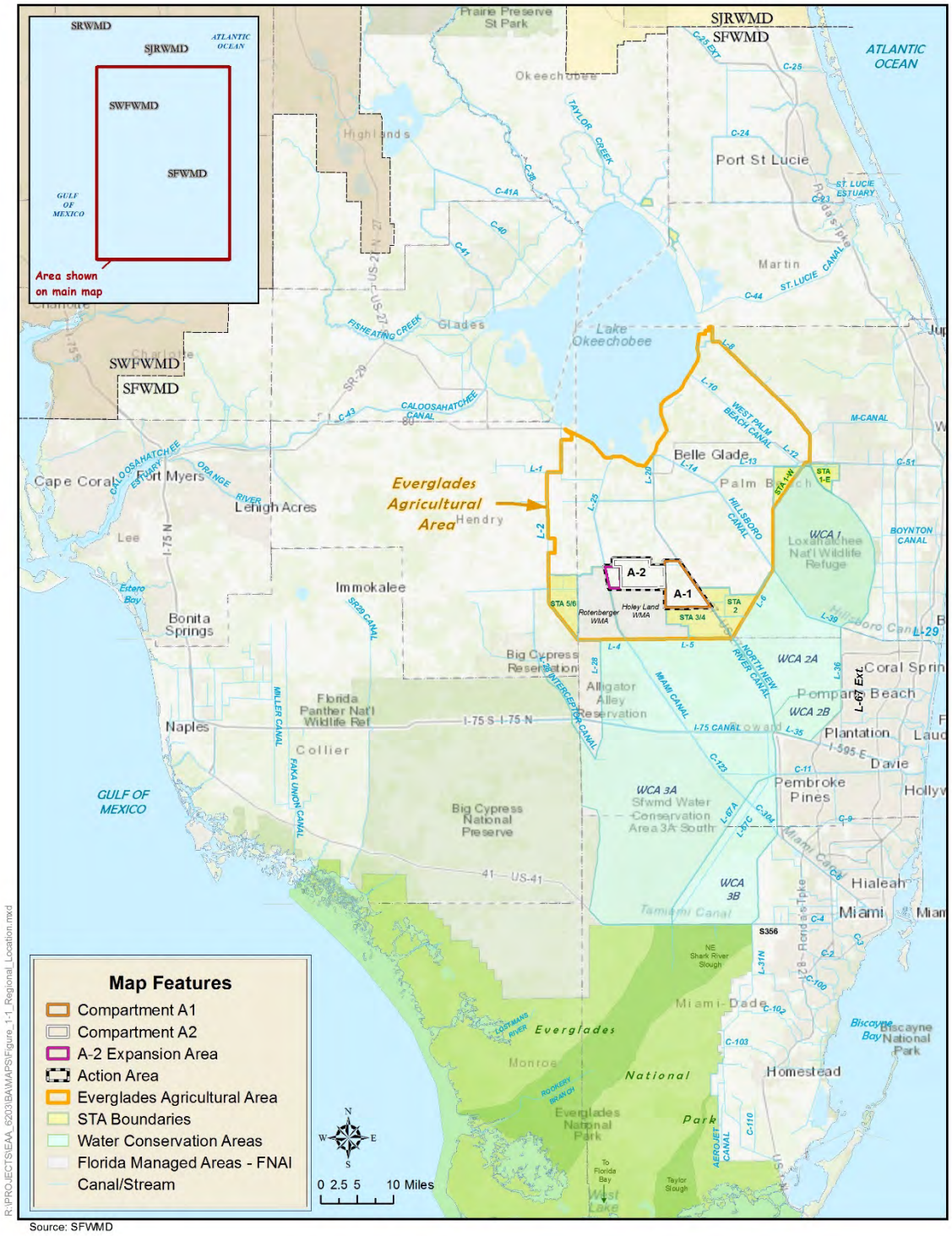
The proposed Everglades Agricultural Area Storage Reservoir and Treatment Wetlands Project is located in southern Florida, south of Lake Okeechobee in south Palm Beach County (Figure 1-1). In July 2017 the SFWMD submitted a request to the USACE to participate in a post authorization change report (PACR) (an integrated Feasibility Study and Environmental Impact Study) for the previously authorized CEPP. The purpose of the CEPP PACR is to increase above-ground water storage amounts by building a reservoir on the A-1 and A-2 parcels and the A-2 Expansion area (Figure 1-2), and to revise the project component of the A-2 parcel to increase water storage to a minimum of 240,000 ac-ft (SFWMD 2017a).

The scope of the CEPP PACR focuses on the final increments of four specific components of the CERP (the assigned letter refers to its CERP designation):

- Everglades Agricultural Storage Reservoirs (Component G);
- Flow to Northwest and Central WCA 3A (Component II);
- Environmental Water Supply Deliveries to the St. Lucie Estuary (C); and
- Environmental Water Supply Deliveries to the Caloosahatchee Estuary (E).

The CEPP PACR also includes consideration of updated System-wide Operational Changes – Everglades Rain-Driven Operations (Component H).

The focus of the CEPP PACR is to develop a plan to provide sufficient water storage, conveyance and treatment capacity in the Everglades Agricultural Area (EAA) to deliver the CERP goal of 300,000 ac-ft of flow to the central Everglades on an average annual basis by redirecting additional undesirable discharges to the Northern Estuaries to the central portion of the Everglades to further restore ecosystem conditions. The water storage and wetland treatment facilities are being proposed between the North New River (NNR) Canal and the Miami Canal within the EAA. The parcels of land to be utilized for the project include the A-2 parcel (14,389 acres) and A-2 Expansion area (4,551 acres), totaling approximately 17,926 acres.




Source: SFWMD

**Figure 1-1. Regional Map for the Everglades Agricultural Area Storage Reservoir and Treatment Wetlands Project.**

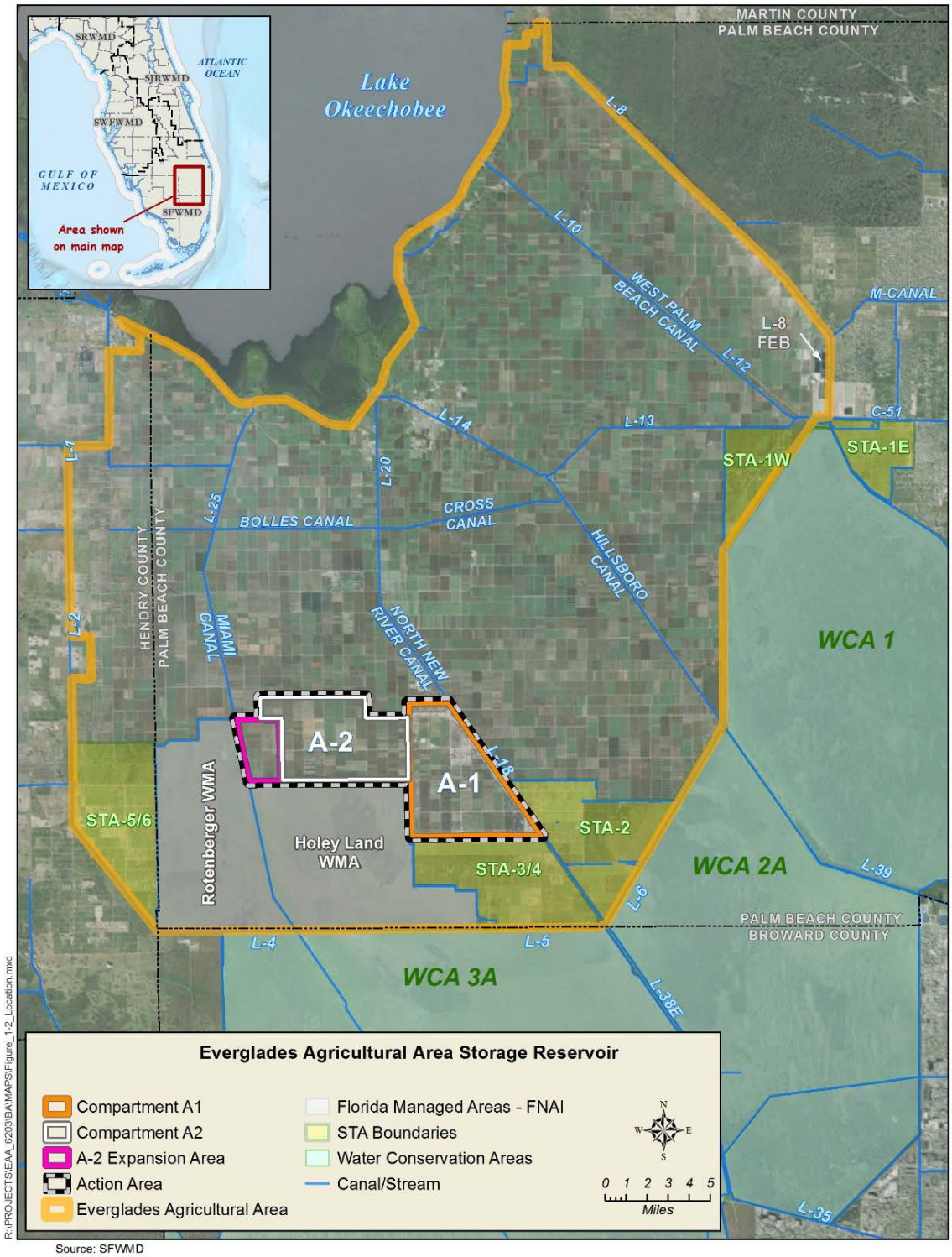



**Figure 1-2. Location Map for the Everglades Agricultural Area Storage Reservoir Project.**

Improvements to Parcels A-2 and A-2 Expansion area will provide 240,000 ac-ft of dynamic water storage and necessary treatment, plus conveyances improvements.

## 1.2 Interrelated and Interdependent Actions

The project components included in the proposed project include 6,500 acres of treatment wetlands and a 10,500-acre reservoir for water storage. The additional acres within the A-2 parcel and A-2 Expansion area will include ancillary structures for the project, including canals, bridges, water control structures and levees. Additionally, the project includes all necessary water control structures to convey water to and from the NNR and Miami Canals, and between the reservoir and the treatment wetlands. Improvements to the existing water conveyance features between Lake Okeechobee and the project area include expansion of the existing Miami Canal and NNR Canal within the existing SFWMD right of way.

Stormwater Treatment Area (STA) 2 and STA 3/4 are located adjacent to the south and southeastern boundaries of the project, and Water Conservation Area (WCA) 2A and WCA 3A are located to the south/southeast of the project and would receive waters from the EAA reservoir.

This Biological Assessment evaluates the potential direct and indirect effects of the proposed action on federally-listed species within the Action Area, which includes the footprint of the A-2 parcel, and A-2 Expansion area, as well as the downstream effects in A-1 FEB, STA 2, STA 3/4, WCA 2A and WCA 3A as a result from the change in water discharges, and the cumulative effects of the proposed project and future planned projects. Determinations have been made for each federally-listed species and their designated critical habitats that have the potential to be affected by the project.

## 1.3 Description of Existing Conditions

The A-2 East (STA) and A-2 West (Reservoir) parcels are historic wetlands drained for the current agricultural practice of sugar cane crop production. The A-1 FEB parcel is currently working in its capacity as a flow equalization basin (15,800 acres) holding stages to 4-ft above land surface.

The soils in the Everglades are primarily composed of peats and mucks. Deep, clean sands characterize the area east of the Everglades and south of Lake Okeechobee with wet, gray or grayish-brown, sandy soils underlain by sandy clay cover the area west of the Everglades. The peat and muck soils, which are dark brown to nearly black, were formed in marshes or swamps by the partial decay of plant materials with some admixture of mineral soil in the case of muck. Peat, by definition, consists of 65% or more organic material with relatively little mineral matter. Muck on the other hand, consists of 25 to 65% plant material mixed with sand, silt, and clay. The peat and muck soils may differ from each other in the kind of plant material that they contain, in the corresponding depths, and/or in the nature of the underlying material. The peat and muck may rest directly on limestone or on an intermediate layer of sand or marl.

The A-2 reservoir and A-2 STA project area is covered by three soil types: Lauderhill muck (drained), Pahokee muck (drained), and Terra Ceia muck (drained). These soil types are classified as very poorly drained, hydric, organic (herbaceous organic parent material) soils

over shallow limestone (26–80 inches). Land use based on the Florida Land Use and Cover Classification System (FLUCCS) in the A-2 parcel and A-2 Expansion area includes 2156-Sugar Cane (17,378.0 acres), 3200-Upland Shrub and Brush (7.0 acres), 5120-Channelized Waterways (282.0 acres), and 6410-Freshwater Marshes (233.0 acres). Of the 17,378 acres of land cover classified as 2156-Sugar Cane, approximately 611 acres are linear water control features used to manipulate water levels in support of agricultural operations.

The existing wetlands (approximately 233 acres) within the A-2 parcel and A-2 Expansion area are degraded wetlands due to sugar cane farming practices that comprise the majority of the surrounding area. Wetland features are generally dominated by nuisance and/or exotic vegetation as identified by the Florida Exotic Pest Plant Council on the List of Invasive Species, and appear to be isolated by the surrounding sugar cane farming. Although wetland features appear to be ecologically isolated from natural uplands and other wetland features, some wetland features appear to have a hydrologic connection to the network of drainage ditches and canals. The remnant wetland habitat is degraded and predominately exotic, but will still provide habitat and foraging for medium and small sized animals. Additionally, wetland features provide limited water storage and promote water quality.

# 2 LISTED SPECIES REVIEW

The A-2 parcel and A-2 Expansion area were evaluated for potential occurrences of federal protected plant and animal species in accordance with Section 7 of the Endangered Species Act of 1973 (as amended) (ESA). Literature searches and a habitat field review were conducted to identify protected species and any critical habitat that might be expected to occur within the project study area.

The reviews and database searches included the following:

- United States Fish and Wildlife Service (USFWS), Endangered and Threatened Wildlife and Plants, 50 Code of Federal Regulations (CFR) 17.11 and 17.12, 2007;
- USFWS Information for Planning and Consultation (IPaC) database (USFWS no date a);
- Florida Fish and Wildlife Conservation Commission (FFWCC), May 2017, Florida's Endangered and Threatened Species (FFWCC 2017a);
- FFWCC, Eagle Nest Locator (2015–2016 nesting season) (FFWCC 2017b);
- Rules for the Department of Agriculture and Consumer Services, Division of Plant Industry, Chapter 5B-40, Preservation of Native Flora of Florida (Florida Administrative Code & Florida Administrative Register, Rule Chapter 5B-40);
- Florida Natural Areas Inventory (FNAI) Tracking List Palm Beach County (FNAI 2017);
- United States Department of Agricultural, Natural Resources Conservation Service (USDA NRCS), Soil Survey of Palm Beach County, Florida (USDA NRCS no date a);
- USDA NRCS, Soil Survey of Hendry County, Florida (USDA NRCS no date b);
- USFWS, National Wetlands Inventory, Wetlands Mapper (USFWS 2017a);
- USFWS, Classification of Wetlands and Deepwater Habitats of the United States, (Cowardin et al. 1979); and
- USFWS Endangered Species website (USFWS 2017b).

## 2.1 Protected Species Observed

### 2.1.1 A-1 and A-2 Parcels and A-2 Expansion Area Project Site

The A-1 and A-2 parcels were formerly the proposed site for the A-1 Reservoir Project, but construction of that project was halted following the completion of a seepage canal. Currently, the agricultural lands on the A-2 and A-2 Expansion area include active sugar cane leases and are in production. Construction of the A-1 FEB was recently completed on the A-1 parcel.

The project site currently contains habitat that has the potential to support protected and federally threatened or endangered species, in particular eastern indigo snake (*Drymarchon corais couperi*), northern crested caracara, (*Caracara cheriway*), bald eagle (*Haliaeetus leucocephalus*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*), red knot (*Calidris canutus rufa*), wood stork (*Mycteria americana*), and Florida panther (*Puma concolor coryi*).

Eastern indigo snakes were reported in the project area from 2006–2008 during construction of the A-1 Reservoir Seepage Canal and from 2014-2015 during construction

of the A-1 FEB on several occasions (SFWMD, personal communication). Since the eastern indigo snake is typically found in upland areas, it is anticipated that eastern indigo snakes may be found in and around the levees, berms, rock piles, and along roadways. This area now supports the A-1 FEB which is a shallow reservoir holding up to four feet of water.

The project site is located within a USFWS northern crested caracara consultation area (USFWS 2003a). The USFWS Standard Local Operating Procedures for Endangered Species manual for South Florida defines the primary protection zone for the species as 985 feet outward from a nesting tree, with a secondary foraging zone of 4,920 feet from an active nesting tree (USFWS 2004). Although the FFWCC does not identify the distribution of northern crested caracara as including Palm Beach County (FFWCC 2017c), this species was observed within the A-1 FEB in December 2013 during construction monitoring (SFWMD, personal communication). Additionally, there are three documented observations of northern crested caracara near the 10-mile buffer of the project to the west, and several observations of this species within the 20-mile project buffer, also concentrated west of the project within Hendry County (see Figure 3-2). A review of eBird data identified an observation of northern crested caracara within the A-2 parcel of the project on January 1, 2003 (eBird 2017a). A crested caracara also was observed just outside the eastern boundary of the A-1 parcel on US Route 27 on January 17, 2015 (eBird 2017b). No suitable nest trees for northern crested caracara are present within the project area.

Emergent wetland habitat in addition to large open water areas within the A-1 and A-2 parcels, and A-2 Expansion area provide potential habitat for Everglade snail kite. Everglade snail kite was observed in the A-1 FEB in 2014 and 2015 during construction monitoring (SFWMD, personal communication).

The freshwater wetlands within the project area serve as foraging habitat for the wood stork. Although the nearest active wood stork colony is located over 20 miles east of the project (see Figure 3-5), wood stork have been observed on the site. Wood stork were last seen within the A-1 parcel of the project on January 31, 2017 (eBird 2017c), and within the A-2 parcel of the project on August 30, 2014 (eBird 2017a). Wood stork also were observed just outside the eastern boundary of the A-1 parcel on US Route 27 on January 17, 2015 (eBird 2017b). Construction monitoring conducted for the A-1 FEB documented presence of wood stork within the A-1 parcel of the project on several occasions in 2014.

Some areas of the primary and secondary Florida panther management zones are located within the project areas. There are small portions of both zones in the A-2 Expansion area (25.1 acres of primary management zone, and 5.9 acres of secondary management zone). Additional primary and secondary habitat management zone areas abut the project site to the south and west (see Figure 3-7). Florida panther have been observed in the project area, having been documented on several occasions within the A-1 FEB project in 2014 and 2015 during construction monitoring (SFWMD, personal communication). Telemetry data also has recorded a Florida panther along the western boundary of the A-2 Expansion area (see Figure 3-6), and there have been two documented Florida panther mortalities, south of the project area, within the 10-mile buffer area of the project (see Figure 3-7). Therefore, it is anticipated that panthers may hunt on the project site, but it is unlikely that they would use these areas for any extended length of time because of the lack of suitable long-term panther habitat.

### 2.1.2 Stormwater Treatment Areas (STAs) 2 and 3/4

The eastern extent of STA 2 is within the core foraging area (CFA) of four wood stork colonies (see Figure 3-5). The southeast corner of STA 3/4 also falls within the 18.6-mile buffer area of a wood stork colony. Wood storks have been documented utilizing wetlands within both STAs.

While unlikely, it may be possible that levees and berms within the project area may provide habitat for the eastern indigo snake. Alligators (*Alligator mississippiensis*) are present within both STAs. Although it was originally anticipated that the Everglade snail kite would only forage in the STAs, there have been documented reports of this species nesting within STA 2 in 2016 (SFWMD 2017b, 2017c). Although snail kites have been documented nesting in STA 3/4 in previous years, there were no nests established in STA 3/4 in 2016 (SFWMD 2017c). Based on current and historical data, the Everglade snail kite has the potential to nest in STA 2 and STA 3/4.

### 2.1.3 Water Conservation Areas

Federally protected species occurring in WCAs 2A and 3A include many of the protected species in the South Florida region including the American alligator, wood stork, northern crested caracara, Everglade snail kite, Florida panther, and possibly the eastern indigo snake. There also is designated critical habitat for the Everglade snail kite in WCA 2 and WCA 3, which have been documented to support several successful nests (USFWS 2009).

### 2.1.4 Downstream Changes in Water Levels

Changes in water levels downstream from the project that will occur once the project is operational, have the potential to affect several other federally threatened and endangered species. Although these species do not have the potential to occur in the project area due to lack of suitable habitat, downstream changes in water levels and potential affects to these species have been included in this assessment. Federally threatened and endangered species that have the potential to be impacted by changes in water levels downstream from the project include deltoid spurge (*Chamaesyce deltoidea* ssp. *deltoidea*), Garber's spurge (*Chamaesyce garberii*), Small's milkpea (*Galactia smallii*), tiny polygala (*Polygala smallii*), smalltooth sawfish (*Pristis pectinate*), sea turtles, Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*) (CSSS), and West Indian manatee (also known as Florida manatee) (*Trichechus manatus*).

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# 3 FEDERALLY-LISTED SPECIES AND SUITABLE HABITAT DESCRIPTIONS

The federal endangered and threatened species list is maintained by the USFWS (terrestrial species) and the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (marine species) in accordance with the ESA. In the ESA, "endangered" species are in danger of extinction throughout all or a significant portion of its range, and "threatened" species are likely to become endangered within the foreseeable future throughout all or a significant portion of its range. "Species of special concern" is not a formal term used by USFWS as it is not defined in the ESA. This term is commonly used to refer to species that are declining, or appear to be in need of conservation (USFWS 2016a).

## 3.1 Federally-Listed Species

The geographic regions considered in the analysis of threatened and endangered species include the proposed A-1 and A-2 parcels, and A-2 Expansion area project sites, as well as the downstream areas affected by the operations of the reservoirs proposed for these parcels. Because the reservoir located in the project area will be operated in close coordination with the existing STA 2 and STA 3/4, which currently discharge into WCA 2A and WCA 3A, respectively, these STAs and WCAs will be included in the areas evaluated for the potential effects to federally listed species.

The federally listed species that use or have the potential to use the habitats located in the project area include Florida panther, northern crested caracara, CSSS, Everglade snail kite, red knot, wood stork, and eastern indigo snake. These are listed in Table 1-1, and followed by descriptions of each species. The American alligator is discussed because the species is listed in Florida as "threatened due to similarity of appearance" (SAE) to the endangered American crocodile (*Crocodylus acutus*).

**Table 1-1. Federal Threatened or Endangered Plant and Wildlife Species Known or having the Potential to Occur in the Project Area.**

| Common Name | Scientific Name | Federal Status[1] | Potential to Occur in Project Area[2] |
|---|---|---|---|
| **FLOWERING PLANTS** | | | |
| Beach jacquemontia | *Jacquemontia reclinata* | E | U |
| Cape Sable thoroughwort | *Chromolaena frustrata* | E | U |
| Crenulate lead-plant | *Amorpha crenulata* | E | U |
| Deltoid spurge | *Chamesyce deltoidea* spp. *deltoidea* | E | U |
| Florida prairie-clover | *Dalea carthagenensis floridana* | E | U |
| Four-petal pawpaw | *Asimina tetramera* | E | U |
| Garber's spurge | *Chamaesyce garberii* | T | U |
| Johnson's seagrass | *Halophila johnsonii* | T | U |
| Okeechobee gourd | *Curcubita okeechobeensis* ssp. | E | U |

**Table 1-1. Federal Threatened or Endangered Plant and Wildlife Species Known or having the Potential to Occur in the Project Area. (continued)**

| Common Name | Scientific Name | Federal Status[1] | Potential to Occur in Project Area[2] |
|---|---|---|---|
| Small's milkpea | *Galactia smallii* | E | U |
| Tiny polygala | *Polygala smallii* | E | U |
| **LICHENS** | | | |
| Florida perforate cladonia | *Cladonia perforata* | E | U |
| **INVERTEBRATES** | | | |
| Bartram's hairstreak butterfly | *Strymon acis bartrami* | E | U |
| Florida leafwing butterfly | *Anaea troglodyte floridalis* | E | U |
| Miami blue butterfly | *Cyclargus thomasi bethunebakeri* | E | U |
| Schaus swallowtail butterfly | *Herclides aristodemus ponceanus* | E | U |
| Stock Island tree snail | *Orthalicu reses* (not including *nesodryas*) | T | U |
| **FISHES** | | | |
| Smalltooth sawfish | *Pristis pectinata* | E | U |
| **REPTILES** | | | |
| American alligator | *Alligator mississippiensis* | SAE | P |
| American crocodile | *Crocodylus acutus* | T | U |
| Eastern indigo snake | *Drymarchon corais couperi* | T | O |
| Green sea turtle | *Chelonia mydas* | T | U |
| Hawksbill sea turtle | *Eretmochelys imbricata* | E | U |
| Kemp's ridley sea turtle | *Lepidochelys kempii* | E | U |
| Leatherback sea turtle | *Dermochelys coriacea* | E | U |
| Loggerhead sea turtle | *Caretta caretta* | T | U |
| **BIRDS** | | | |
| Northern crested caracara | *Caracara cheriway* | T | O |
| Bald eagle | *Haliaeetus leucocephalus* | BGEPA | O |
| Cape Sable seaside sparrow | *Ammodramus maritimus mirabilis* | E | U |
| Everglade snail kite | *Rostrhamus sociabilis plumbeus* | E | O |
| Florida scrub-jay | *Aphelocoma coerulescens* | T | U |
| Ivory-billed woodpecker | *Campephilus principalis* | E | U |
| Kirtland's warbler | *Setophaga kirtlandii* | E | U |
| Piping plover | *Charadrius melodus* | T | U |
| Red knot | *Calidris canutus rufa* | T | P |
| Red-cockaded woodpecker | *Picoides borealis* | E | U |
| Roseate tern | *Sterna dougallii* | T | |
| Whooping crane | *Grus americana* | EXPN | U |
| Wood stork | *Mycteria americana* | T | O |

**Table 1-1. Federal Threatened or Endangered Plant and Wildlife Species Known or having the Potential to Occur in the Project Area. (continued)**

| Common Name | Scientific Name | Federal Status[1] | Potential to Occur in Project Area[2] |
|---|---|---|---|
| **MAMMALS** | | | |
| Florida bonneted bat | *Eumops floridanus* | E | U |
| Florida panther | *Felis concolor coryi* | E | O |
| Southeastern beach mouse | *Peromyscus polionotus niveiventris* | T | U |
| West Indian manatee | *Trichechus manatus* | T | U |

1 – BGEPA – Bald and Golden Eagle Protection Act; E – federally endangered; T – federally threatened; SAE – Similarity in appearance, endangered; EXPN – experimental population, nonessential

2 - O – documented as occurring in the project area; P – potential to occur in project area; U – unlikely to occur in the project area
Source: USFWS 2017c

### 3.1.1 Flowering Plants

#### *3.1.1.1 Beach Jacquemontia*

Beach jacquemontia (*Jacquemontia reclinata*) is a federally endangered perennial vine, endemic to the southeast coast of Florida. It is found in beach coastal strand and maritime hammock vegetation habitats (USFWS 1999, FNAI 2000) where there is bare soil and protection from direct winds. Known wild distribution is restricted to suitable habitat, which currently is limited to 10 locations along the Atlantic coast, totaling approximately 730 individuals in 2011 (Maschinski et al. 2013). The project does not contain any coast dune habitats. Beach jacquemontia is unlikely to occur in the project area.

#### *3.1.1.2 Cape Sable Thoroughwort*

Cape Sable thoroughwort (*Chromolaena frustrata*) is a perennial herbaceous plant that was listed as federally endangered in 2013 (78 FR 63796). The plant ranges from approximately 6 to 10 inches tall with bunches of blue to lavender flowers. The species is endemic to south Florida and found in open canopy habitats of coastal berms and coastal rock berms, as well as semi-closed canopy habitats of buttonwood forests, coastal hardwood hammocks, and rockland hammocks. Critical habitat was designated for the Cape Sable thoroughwort in 2014 and includes coastal areas along the southern tip of Florida and areas within the Florida Keys (79 FR 1552). The project area does not include known habitat for Cape Sable thoroughwort and this species is not expected to occur.

#### *3.1.1.3 Crenulate Lead-Plant*

The crenulate lead-plant (*Amorpha crenulata*) is a federally endangered shrub endemic to the marl prairies and wet pine rocklands in a 20-square mile area of Miami-Dade County, Florida (USFWS 1999). Its current distribution is only slightly smaller than historical estimates. There are currently eight known populations. Habitats include areas historically associated with seasonal inundating and frequent burning, as well as some other poorly-drained soil types, with the species requiring open sun to partial shade (USFWS 1999). Loss of pine rockland habitat to development is a major factor in its listing as endangered. The plant is not known to occur in the project area, nor is its preferred habitat present.

Although crenulate lead-plant is not expected to occur in the project area, it is located within the action area of effects due to potential for downstream changes in water levels.

#### *3.1.1.4 Deltoid Spurge*

The deltoid spurge is listed as federally endangered and endemic to Miami-Dade County, Florida. It is an herbaceous, generally prostrate, plant that forms mats in the pine rocklands of southern Florida. Though historically more widely distributed, this and other species dependent on the pine rockland habitats are threatened by habitat destruction for residential construction (50 FR 29345). Additional threats include invasive species and fire suppression (USFWS 1999). Pine rockland habitat is not present in the project area. Although deltoid spurge is not expected to occur in the project area, it is located within the action area of effects due to potential for downstream changes in water levels.

#### *3.1.1.5 Florida Prairie-Clover*

The Florida prairie-clover (*Dalea carthagenensis* var. *floridana*) is federally listed as endangered. It is a woody shrub that averages 6 feet in height. The species is found in pine rockland, rockland hammock, marl prairie, and coastal berm, as well as connecting habitats. The species was historically present in Miami-Dade, Monroe, Collier, and Palm Beach counties. The last reported occurrence in Palm Beach County was in 1918. Current distribution includes Big Cypress National Park, three Miami-Dade County conservation areas, and three unprotected areas in the Cutler Bay area of Miami-Dade County (82 Federal Register [FR] 46691, October 6, 2017). There are no known occurrences of Florida prairie-clover in the project area and the project does not contain suitable habitat. Florida prairie-clover is unlikely to occur in the project area.

#### *3.1.1.6 Four-Petal Pawpaw*

The four-petal pawpaw (*Asimina tetramera*) is a federally endangered aromatic shrub of the custard apple family, endemic to the southeast coast of Florida. It is currently found in the coastal sand pipe scrub habitats of Martin and Palm Beach counties (USFWS 1999). Much of the suitable habitat, including sand pine scrub habitat on old coastal dunes, has been converted into residential areas. Suitable habitat for four-petal pawpaw is not present in the project area, as the project does not contain any the coastal dune habitats. Four-petal pawpaw is unlikely to occur in the project area.

#### *3.1.1.7 Garber's Spurge*

Garber's spurge is listed as federally threatened. It is a short-lived perennial herb known from the pine rocklands, coastal flats, coastal grasslands, and beach ridges in Miami-Dade and Monroe counties, Florida (USFWS 1999). It is typically found in open to moderate shade locations at low elevations, on sandy soils or bare limestone. It is a small prostrate to erect herb with small ovate leaves and is endemic to southern Florida. It occurred historically from Perrine, Miami-Dade County, west to Cape Sable, Monroe County, and to the Sand Keys west of Key West, Monroe County. It continues to be abundant on Cape Sable and likely occurs in small numbers throughout the Keys (USFWS 1999). The project area is not within this known distribution, nor does it contain habitat in which the species is generally found. Although Garber's spurge is not expected to occur in the project area,

it is located within the action area of effects due to potential for downstream changes in water levels.

#### *3.1.1.8 Johnson's Seagrass*

Johnson's seagrass (*Halophila johnsonii*) was federally listed as threatened in 1998, and critical habitat was designated in 2000 (NMFS 2002). Designated critical habitat for Johnson's seagrass is located within 10 portions of the Indian River Lagoon and Biscayne Bay, within its current range (65 FR 17786). This is a small sea grass, with leaves ranging from 2 to 5 centimeters in length, spaced approximately 3 to 5 centimeters along the rhizome. The species has a restricted distribution (only found along approximately 200 kilometers of south Florida coastline between Sebastian Inlet and north Biscayne Bay) and limited reproduction; only reproducing through asexual branching (NMFS 2002). Growth habits are often patchy distribution from the intertidal area to water depths of 3 meters. The plant general grows where light levels are at least 10% of surface light, salinity is at least 15 parts per million (ppm), water temperatures are between 10 and 35 degrees Celsius, and occurring on unconsolidated sand or mixed sand with silt-clay (NMFS 2002). Habitat degradation (dredging, filling, construction), shading from overwater structures, prop scaring, altered water quality and siltation are key threats to the species, along with regulatory issues and storm events. Johnson's seagrass does not occur in the project area, as the project area does not contain suitable habitat to support this species.

#### *3.1.1.9 Okeechobee Gourd*

The Okeechobee gourd (*Curcubita okeechobeensis* ssp.) is federally listed as endangered. It was locally common in the pond apple (*Annona glabra*) forests south of Lake Okeechobee, but declined as the swamps and marshes were converted to agriculture. Current distribution is limited to two small populations, one along the St. Johns River, and a second around the shoreline of Lake Okeechobee (USFWS 1999). Although the project area is likely within the historical range of the Okeechobee gourd, any suitable habitat that occurred to support this species has likely been significantly altered to ongoing agricultural activities. Okeechobee gourd is unlikely to occur in the project area.

#### *3.1.1.10 Small's Milkpea*

Small's milkpea is federally endangered. It is a small, perennial prostrate legume with small, purple flowers, and is endemic to the pine rocklands of Miami-Dade County (USFWS 1999). Loss of habitat (less than 2% of its original pine rockland habitat remains) through conversion of pine rocklands for residential housing, commercial construction, or agriculture, has severely impacted the species. Remaining habitat occurs in small, isolated stands. Continued habitat loss and fragmentation, fire suppression, and invasion by exotic plant species are a continued threat to the species survival (USFWS 1999). No pine rockland habitat is present in the project area. Although Small's milkpea is not expected to occur in the project area, it is located within the action area of effects due to potential for downstream changes in water levels.

#### *3.1.1.11 Tiny Polygala*

The tiny polygala is a federally endangered milkwort endemic to the Atlantic coast of Florida. There are 11 known populations on the Atlantic Coastal Ridge, between the

Perrine area of Miami-Dade County, north to the southeast part of St. Lucie County. All populations are within 9.7 kilometers of the Atlantic coast (USFWS 1999). These populations "occur in sand pockets of pine rocklands, open sand pine scrub, slash pine, high pine, and well-drained coastal spoil" (USFWS 1999), where there is abundant light and no organic ground cover. Loss of habitat due to urban development, fire suppression and non-native plants has resulted in populations declines. Due to lack of suitable habitat in the project area to support tiny polygala, this species is unlikely to occur. Although tiny polygala is not expected to occur in the project area, it is located within the action area of effects due to potential for downstream changes in water levels.

### 3.1.2 Lichens

#### *3.1.2.1 Florida Perforate Cladonia*

The Florida perforate cladonia (*Cladonia perforata*) is a federally endangered reindeer lichen endemic to the high, well-drained sands of rosemary scrub habitat in Florida (USFWS 1999). This lichen grows on patches of bare ground, open rock outcrops or sand. Florida scrub is characterized, in part, by patches of bare sand, providing suitable growing media for reindeer lichens, including the Florida perforate cladonia (USFWS 1999). Due to lack of suitable habitat in the project area to support Florida perforate cladonia, Florida perforate cladonia is unlikely to occur.

### 3.1.3 Invertebrates

#### *3.1.3.1 Bartram's Hairstreak Butterfly*

Bartram's hairstreak butterfly (*Strymon acis bartrami*) is a federally endangered species. This small butterfly is endemic to Florida and is dependent on pine rocklands containing pineland croton (*Croton linearis*), the larvae's only known host plant (79 FR 47190, August 12, 2014). Pineland croton has been confirmed in Palm Beach County; however, these are limited to two occurrences documented in 1962 and 1963 (Atlas of Florida Plants 2017). Although focused plant surveys have not been completed for the project area, pineland croton is unlikely to occur due to the ongoing disturbances that are associated with the agricultural practices that occur within the project area. Bartram's hairstreak butterfly is unlikely to occur in the project area.

#### *3.1.3.2 Florida Leafwing Butterfly*

The Florida leafwing butterfly (*Anaea troglodyte floridalis*) is a federally endangered species. This medium sized butterfly is endemic to southern Florida, and feeds on only one known host plant, pineland croton (*Croton cascarilla*) (79 FR 47222, August 12, 2014). Pineland croton has been confirmed in Palm Beach County; however, these are limited to two occurrences documented in 1962 and 1963 (Atlas of Florida Plants 2017). Although focused plant surveys have not been completed for the project area, pineland croton is unlikely to occur due to the ongoing disturbances that are associated with the agricultural practices that occur within the project area. Florida leafwing butterfly is unlikely to occur in the project area.

#### *3.1.3.3 Miami Blue Butterfly*

The Miami blue butterfly (*Cyclargus thomasi bethunebakeri*) is a federally endangered small blue butterfly that is endemic to Florida. The historical distribution of the Miami blue butterfly is generally thought to be within coastal areas along the southern half of Florida (FFWCC 2010). Its known current distribution is restricted to two populations: one in Bahia State Park and another in Key West National Wildlife Refuge. This species has poor dispersal abilities and is found in edge habitats of tropical hardwood hammocks, beachside scrub and is occasionally found on pine rocklands. Host plants for larva include nonnative balloonvine (*Cardiospermum halicacabum*), gray nickerbean (*Caesalpinia bonduc*), a nonnative nickerbean (*C. pulcherrima*), and blackbeads (*Pithecellobium* spp.) and other tropical trees and shrubs. Adults feed on a variety of flowering plants. The project is not coastally located, therefore the Miami blue butterfly is unlikely to occur in the project area.

#### *3.1.3.4 Schaus Swallowtail Butterfly*

The Schaus swallowtail butterfly (*Heraclides aristodemus ponceanus*) is a federally endangered species. This large, brown and yellow butterfly is endemic to Florida, and has limited distribution within intact sub-tropical dry forests (hardwood hammocks) and their associated margins. Historically, it occurred from the greater Miami area, south through the Florida Keys to Lower Matecumbe Key. Current distribution is limited to a few sites on the south Florida mainland, mid- to northern Key Largo, and Biscayne National Park (USFWS 1999, University of Florida 2014). Sea torchwood (*Amyris elemifera*) is the primary food source; however, adults also have been seen feeding on guava (*Psidium guajava*), cheese shrub (*Morinda royoc*), and wild coffee (*Psychotria* spp.) (USFWS 1999). Principle threats include loss of habitat to commercial and residential development, pesticides and other hazardous chemicals, road kills, extreme climatic conditions, predation, parasites, and collectors (USFWS 1999). The species is not anticipated to occur in the project area as it is not a known distribution area and does not contain required habitat.

#### *3.1.3.5 Stock Island Tree Snail*

Stock Island tree snail (*Orthalicu reses* [not including *nesodryas*]) is a federally threatened species. This large arboreal snail is endemic to the Florida Keys of Monroe County, Florida (USFWS 1999). Historical distribution is believed to have been limited to Stock Island and Key West. Key habitat is hammocks with smooth-barked native trees that support relatively large amounts of lichens and algae. Collectors have extended this distribution, where they have been introduced to Key Largo and the southernmost parts of the mainland. Most of the known occurrences are now outside of its historic range, including the ENP. Major threats include habitat destruction and modification for residential and commercial development, pesticide use, and over collecting (USFWS 1999). Although surveys for Stock Island tree snail have not been conducted within the project area, due to its limited range and distribution and lack of suitable habitat in the project area, Stock Island tree snail is unlikely to occur.

### 3.1.4 Fishes

#### *3.1.4.1 Smalltooth Sawfish*

The smalltooth sawfish is a federally endangered species. Designated critical habitat for smalltooth sawfish consists of two coastally-located units: the Charlotte Harbor Estuary Unit, and the Ten Thousand Islands/Everglades Unit (74 FR 45353). These two units are located along the southwestern coast of Florida between Charlotte Harbor and Florida Bay.

The smalltooth sawfish is an elasmobranch with a cartilaginous skeleton. It is a type of ray but swims more like a shark. Historically, the species was found in the western Atlantic Ocean from New York to central Brazil (inclusive of the Gulf of Mexico), as well as the eastern Atlantic, along the central west coast of Africa. Common in Florida during the 1800's, overfishing and low reproductive rates led to dramatic populations declines (FFWCC 2018a). The species has been protected from harvest since 1992 and was listed as endangered under the ESA in 2003.

The current range of this species includes peninsular Florida, with some regularity only in south Florida from Charlotte Harbor to Florida Keys. The smalltooth sawfish resides in the Caloosahatchee River and adjacent Charlotte Harbor estuaries, and has the potential to be found in the southern estuaries where juveniles could potentially occur and feed along red mangrove shorelines. The species uses nearshore habitat (near river mouths or tidal creeks) when smaller (3 to 6 feet), and deeper offshore habitats once they reach larger sizes (up to 18 feet) (FFWCC 2018a). Juvenile sawfish use shallow habitats with a lot of vegetation, such as mangrove forests, as important nursery areas. Many such habitats have been modified or lost due to development of the coastal areas of Florida and other southeastern states. The loss of juvenile habitat likely contributed to the decline of this species.

Although the main Florida population resides in the Caloosahatchee River and adjacent Charlotte Harbor estuaries, smalltooth sawfish has the potential to be found in the southern estuaries where the juveniles could potentially occur and feed in red mangrove wetlands. Smalltooth sawfish is not expected to occur in the project area, therefore, no direct effects to smalltooth sawfish are expected from the proposed project.

### 3.1.5 Reptiles

#### *3.1.5.1 American Alligator*

The American alligator is a large, carnivorous reptile related to crocodiles that inhabits freshwater lakes, ponds, marshes, sloughs, swamps, canals, and occasionally brackish waters throughout the southeastern United States (U.S.). It is commonly seen on canal banks throughout the EAA and in the WCAs.

In 1985, alligators were down-listed in Florida from "threatened" to status of SAE because of its similarity to the endangered American crocodile. A distinguishing characteristic from the American crocodile, a close relative, is that only the upper teeth are visible with the alligator's mouth closed, while both the upper and lower teeth are visible on the American crocodile. The SAE listing is defined for species that are not currently biologically

threatened, but that are believed to likely become endangered in the future (50 CFR Part 17). Therefore, no coordination with USFWS is needed for this species.

#### *3.1.5.2 American Crocodile*

The American crocodile (*Crocodylus acutus*) is federally listed as threatened in Florida, which is at the northern extent of its range. The species inhabits coastal waters and mangrove swamps. Critical habitat for American crocodile is limited to the area within the southern tip of Florida, including Cape Sable and the Florida Keys (USFWS 2000).

The project is not coastally located and does not contain mangrove swamp habitat that would support American crocodile. Although American crocodile is unlikely to occur in the project area, it is located within the action area of effects due to potential for downstream changes in water levels.

#### *3.1.5.3 Eastern Indigo Snake*

The eastern indigo snake is federally listed as threatened. It is a large, bluish-black, non-venomous snake that reaches lengths of 8 feet (FFWCC no date). Its historical range extended throughout Florida and the coastal plains of Mississippi, Alabama, and Georgia (USFWS 1999).

The eastern indigo snakes preferred habitats are uplands (flatwoods, dry prairies, tropical hardwood hammocks, and coastal dunes). They are not usually found in Everglades wetlands (Steiner et al. 1983), but can be found on the edges of freshwater marshes and in agricultural fields (USFWS 1999). They are extremely susceptible to desiccation and cold. In dry, cold habitats (Georgia, Alabama, and the Florida panhandle), eastern indigo snakes depend on the holes of the gopher tortoise (*Gopherus polyphemus*), which provide protection from cold and dry conditions (USFWS 1999). Throughout the warmer environment of peninsular Florida, eastern indigo snakes may exist in any terrestrial habitats with low urban development (USFWS 1999). They frequently use natural holes, gopher tortoise burrows, trash piles and similar locations even in warmer south Florida. They prey on a variety of food sources including fish, frogs, toads, lizards, turtles and their eggs, small alligators, birds, and small mammals (USFWS 1999).

Initially, the population decline of eastern indigo snakes was attributed to over-collection for the pet trade (43 FR 4028), but current major threats to the eastern indigo snake include loss and fragmentation of habitat from increased development (USFWS 1999). Other threats to this species that are associated with development include increased mortality from vehicular collisions, domestic pets, people, and pesticides (USFWS 1999).

Eastern indigo snakes range over large areas and use various habitats throughout the year, with most activity occurring in the summer and fall (USFWS 1999). Warmer weather during the winter months in South Florida may afford the eastern indigo snake a larger range than 11.9 acres (USFWS 1999). Adult males have larger home ranges than adult females and juveniles; their ranges may encompass as much as 554 acres and 390 acres in the summer (USFWS 1999). By contrast, a gravid female may use from 3.5–106 acres (USFWS 1999). These estimates are comparable with those found in south-central Florida, that determined adult male home ranges average about 183 acres (max. 492 acres), whereas adult female home ranges average about 47 acres (max. 120 acres) (USFWS 1999). At the

Archbold Biological Station near Lake Placid, Florida, average home range size for females was determined to be 47 acres, and overlapping male home ranges to be 185 acres (USFWS 1999). Although FFWCC has not reported any sightings of eastern indigo snake in the project area, they have been observed within the A-1 FEB area (SFWMD, personal communication), and they also have been observed in other areas of the EAA (Figure 3-1) (note this figure does not contain the data for sightings within the A-1 portion of the project). Eastern indigo snakes were reported in the project area from 2006–2014. Currently, some of the former agricultural lands have converted back to wetland vegetation. Since the eastern indigo snake is typically found in upland areas, it is anticipated that eastern indigo snakes may be found in and around the levees and berms, as well as along roadways.

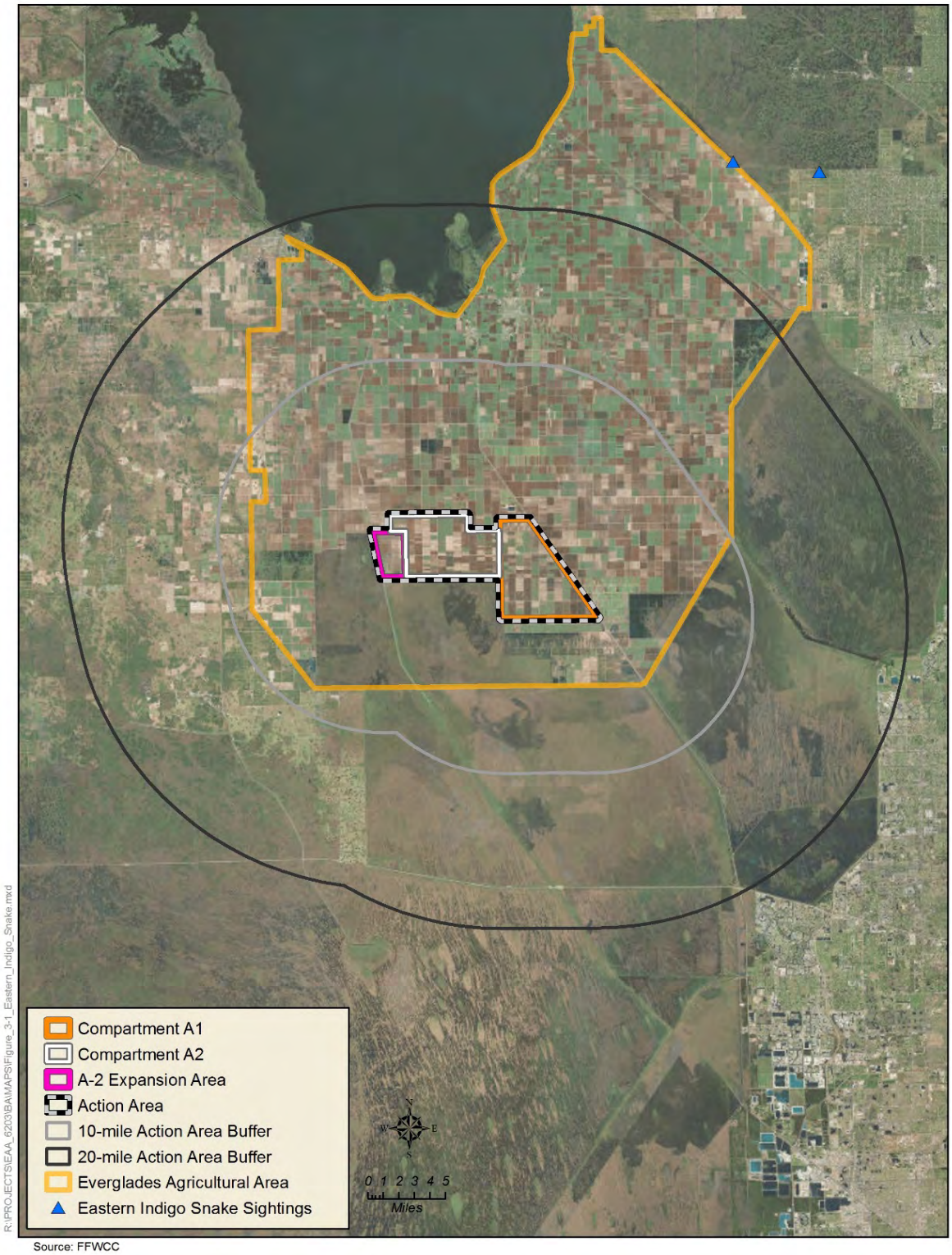



**Figure 3-1. Eastern Indigo Snake Occurrences.**

#### *3.1.5.4 Green Sea Turtle*

Green sea turtle (*Chelonia mydas*) is a federally threatened species. Green sea turtle occurs circum-globally in tropical and sub-tropical waters. In South Florida, green sea turtle is a regular nester, primarily on the east coast between Volusia and Broward counties (USFWS 1999). Important feeding areas for green sea turtle in Florida include Indian River Lagoon, Florida Keys, Florida Bay, Homosassa River, Crystal River, and Cedar Key. In Florida, green sea turtles have been documented nesting in all coastal counties of the state, with the largest numbers nesting along the east coast within Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward counties (USFWS 1999). Green sea turtles inhabit high-energy oceanic beaches, convergence zones within pelagic habitat, and benthic feeding grounds, within relatively shallow, protected waters. Although green sea turtle is unlikely to occur in the project area, it is located within the action area of effects due to the reduction in freshwater flows to the estuaries and improvements to coastal habitat.

#### *3.1.5.5 Hawksbill Sea Turtle*

Hawksbill sea turtle (*Eretmochelys imbricata*) is a federally endangered species. It occurs in tropical and subtropical seas of the Atlantic, Pacific, and Indian oceans. Representatives of some life history stages regularly occur in southern Florida and other states located along the Gulf of Mexico, as well as along the eastern seaboard (USFWS 1999). Sightings of hawksbill sea turtle north of Florida are rare. Although the hawksbill sea turtle is unlikely to occur in the project area, it is located within the action area of effects due to the reduction in freshwater flows to the estuaries and improvements to coastal habitat.

#### *3.1.5.6 Kemp's Ridley Sea Turtle*

Kemp's ridley sea turtle (*Lepidochelys kempii*) is a federally endangered species. Nesting in Florida by Kemp's ridley turtle is rare, with only five nests documented in Pinellas (two), Lee (one), and Volusia (two) counties since 1989 (USFWS 1999). This species mainly occurs in coastal areas in the Gulf of Mexico and the northwestern Atlantic Ocean. Although the Kemp's ridley sea turtle is unlikely to occur in the project area, it is located within the action area of effects due to the reduction in freshwater flows to the estuaries and improvements to coastal habitat.

#### *3.1.5.7 Leatherback Sea Turtle*

Leatherback sea turtle (*Dermochelys coriacea*) is a federally endangered species. It occurs within a wide-range of shores of the Atlantic, Pacific, and Indian oceans. This species regularly nests in small numbers along the east coast of Florida (Meylan et al. 1995), and they also are known to nest on the west coast of Florida in St. Vincent National Wildlife Refuge, and St. Joseph Peninsula State Park and St. George Island (USFWS 1999). Although the leatherback sea turtle is unlikely to occur in the project area, it is located within the action area of effects due to the reduction in freshwater flows to the estuaries and improvements to coastal habitat.

#### *3.1.5.8 Loggerhead Sea Turtle*

Loggerhead sea turtle (*Caretta caretta*) is a federally threatened species. It occurs in temperate and tropical waters worldwide, and inhabits continental shelves and estuarine

environments along the margins of the Atlantic, Pacific, and Indian oceans. This species is the most common sea turtle species in south Florida (USFWS 1999). Although the loggerhead sea turtle is unlikely to occur in the project area, it is located within the action area of effects due to the reduction in freshwater flows to the estuaries and improvements to coastal habitat.

### 3.1.6 Birds

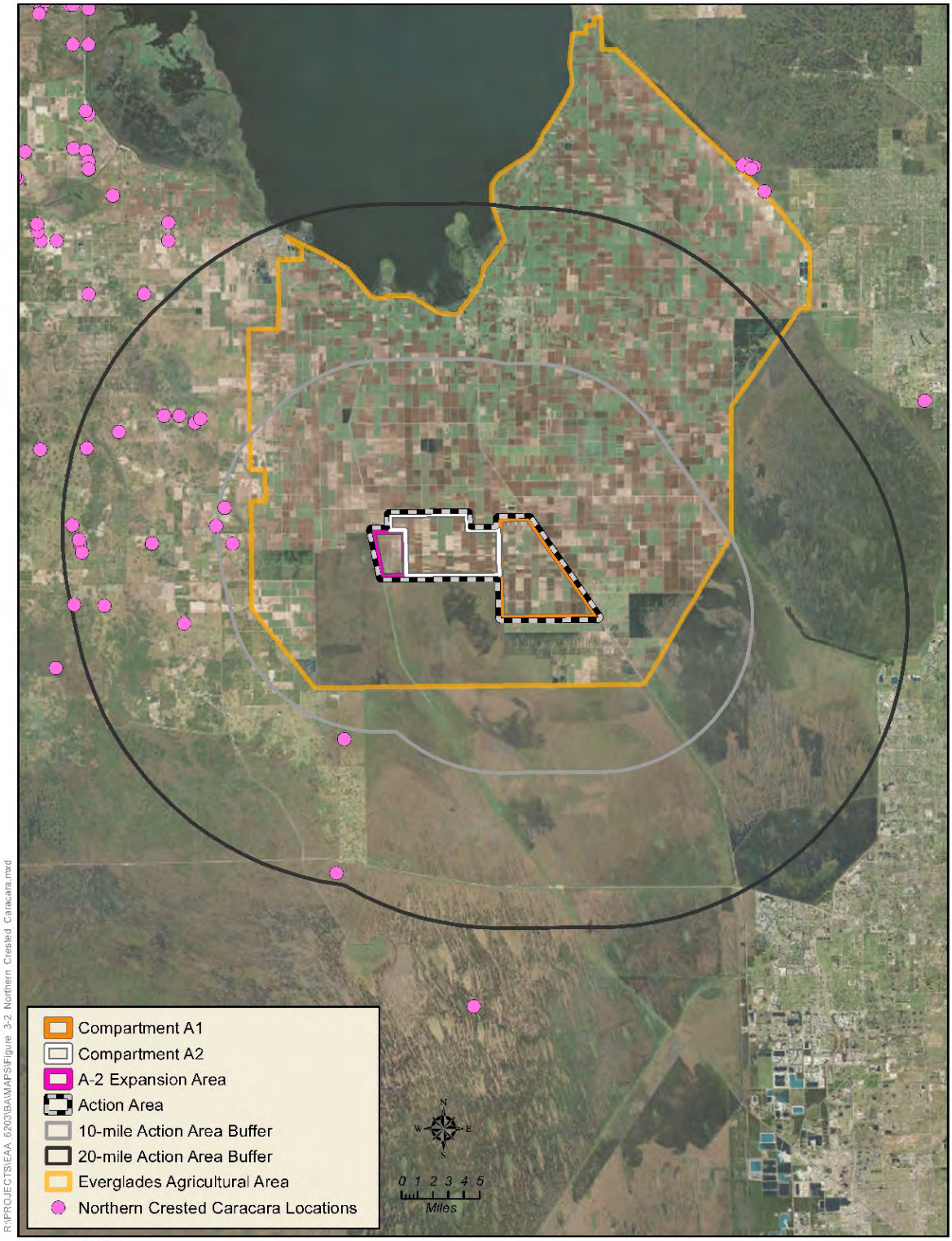
#### *3.1.6.1 Northern Crested Caracara*

The northern crested caracara is federally listed as threatened. It is a large non-migratory raptor with its overall distribution including the southern U.S., Mexico, and Central America to Panama. In Florida, the most abundant populations of crested caracara are in Glades, Desoto, Highlands, Okeechobee, and Osceola counties, all of which are located north and west of Lake Okeechobee (USFWS 1999). Caracaras are most commonly found in dry or wet prairies with occasional cabbage palms (*Sabal palmetto*) or scattered wooded vegetation. Prey include insects and other small invertebrates, small mammals, reptiles, and fish. Because of changes in land use, the crested caracara also now uses improved or semi-improved pastures (USFWS 1999). The primary threat to the crested caracara is the conversion of dried prairies to agriculture and development. The project site is located within a USFWS crested caracara consultation area. In addition to the nearest documented occurrences of the northern crested caracara in relation to the project site shown in Figure 3-2, northern crested caracara was documented in the project area in 2003, and adjacent to the project area in 2013 and 2015 (US 27 tower south of South Bay) (ebird 2017b) (note Figure 3-2 does not contain the data for these sightings adjacent to the project area).

#### *3.1.6.2 Bald Eagle*

The bald eagle was removed from the federal ESA in 2007; however, this species continues to be protected by the Bald and Golden Eagle Protection Act (16 United States Code [U.S.C.] 668-668c). The densest concentrations of nesting bald eagles in the lower 48 states occurs in Florida, with an estimated 1,500 nesting pairs present throughout the state (FFWCC 2018b). Nesting territories throughout Florida are clustered around significant lake, river, and coastal systems.

Although a review of the FFWCC Eagle Nest Locator for the 2015–2016 nesting season did not identify any nests within the project area or vicinity (FFWCC 2017b), bald eagles have been observed in the project area. Construction monitoring conducted for the A-1 FEB in 2014 documented presence of bald eagles within the A-1 area of the project on at least three occasions (SFWMD, personal communication). The most recent observation of bald eagles in the A-1 FEB was in May 2017 during Avian Protection Plan surveys. Both mature and immature bald eagles are regularly observed in the project area. Thus, bald eagles have the potential to occur in the project area, but are unlikely to nest within the project area due to the lack of suitable nesting trees.




Source: FFWCC

**Figure 3-2. Northern Crested Caracara Occurrences.**

### *3.1.6.3 Cape Sable Seaside Sparrow*

The federally endangered CSSS is a medium-sized sparrow that is restricted to the Florida peninsula (USFWS 1999). Critical habitat for CSSS is limited to areas within and adjacent to ENP in Miami-Dade County (72 FR 62736) (Figure 3-3). CSSSs are non-migratory, inhabiting freshwater to brackish marshes. This species has a very restricted range, and is only known to occur in the Everglades region of Miami-Dade and Monroe counties in South Florida. Currently their known distribution is restricted to two areas of marl prairies east and west of Shark River Slough, and flanking Taylor Slough (USFWS 1999).

The project is not located within USFWS' CSSS consultation area, and due to its restricted range and distribution, this species is not expected to occur in the project area; however, it is located within the action area of effects due to potential for downstream changes in water levels.

### *3.1.6.4 Everglade Snail Kite*

The federally endangered Everglade snail kite is a medium-sized raptor that feeds almost entirely on apple snails (*Pomacea paludosa*), which are found in palustrine emergent, long hydro-period wetlands (USFWS 1999). The snail kite's foraging habitat is restricted to clear, calm waters of freshwater marshes and shallow vegetated littoral zones of lakes in south and central Florida, including Palm Beach and Hendry Counties. Snail kites require emergent vegetation as a nest substrate. Although woody vegetation is preferred, non-woody plants such as areas of dense cattail (*Typha* spp.) also are commonly used. The shallow inundated areas must consist of open water areas that support sustainable populations of their food source, the apple snail.

Apple snails inhabit a wide range of ecosystems from swamps, ditches and ponds, to lakes and rivers. Apple snails eat, feed, breed, and lay eggs on emergent aquatic vegetation (EAV) in waterbodies that are flooded continuously for longer than a year (USFWS 1999). Changes in water regimes and depth, and duration of inundation are important characteristics for wetland vegetation that supports snail kite nesting and foraging habitat, Florida apple snails, and all aspects of snail kite and apple snail life history. Rapid and/or large increases in water depth may detrimentally affect desirable vegetation, and can flood out Florida apple snail eggs, leading to reductions in apple snail populations and reduced snail kite foraging; however, prolonged drying of wetlands, especially in an impounded area with little variation in water depth, also can cause the local depletion of apple snails (USFWS 1999). The appropriate restoration target for major portions of the WCAs is a heterogeneous wetland having a prolonged hydro-period over most of the area, but without extended periods of deep water.

Designated critical habitat for the snail kite is located on the western side of Lake Okeechobee and portions of the Everglades Protection Area[1] (EPA), including WCA 1,

[1] The Everglades Protection Area is a protected area of the Florida Everglades as defined by the Everglades Forever Act, and includes Water Conservation Area (WCA) 1 (the Arthur R. Marshall Loxahatchee National Wildlife Refuge), WCA 2 (which includes WCA-2a and WCA-2b), WCA 3 (which includes WCA-3a and WCA-3b), and Everglades National Park (Everglade Forever Act Title XXVIII, Chapter 373, Section 373.4592).

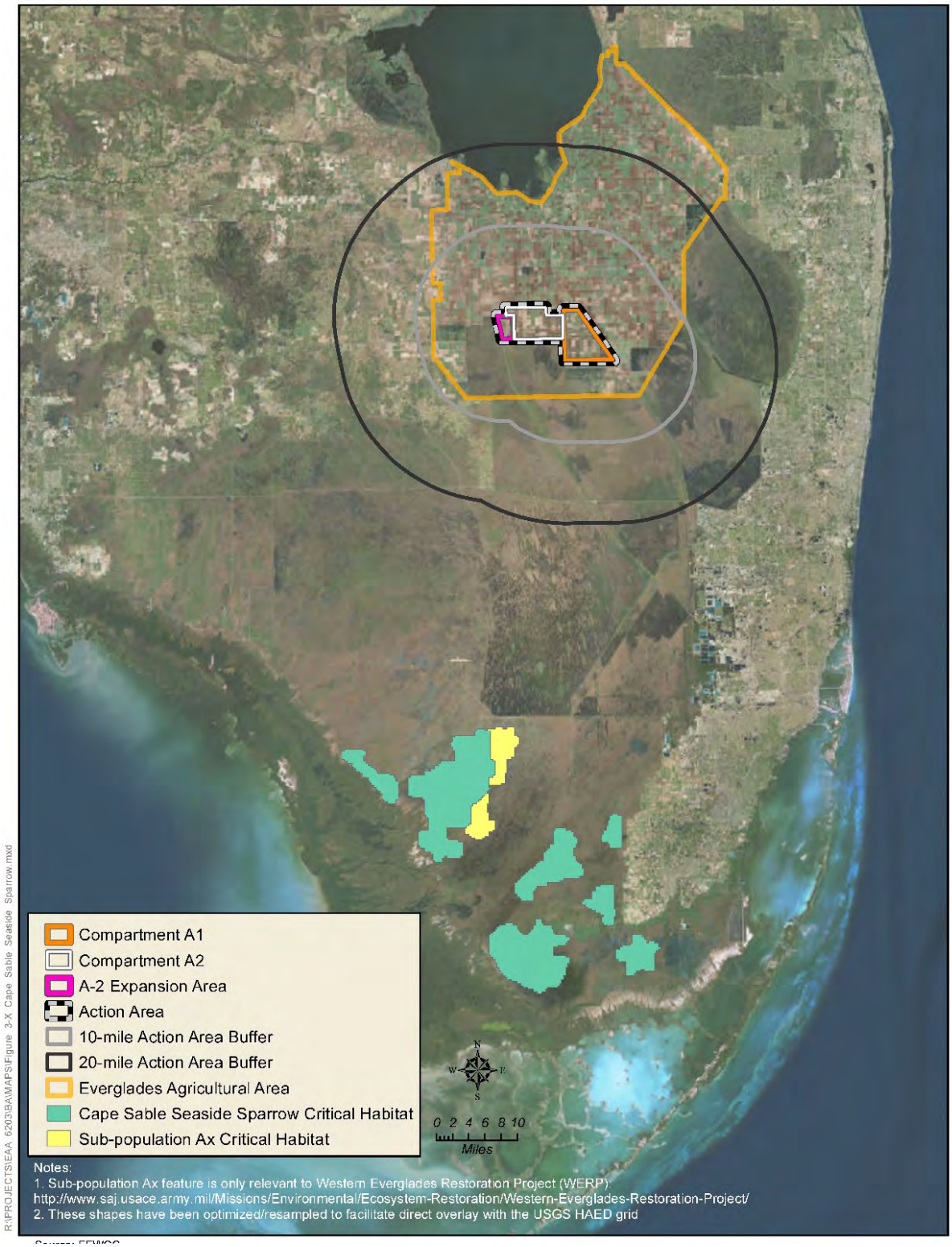



**Figure 3-3. Cape Sable Seaside Sparrow Critical Habitat.**

WCA 2 and portions of WCA 3A (Figure 3-4). Snail kites also are found in the Holey Land Wildlife Management Area, which is located adjacent to the project area. Wood storks and snail kites have overlapping ranges, but have different feeding mechanisms and require different hydrologic conditions for optimum feeding. Historically, both have survived with the hydrologic variability characteristic of the natural system. The reduced heterogeneity and extent of natural areas within the present system makes the snail kite more vulnerable to natural and human-caused threats (USFWS 1999).

Loss and degradation of habitat are the primary threat to snail kites. Water levels, duration, and quality are primary concerns for Everglade snail kite conservation. Water levels must allow for appropriate nesting sites, durations of water levels must be sufficient to support apple snail populations, and water quality must be such that invasive species do not take over Everglade snail kite foraging habitat (USFWS 1999).

Lake Okeechobee is a critical stopover point for snail kites moving among wetlands, and lies within the center of Everglade's snail kite range (USACE 2016). Between 1996 and 2010 the wetland habitat network of Lake Okeechobee contributed minimally to snail kite reproduction, which was largely attributed to a shift in water management regimes. Hurricanes occurring in 2004 which degraded snail kite habitat, also were a factor during this period. In 2010 snail kites were observed nesting on Lake Okeechobee for the first time since 2006, and nesting also was documented to increase at Lake Okeechobee during 2011–2015 making Lake Okeechobee among the top four most productive habitats within their range for this period (USACE 2016). As such, Lake Okeechobee is considered critical to snail kite's long-term population persistence.

WCA 3A is often considered one of the 'most critical' wetlands within snail kite's range in Florida. Although WCA 3A has functioned as a stronghold for snail kite reproduction for several decades, reproductive effort and success at WCA 3A declined sharply between 1998 and 2012 (USACE 2016). More recently (2013 and 2014) more successful nesting has occurred in this area. Nesting success also was observed to decline in 2015. The lower reproductive success in this area has been attributed to changes in water management regimes in which (1) rapid recession rates and low water stages often shorten the window for favorable breeding and foraging conditions, and (2) prolonged high water events led to long-term habitat degradation that negatively affected snail kite nesting and foraging habitat (USACE 2016).

Productivity of snail kites within STAs in the project area have been successful, although 2015 showed a decline in reproductive success (USACE 2016). This is possibly attributed to changes in habitat quality or relocation of some individuals to more suitable habitats.

All of the project site and surrounding areas, including the STAs and WCAs, are all within the Everglade snail kite USFWS consultation area (USFWS 2003b). The nearest nesting of snail kite to the project area occurred in 2017 and 2018, where more than 80 nesting attempts were documented in the south and southeastern portions of the Rotenberger Wildlife Management Area, located approximately 4 miles from the A-2 STA footprint (Figure 3-4). Nesting also was recorded in 2011 within STA 3/4, 2012 (14.1 miles to the west and 22.3 miles to the east in WCA 1), and in 2016 in STA 2. Snail kite was documented using the A-1 portion of the project area in 2014 and 2015 during construction of the A-1 FEB (SFWMD, personal communication) (note Figure 3-4 does not contain data

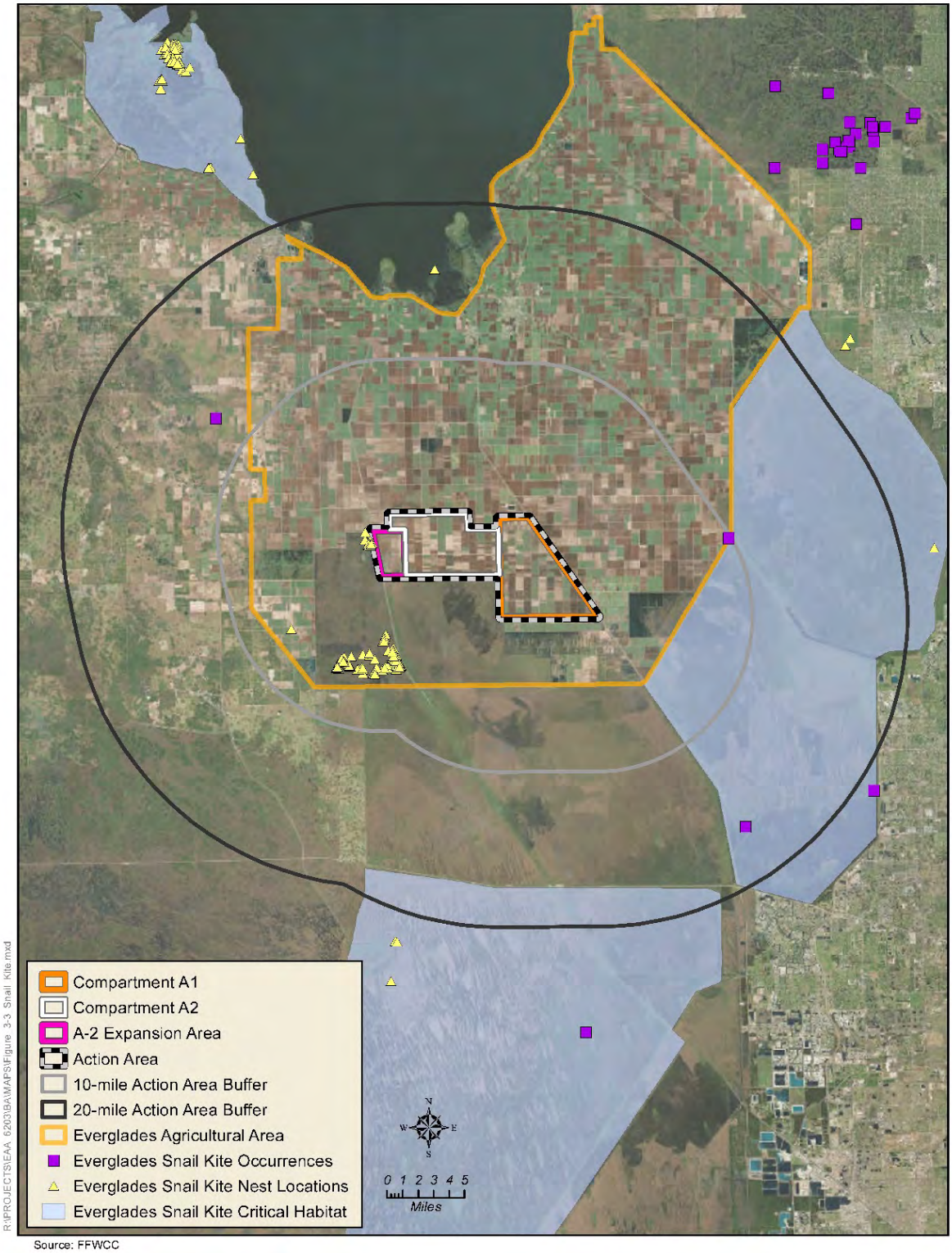



**Figure 3-4. Everglade Snail Kite Occurrences and Nesting Locations.**

for sightings within the A-1 portion of the project). Use of WCA 3A has been variable, with low use during drought years (i.e., 1991) and high use in wet years (i.e., 1994).

#### *3.1.6.5 Florida Scrub-jay*

The Florida scrub-jay (*Aphelocoma caerulescens*) is federally listed as threatened. It is a small to medium sized blue and gray bird reaching lengths of 30.5 centimeters (cm) with wingspans up to 34.3 cm. It is endemic to Florida and ranges throughout much of the central part of the state, preferring areas of sand pine and xeric oak scrub (FFWCC 2017d).

Essential habitat for the Florida scrub-jay are relic oak-dominated scrub, or xeric oak scrub lands which are adapted to nutrient poor soils, high seasonal rainfall, periodic drought, and frequent fires (USFWS 1999). The current population is divided into five regions corresponding to major sand deposits, with three core populations: the Atlantic Coast Subregion, the Ocala Subregion, and the Lake Wales Ridge Subregion. None of these subregions are located in or near the project area (USFWS 1999). The species is non-migratory, with fewer than 5% of scrub-jays dispersing more than 8 kilometers where habitat is suitable. Dispersal distances are dependent upon habitat type and range from 2 kilometers over open water and urban areas, to 8–24 kilometers over broken pasture, fence rows, and roads sites and patch overgrown shrub areas.

Invertebrates comprise the majority of the Florida scrub-jay diet, with acorns being their most important plant food. Foraging is done on open ground, via natural or man-made clearings and acorn stashing is an important behavior. The species are cooperative breeders and occupy year-round multipurpose territories, nesting in shrubby oaks, between 1 and 2 meters high.

While Florida scrub-jay are present in Palm Beach County, known nesting pairs are only found along the coast (USFWS 1999) and the nearest eBird observations are greater than 25 kilometers from the Project area (eBird 2017d). Florida scrub-jay is unlikely to occur in the project area.

#### *3.1.6.6 Ivory-Billed Woodpecker*

The ivory-billed woodpecker (*Campephilus principalis*) is federally listed as endangered. There are no confirmed sightings of the species within the state of Florida and only audio observations have been claimed since 1944. The species was listed as endangered in 1967 and the last reported observation of the Cuban subspecies was made in 1987. In recent years, audio recordings and indistinct photographs have suggested that the species may not be extinct; however conclusive evidence has not been found.

Ivory-billed woodpeckers are among the largest known woodpeckers, with lengths of 48–53 cm and typical wingspans of 76 cm. Preferred habitat is thick hardwood swamps and pine forests with substantial amounts of snags. The birds feed on larval wood-boring beetles as well as seeds, fruit, and other insects. Healthy populations occurred at low densities. Heavy logging and hunting led to the presumed extinction of the ivory-billed woodpecker. Due to the lack of suitable habitat to support ivory-billed woodpeckers, the lack of confirmed sightings of this species in Florida, and documentation suggesting this species is extinct, ivory-billed woodpecker is unlikely to occur in the project area.

#### *3.1.6.7 Kirtland's Warbler*

The Kirtland's warbler (*Pinus banksiana*) is federally listed as endangered. The species does not breed or overwinter in Florida, but is sometimes observed during migration periods. Kirtland's warbler is a large insectivorous warbler, around 15 cm in length. The species breeds in upper and lower Michigan and migrates to the Bahamas for the winter. It is thought that birds observed in Florida are likely individuals that have been blown off-course during migration. Unconfirmed sightings have been made during spring migration, from mid-April to early May, in Palm Beach, Alachua, and Duval counties. Observations during fall migration have been made in Miami-Dade, Escambia, Collier, Martin, Palm Beach, St. Lucie, St. John's, and Wakulla counties.

There have been four sightings of Kirtland's warbler within Palm Beach and Broward counties; however, all of these sightings are located on the east coast of Florida (eBird 2017e). Kirtland's warbler is unlikely to occur in the project area.

#### *3.1.6.8 Piping Plover*

Piping plover (*Charadrius melodus*) is federally listed as threatened. It is a small shorebird, 17–18 cm long, weighs an average of 55 grams, and has a wingspan between 11.0 and 12.7 cm (USFWS 1999). Piping plovers have a broad distribution, breeding in three geographic regions: the northern plains of the U.S. and Canada, beaches along the Great Lakes, and the Atlantic coast from New Brunswick to North Carolina. Although the winter range is not fully understood, overwintering occurs along the Atlantic coast, from North Carolina to Florida, and along the Gulf Coast and Caribbean islands. Preferred wintering habitats are coastal areas with large sandspits and/or mudflats. The project area does not contain suitable lakeshore or coastal habitat that would support piping plover, therefore, piping plover is unlikely to occur in the project area.

#### *3.1.6.9 Red Knot*

Red knot is federally listed as threatened. It is a medium-sized shorebird, generally a coastal species but occasionally found inland, especially around the Great Lakes. The species generally nests and breeds inland near the Arctic coast and migrate south during the winter to the southeast U.S., northeast Gulf of Mexico, northern Brazil, and Tierra del Fuego (USFWS 2015a). Wintering and stop-over habitats are generally coastal marine and estuary habitats, where there is access to foraging in large areas of exposed intertidal sediments. Common habitats in North America include beaches, tidal mudflats, salt marshes, coastal impoundments and lagoons. While they prefer undisturbed roosting habitats, they have been known to use modified environments that mimic natural conditions (USFWS 2015a).

While the majority of eBird sightings of red knot are found along the coast, there are some interior Florida sightings, including a sighting from 1983 just north of the project area along U.S. Route 27 (eBird 2017f). Red knots may use inland waterbodies as stop-over locations during migration (USFWS 2014). Although red knots have the potential to occur in the project area as a stop-over migrant, their potential to occur is low as the project area does not provide high quality habitat that would attract this species.

#### *3.1.6.10 Red-Cockaded Woodpecker*

The red-cockaded woodpecker (*Picoides borealis*) is federally listed as endangered. Historically abundant, it ranged across the southeastern U.S. from eastern Texas to New Jersey (USFWS 1999). The majority of the individuals in Florida live in the panhandle region of the state (UWFWS 1999). The species' decline is attributed to loss of habitat, and it is estimated that only about 3% of its preferred habitat, the long-leaf pine (*Pinus palustris*) ecosystem, remains of the species historic range (FFWCC 2017e). The red-cockaded woodpecker is a cavity nester, excavating cavities from the living part of trees, with a preference for nesting in long-leaf pines that are 63–130 years old. The species lives in social groups of 2–9 individuals, with one breeding pair.

While red-cockaded woodpecker is found in Palm Beach County, documentation of their location is more than 50 kilometers north and 20 kilometers east of the project area (USFWS 1999, eBird 2017g).

#### *3.1.6.11 Roseate Tern*

The federally threatened roseate tern is a midsized tern that nests in broken coral deposits, bare limestone, shell/sandy beaches, new deposits of mud and rock, as well as rooftops (FFWCC 2018c). The primary diet consists of small fish and some invertebrates. Within North America, the species ranges from Nova Scotia, south to the Florida Keys. It is found on islands throughout the Caribbean. Disturbance by humans during the nesting period is considered the main threat to species survival (USFWS 1999).

Distribution in Florida includes the Florida Keys and parts of southern Florida. This species is strictly a coastal species (USFWS 1999), and does not depend on estuary habitat and is therefore unlikely to occur within the project area.

#### *3.1.6.12 Whooping Crane*

Reintroduction of whooping crane (*Grus americana*) in Florida began in 1993, as a non-migratory population in central Florida. These efforts continued until 2004, when the program was stopped due to lack of success (low productivity and survival). Migratory birds have been reintroduced since 2001 by leading individuals from Wisconsin to Florida by ultralight aircraft (FFWCC 2017f).

Whooping crane habitat includes shallow marshes with adjacent, open grasslands. Nesting in central Florida occurs between January and May. The closest observation of whooping crane to the project area is more than 12 kilometers to the west, near the northwest corner of STA 5/6 (eBird 2017h). The population present within the region are a non-essential experimental population (USFWS 2017c), and therefore Section 7 consultation requirements are not applicable to this species.

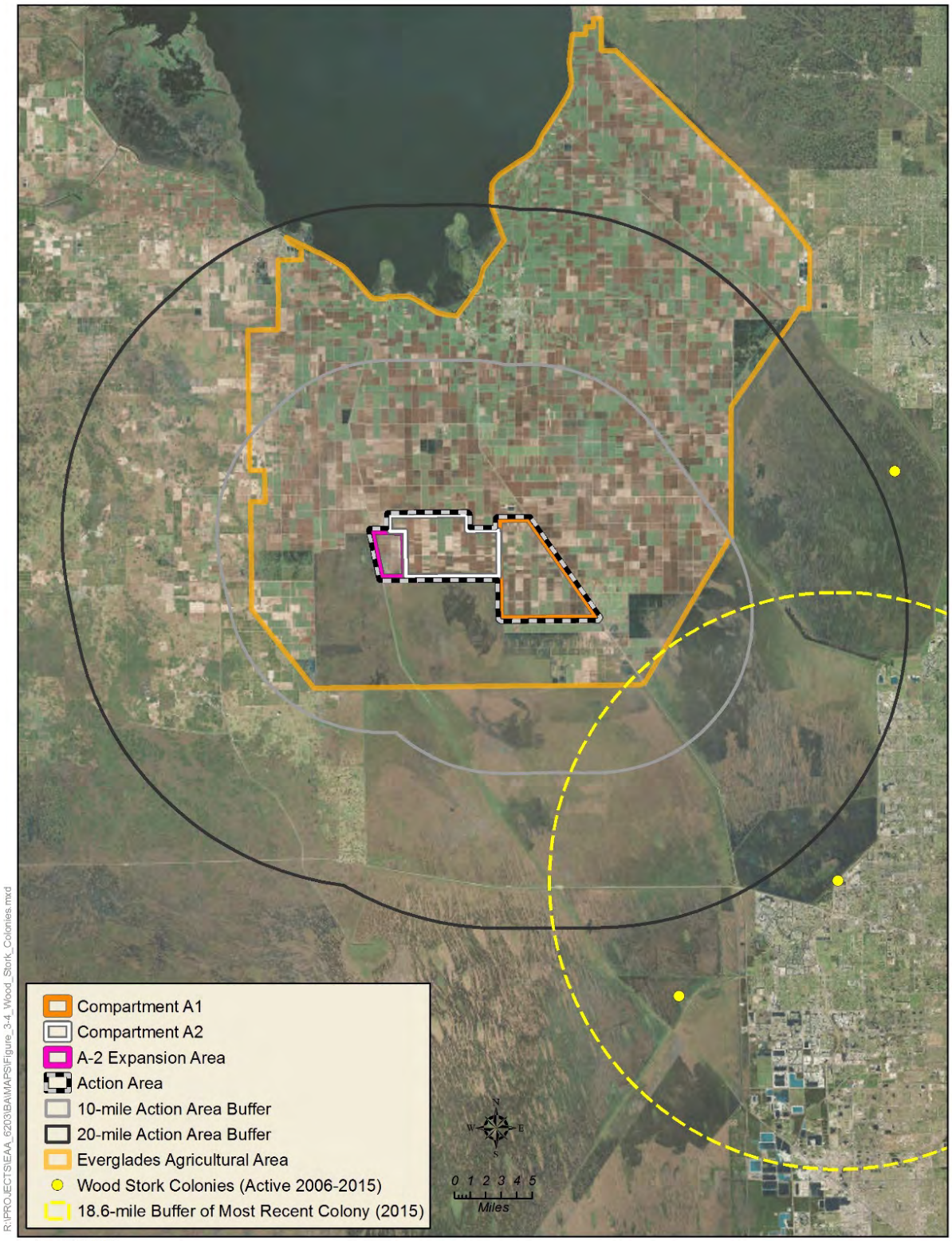
#### *3.1.6.13 Wood Stork*

The federally threatened wood stork is a tall, long-legged wading bird that utilizes a variety of freshwater and estuarine wetlands (USFWS 1999), including shallow freshwater wetlands, canals, and ditches to catch prey. Historically, breeding colonies existed in coastal states from Texas to South Carolina, but today breeding colonies are limited to

Georgia, Florida, and coastal South Carolina (USFWS 1999). Their non-breeding season range extends throughout the continental U.S.

The timing, duration, and quantity of water affect wood stork distribution for two reasons: shallow waters with high prey densities are needed for feeding, and they prefer nesting sites surrounded by deep water. The primary prey of wood stork is small fish. During feeding, wood storks immerse their bill, partly open, in water and snap it shut when it contacts a prey item (USFWS 1999). This feeding behavior, known as tactolocation or grope feeding, requires high prey concentrations found after drying events that concentrate fish to smaller areas. Nesting colonies of wood storks are usually established in stands of medium to tall trees, such as cypress (*Taxodium* spp.) stands or mangrove forests (*Rhizophora mangle*, *Avicennia germinans*, and *Laguncularia racemosa*), surrounded by deeper water marshes (USFWS 1999). These areas provide protection from terrestrial predators.

The freshwater wetlands within the project area serve as foraging habitat for the wood stork. Although the nearest active wood stork colony is located over 20 miles east of the project (Figure 3-5), wood stork have been observed on the site. The most recent wood stork observations within the A-1 FEB occurred on January 31, 2017 (eBird 2017c) within the A-2 parcel of the project on August 30, 2014 (eBird 2017a), and within the A-1 FEB of the project in June 2017 (SFWMD, personal communication). Wood stork also was observed just outside the eastern boundary of the A-1 FEB on US Route 27 on January 17, 2015 (eBird 2017b). The wood stork is commonly observed in the project area.




Source: USFWS

**Figure 3-5. Wood Stork Colonies.**

### 3.1.7 Mammals

#### *3.1.7.1 Florida Bonneted Bat*

The Florida bonneted bat (*Eumops floridanus*) is found only in Florida and is the largest bat in the state (Timm and Genoways 2004, McDonough et al. 2008). It has one of the most restricted ranges of any bat species occurring in the U.S., occurring in only a few counties in south Florida (FFWCC 2017g). A Florida Bat Conservancy survey completed in 2006 and 2007 estimated the range of Florida bonneted bat to be restricted to areas within Charlotte, Collier, Lee, Miami-Dade, and Monroe counties (Timm and Genoways 2004, FFWCC 2013). Range information available from the USFWS for Florida bonneted bat does not include Palm Beach County (USFWS no date b); however, the USFWS Consultation Area for the Florida bonneted bat was recently expanded to include all of Palm Beach County as well as the nearly entire area of the SFWMD footprint. Bats in south Florida are thought to roost primarily in trees and manmade structures, with protective tree cover around bat roosts thought to be important for predator avoidance and for allowing earlier emergence from the roost, allowing bats to take advantage of peak insect activity that occurs at dusk and extend their foraging time (78 FR 191, October 2, 2013). However, it is important to note that available information on roosting sites for this species is extremely limited. Roosting and foraging areas appear varied, with the species occurring in forested, suburban, and urban areas. Bonneted bats are closely associated with forested areas because of their tree-roosting, but specific information is limited. It is unlikely that suitable roosts with protective cover would occur in the project area, and along with the range information available for Florida bonneted bat, this species is unlikely to occur.

#### *3.1.7.2 Florida Panther*

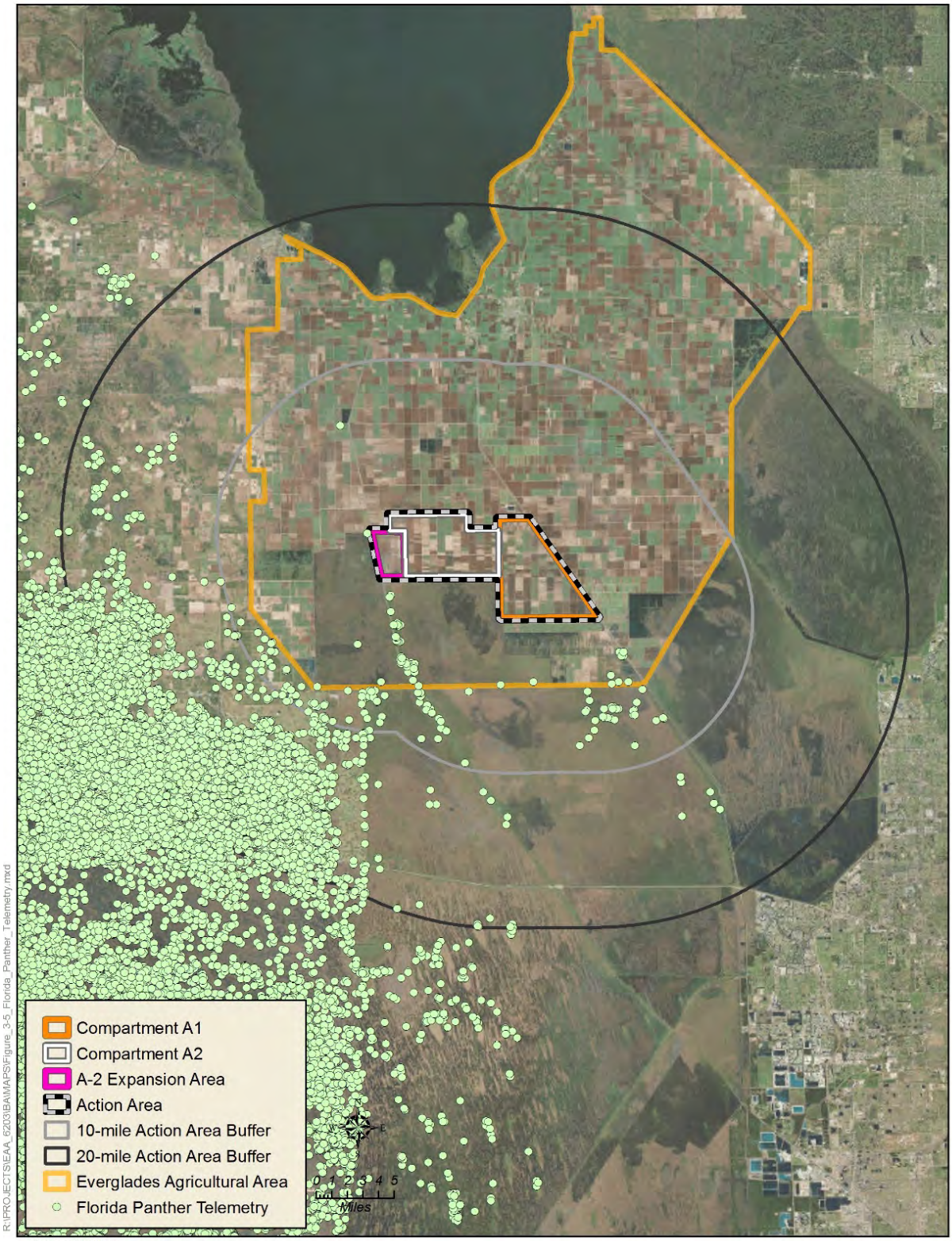
The Florida panther, a medium-sized, tawny-colored, long-tailed puma, is federally listed as endangered. At one time, the panther's range extended through Arkansas, Louisiana, Mississippi, Alabama, Georgia, southern Tennessee, South Carolina, and Florida. Today, the only existing population is found in a two million acre area in central and south Florida, with population estimates of only 80 total individuals, consisting of 30–50 adults and approximately 30 subadults (USFWS 1999). The Big Cypress Swamps/Everglades has the only known breeding panther population (USFWS 1999).

The Florida panther, a subspecies of the mountain lion (or puma), is Florida's designated state mammal. Male panthers weigh 102 to 154 pounds and reach 7 feet in length, while the smaller females weigh 50–108 pounds and reach 6 feet in length (USFWS 1999). Panther's preferred habitats are hardwood hammocks and pine flatwoods, but they also can be found in wetlands and disturbed habitat (USFWS 1999). The panther diet includes feral hogs (*Sus scrofa*), white-tailed deer (*Odocoileus virginianus*), raccoon (*Procyon lotor*), and armadillo (*Dasypus novemcinctus*) (USFWS 1999).

Habitat loss and fragmentation from development are the largest threat to panthers and have led to inbreeding, reduced prey availability, and mortality from vehicle strikes. An individual panther range may extend, on average, 200 square miles for males and 74 square miles for females (USFWS 1999). The panther's wide-range recovery plan cites three conditions necessary for the survival and recovery of the species: (1) protection and enhancement of existing populations, habitats, and prey resources; (2) improving genetic

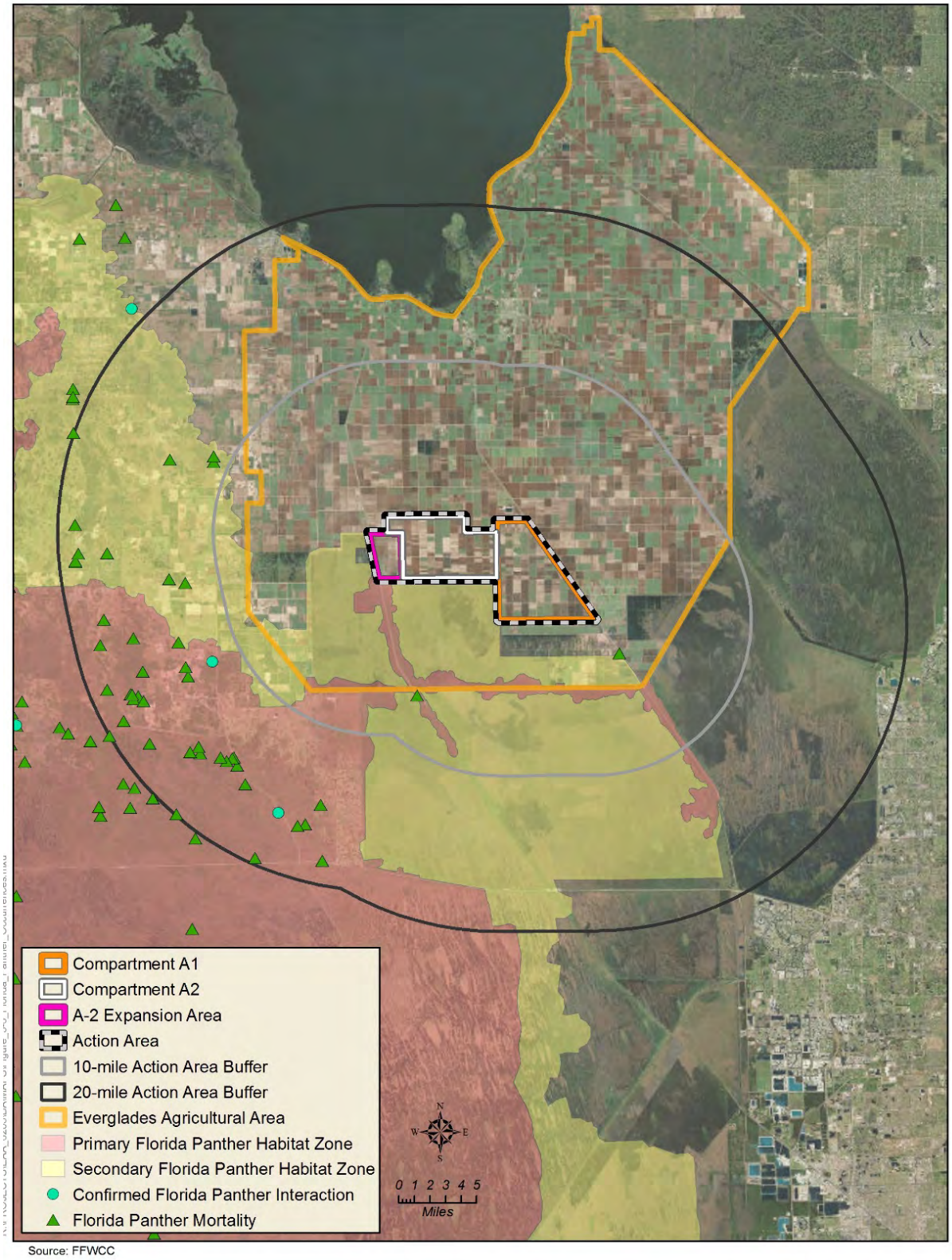
health and population viability; and (3) reestablishing a minimum of two more reproducing populations within the historical range.

Florida panther has been observed in the A-1 area of the project in 2014 and 2015 (SFWMD, personal communication). Panther telemetry data for 1981–2005 also show panthers occurring in other portions of the EAA, including areas directly adjacent to the project site and in WCA 3A (USACE 2009). Panther telemetry data for 1997–2011 is shown on Figure 3-6, and regional occurrence information for Florida panther is shown on Figure 3-7 (note this figure does not contain the 2014 and 2015 data for sightings within the A-1 portion of the project).




Source: FFWCC

**Figure 3-6. Florida Panther Telemetry.**




Source: FFWCC

**Figure 3-7. Florida Panther Occurrences within the EAA.**

#### *3.1.7.3 Southeastern Beach Mouse*

Southeastern beach mouse (*Peromyscus polionotus niveiventris*) is a subspecies of the oldfield mouse and is federally listed as threatened under the ESA (USFWS 1999). Historically, the species occupied 175 miles of Florida's Atlantic coast, but its distribution has been reduced to approximately 50 miles of beach (USFWS 1993), with habitat conversion being the major threat to species distribution. The southeastern beach mouse is limited to beach dune systems (primary, secondary and sometimes tertiary dunes) and adjacent interior scrub habitat (USFWS 1993, FNAI 2001, USFWS 2005). While healthy populations still exist on beaches of Merritt Island National Wildlife Refuge and Cape Canaveral Air Force Station in Brevard County, the species no longer persists in the southern portion of its range within Broward, Palm Beach, and Martin counties (USFWS 2005). It is unlikely that southeastern beach mouse would occur in the project area, since the project is inland from the coast, located away from beach and dune habitats, and located in Palm Beach County where these mice are no longer thought to occur.

#### *3.1.7.4 West Indian Manatee*

West Indian manatee was downlisted from endangered to threatened on March 5, 2017 (82 FR 16668, April 5, 2017). Critical habitat for West Indian manatee is restricted to areas in Florida, including coastal and riverine areas within Citrus, Hillsborough, Manatee, Sarasota, Charlotte, De Soto, Lee County, Collier, Monroe, Dade, Palm Beach, West Palm Beach, Martin, Volusia County, Brevard County, Nassau, and Duval counties. In Palm Beach County, designated critical habitat for West Indian Manatee includes all of Lake Worth, from its northernmost point immediately south of the intersection of U.S. Highway 1 and Florida State Highway A1A southward to its southernmost point immediately north of the town of Boynton Beach; and the section of the intracoastal waterway from the town of Seawalls Point, Martin County to Jupiter Inlet in Palm Beach County (USFWS 2017d).

There are an estimated 6,350 individuals of the Florida subspecies. These large marine mammals are around 3 meters long and weigh about 1,000 kilograms (79 FR 37706, July 2, 2014). Manatees are found in coastal and nearshore environments, including estuarine and freshwater habitats such as tidal rivers, mangrove swamps and saltmarshes, grassbeds and freshwater springs. While the project area is located in former swamp habitat, the area has been drained and farmed for many years, and the distance of the project from the shore also makes it very unlikely that manatees would be found within the project area. Furthermore, the affected waterbodies are not accessible to the West Indian manatee, as manatee barriers have been placed to preclude manatee access to Everglades region canals from Lake Okeechobee at water control structures S-351, S-352 and S-354. These structures regulate the flow of water into the L-14 Canal (Hillsboro Canal) the L-20 Canal (North New River), the L-10 Canal (West Palm Beach Canal), and the L-25 Canal (Miami River), respectively. Although these barriers preclude West Indian manatee access to the project area, this species is located within the action area of effects due reduction in damaging discharges to the coastal areas and improvements to habitat.

## 3.2 Cumulative Effects of State and Private Actions in the Project Area

Cumulative effects include the effects of future state, Tribal, local, or private actions reasonably certain to occur in the Action Area considered in this Biological Assessment.

Future federal actions unrelated to the proposed action but located in the Action Area, are not considered because they require separate consultations pursuant to Section 7 of the ESA. To identify future private actions that may reasonably be certain to occur in the Action Area, the USACE identified the types of land alteration actions that could occur in the Action Area, then developed a mechanism to distinguish between those that will require federal review and those that are not likely to be a future federal action, and thus meet the cumulative effects definition. The USACE believes that waters of the U.S. within the Action Area would not be developed without federal review and would, therefore, all be considered future federal actions.

Private actions in the project area, include the existing land uses of agriculture. The cumulative effects of future actions would be the potential conversion of agricultural lands into STAs or similar type projects, such as a reservoir. This in turn could increase pressure to develop agriculture elsewhere. Also, the conversion of existing agriculture lands to reservoirs or STAs will reduce the amount of uplands available to land-based animals.

### 3.2.1 Palm Beach County

Most lands within the Palm Beach County portion of the EAA, including STA 2 and STA 3/4 are within the Glades Tier as established by the Palm Beach County Comprehensive Plan (Palm Beach County 2015). Planning direction for the Glades Tier is intended primarily to maintain and support continued large-scale agricultural operations (Palm Beach County 2017). Per Objective 1.6, Palm Beach County works with the communities in the Glades Tier to preserve and enhance the unique characteristics of the Glades and protect the economically viable agricultural base of the area.

### 3.2.2 A-2 Parcel and A-2 Expansion Areas Project Site

The SFWMD owns fee interest in 13,825 acres of the A-2 parcel and 2,393 acres of the A-2 Expansion area. The State of Florida owns fee interest in 1,251 acres of the A-2 Expansion area. Florida Law prohibits the State from conveying fee title. These lands will be acquired by SFWMD from the State, either through direct acquisition of a permanent easement from the State or a permanent easement or fee provided by the State by Supplemental Agreement with the SFWMD prior to construction. The remaining 499 acres in the A-2 Expansion area is owned by two private landowners. One parcel is approximately 10 acres and the other is approximately 489 acres. The private lands are expected to be acquired prior to construction.

### 3.2.3 STAs

STA 2 (including Compartment B) and STA 3/4 were constructed and are being operated to provide water quality improvement in discharges to the EPA. Physical features within the existing STAs include the constructed wetlands and the associated water management infrastructure (such as levees, canals, and water control structures). Land cover within the STAs is primarily a mixture of open water, emergent, and submergent marshes. Land use for these areas can be classified as public/institutional or conservation. To varying degrees, the STAs also support ancillary recreational uses such as hunting, fishing, and wildlife viewing.

### 3.2.4 WCAs

WCAs 2A and 3A were designated primarily to receive flood waters from adjacent areas and store the waters for beneficial municipal, urban, and agricultural uses; however, they are currently managed for multiple uses including flood protection, water supply storage, and environmental resource protection. The FFWCC currently manages fish and wildlife in the WCAs and the Holey Land Wildlife Management Area.

## 3.3 Other Consultations of Federal Actions to Date

To date, the USACE has consulted with the USFWS for the following projects which are associated with similar habitats or affect similar species:

**EAA A-1 Reservoir:**

USFWS Log No.: 4-1-04-F-8754
USACE Application No.: SAJ-2005-53 (IP-TKW)
Date Received: October 3, 2005
Formal Consultation Initiation Date: February 10, 2006
Applicant: SFWMD - Acceler8
Program County: Palm Beach
By letter dated April 14, 2006, the USFWS provided a biological opinion (BO) for issuing a USACE permit for the construction of the SFWMD Acceler8 project known as the EAA A-1 Reservoir Project (EAA A-1 Reservoir) and its effects on the endangered Florida panther in accordance with Section 7 of the ESA) (87 Stat. 884; 16 U.S.C. 153 1 *et seq.*).

**STA 2 Cell 4 and STA 5 Flowway 3:**

USFWS Log No.: 4-1-05-11288
Date Received: January 20, 2005
Formal Consultation Initiation Date: July 18, 2005
Applicant: SFWMD
Projects: STA 2 Cell 4 and STA 5 Flowway 3
Counties: Palm Beach and Hendry
By letter dated April 16, 2005, the USFWS provided a BO for the construction and operation of the above referenced projects and their effects on the endangered wood stork, the threatened bald eagle, and the Everglade snail kite in accordance with Section 7 of the ESA (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

**Everglades Agricultural Area Reservoir A- 1:**

USFWS Consultation Code: 4 1420-2006-F-0855
USACE Application No.: SAJ-2005-53 (IP-TKW)
Formal Consultation Initiation Date: October 20, 2006
Applicant: SFWMD
Project: Everglades Agricultural Area Reservoir A-1
County: Palm Beach
By letter dated November 21, 2006, the USFWS provided a BO for the construction and flooding of the EAA Reservoir A-1 Project in Palm Beach County, Florida, and its adverse effects on the eastern indigo snake in accordance with Section 7 of the ESA (87 Stat. 884; 16 U.S.C. 153 1 *et seq.*).

**Lake Okeechobee Regulation Schedule Study:**

USFWS Consultation Code: 41420-2006-F-0072
Formal Consultation Initiation Date: July 3, 2006
Applicant: SFWMD
Project: Lake Okeechobee Regulation Schedule Study
By letter dated October 15, 2007, the USFWS provided a BO for the operational changes to the water management infrastructure that discharges water from Lake Okeechobee to downstream systems (St. Lucie and Caloosahatchee estuaries, the EAA and the WCAs, and its adverse effects on the wood stork, Okeechobee gourd, West Indian manatee, and Everglade snail kite in accordance with Section 7 of the ESA (87 Stat. 884; 16 U.S.C. 153 1 *et seq*.).

**Compartment B Stormwater Treatment Area:**

USFWS Consultation Code: 41420-2009-F-0765
Formal Consultation Initiation Date: March 24, 2009
Applicant: SFWMD
Project: By letter dated April 3, 2009, the USFWS provided a BO for the construction and operation of an STA on Compartment B lands and its adverse effects on northern crested caracara, Florida panther, Everglade snail kite, and eastern indigo snake.

**A-1 Flow Equalization Basin (FEB) Project:**

USFWS Consultation Code: 41420-2012-I-0247
Formal Consultation Initiation Date: February 25, 2013
Applicant: SFWMD
Project: By letter dated September 6, 2013, the USFWS provided an amendment to the Everglades Agricultural Area (EAA) A-1 Reservoir Project (A-1 Reservoir) Biological Opinion for the construction of the A-1 FEB and effects on the eastern indigo snake.

**Central Everglades Planning Project:**

USFWS Consultation Code: 04EF2000-2012-F-0290
Formal Consultation Initiation Date: October 24, 2013
Applicant: USACE
Project: By letter dated April 9, 2014, the USFWS provided a BO for the construction and operation of the CEPP and its potential adverse effects on the Everglades snail kite, CSSS, wood stork, and the eastern indigo snake.

## 3.4 Designated Critical Habitat

A list of federally designated critical habitat for protected species is maintained by the USFWS and NOAA, National Marine Fisheries Service in accordance with the ESA. The ESA defines “critical habitat” as (1) the specific areas within the geographical area occupied by the species at the time it is listed on which are found physical or biological features essential to the conservation of the species, and which may require special management considerations or protection; and (2) specific areas outside of the geographical areas occupied by the species at the time it is listed upon a determination that such areas are essential for the conservation of the species.

The only designated critical habitat within the Action Area is for Everglade snail kite, located within WCA 2 and portions of WCA 3 (Figure 3-4). Loss and degradation of habitat are the primary threat to snail kites. Water levels, duration, and quality are primary concerns for Everglade snail kite conservation. Water levels must allow for appropriate nesting sites, durations of water levels must be sufficient to support apple snail populations, and water quality must be such that invasive species do not take over Everglade snail kite foraging habitat (USFWS 1999). Critical habitat was designated for the Everglade snail kite in 1977.

The project site is within USFWS' Everglade snail kite consultation area (USFWS 2003b). Everglade snail kites are present in the EAA, STAs 2 and 3/4, and WCAs 2A and 3A. The nearest nesting of snail kites to the project area occurred in 2017 and 2018, where more than 80 nesting attempts were documented in the south and southeastern portions of the Rotenberger Wildlife Management Area, located approximately 4 miles from the A-2 STA footprint. Nesting also was recorded in 2011 within STA 3/4, 2012 (14.1 miles to the west and 22.3 miles to the east in WCA 1), and in 2016 in STA 2. Snail kite was documented using the A-1 portion of the project area in 2014 and 2015 during construction of the A-1 FEB (SFWMD, personal communication). It is likely that snail kites use the freshwater marshes in the project area for foraging and nearby STAs and WCAs for nesting.

# 4 EFFECTS OF THE PROPOSED ACTION

## 4.1 Direct Effects

Direct wetland impacts for the construction of the reservoir and STA in the project area will occur during construction, or as a direct result of construction activities. These include, but are not limited to, regrading of wetlands and/or waters of the U.S., dredging or the placement of fill material into wetlands and/or waters of the U.S., any temporary fill necessary for construction staging areas within the project footprint, and noise from construction activities. Wetlands within the project site that are not converted to canals or uplands would be directly affected by inundating of the wetlands. As a result of the proposed project, approximately 233 acres of emergent and scrub-shrub wetland within the A-2 parcel and A-2 Expansion area will be converted to open water aquatic habitat. The proposed project will replace the existing agricultural lands and degraded wetland habitat with an aquatic habitat associated with the A-2 reservoir and A-2 STA project components that will be approximately 10,500 and 6,500 acres in size, respectively.

The construction of the reservoir and STA would result in short-term impacts and displacement of the natural environment within the project area. In addition, some temporary, short-term negative effects would likely occur during the construction phase, including roadway impacts. The construction of the A-2 STA will have long-term positive effects on water quality, recreation, and for species that utilize the STAs.

## 4.2 Indirect Effects

The CEPP PACR Feasibility Study and integrated Environmental Impact Statement (FS/EIS) assessed indirect effects, including effects to STA 2 and 3/4 and WCA 3A. Since the proposed A-2 reservoir and A-2 STA would be working in conjunction with STA 2 and STA 3/4, the indirect project impacts will include the footprint of these existing STAs. The downstream receiving areas also are included in the indirect assessment including WCA 2A and WCA 3A, ENP, and Florida Bay.

The existing STAs (STA 2 and STA 3/4) are not waters of the U.S. because they are water treatment facilities that are operated under the Florida's National Pollutant Discharge Elimination System program. The indirect effects to these STAs are included in this assessment because they provide foraging habitat for fish and wildlife species. As proposed, these STAs would operate to effectively reduce phosphorus concentration and load from upstream areas and discharge into the downstream areas. The potential indirect effects to the receiving downstream areas (the central Everglades) include an imbalance in the flora and fauna of wetland and aquatic communities as a result of changes in hydrology and phosphorous levels.

The modeling data was conducted for the CEPP PACR FS/EIS for a No Action Alternative (Future Without [FWO]) and five project alternatives associated with three different modeling runs (R240, R360, and C360). Because the R240A (A-2 east reservoir and A-2 west STA) was evaluated and determined to be a cost effective best buy, the modeling was optimized for that alternative utilizing a multi-purpose alternative (environmental benefits

and other water related needs). The C240A alternative is the applicant's preferred alternative, with the "C" representing the multi-purpose operations of the reservoir. The other alternatives were not evaluated in the BA. The applicant's preferred alternative (Alternative C240A), as modeled in the CEPP PACR, predicted the conditions expected with the operation of the A-2 reservoir and A-2 STA working in conjunction with the existing and foreseeable authorized CEPP projects.

## 4.3 Effects of Interrelated and Interdependent Actions

The EAA was historically Everglades swampland, which have been drained and put into agricultural production. The former swampland produced the rich organic peat and muck soils that today make it a highly productive agricultural area, with approximately 620,797 acres of agricultural land (USACE 2009). The agricultural area designation was formally established in the 1950s and associated water management infrastructure had been substantially completed by 1962. Sugar cane is the area's dominant crop with approximately 898 square miles of active sugar cane fields, which provides 50% of the sugar produced nationally (USACE 2009).

Runoff water from the EAA, which contains high levels of dissolved nutrients, mainly phosphorus and nitrogen from fertilizers and particulate matter, drain from the agricultural canals, to the secondary canals, into the six main primary canals, and are eventually discharged into the Everglades Protection Area (EPA) or to coastal waters. In addition to flood protection for and water supply to the EAA, the canals and water control structures convey regulatory releases from Lake Okeechobee to the WCAs, water supply releases to the EAA and eastern Palm Beach, Broward, and Dade counties for municipal water supply and to prevent saltwater intrusion, and water supply releases to ENP (Cooper 1989).

### 4.3.1 Water Conservation Areas (WCAs)

Three WCAs (1, 2A, and 3A) directly receive water from the EAA and Lake Okeechobee. The WCAs serve as surface water impoundments developed to provide water storage, flood control, and wildlife conservation (SFWMD 2014) and are subjects of Everglades restoration activities of the CERP. Although the highly managed hydrology in the WCAs has dramatically altered vegetation communities and soils of the Everglades, the interior wetlands and wetland soils persist and continue to provide substantial wildlife habitat.

In 1951, WCA 1 was formally declared a national wildlife refuge (Arthur R. Marshall Loxahatchee National Wildlife Refuge) under the authority of the Migratory Bird Conservation Act of 1929, and through a license agreement between the Central & Southern Florida Flood Control District (now the SFWMD) and the USFWS. This 147,392-acre refuge is managed by the USFWS and includes more than 14,880 acres of Everglades habitat, recreational amenities, and a 400-acre cypress swamp that is the largest remaining remnant of a cypress strand that once separated the pine flatwoods in the east from the Everglades marshes (USFWS 2015b). There is no change in the volume of water, total phosphorus loads, and total phosphorus concentrations in WCA 1 as a result of the project.

WCA 2A and WCA 3A are primarily state-owned and managed for multiple purposes including flood protection, fish and wildlife, and recreation. WCA 3A is a 578,000-acre

impoundment with typical Everglades sawgrass (*Cladium* spp.) and wet prairie vegetation. It is managed by the state and management decisions potentially affect Tribal land as it overlaps with a portion of the Miccosukee Indian Reservation and is adjacent to the Big Cypress Seminole Indian Reservation. Directly to the south of WCA 3A is ENP and Florida Bay. Hydrologic conditions in ENP, Florida Bay, and Biscayne Bay, including Biscayne National Park, also are dependent on freshwater flows coming from Lake Okeechobee and the EAA. As a result of implementation of the project, a decrease in phosphorus loading and concentration is expected to decrease invasive cattail coverage and result in a higher habitat value. For WCA 3A, the increase in water flows, may increase phosphorus loads and concentrations, although water quality will be the same as the FWO. Improvements to the hydroperiod in WCA 2A and WCA 3A will promote native vegetation and improve wetland habitat.

## 4.4 Mitigation Measures

The project is expected to contribute to the overall goal of the ecological restoration of the greater Everglades by improving the quality and quantity of water delivered to WCA 3A, the central Everglades, ENP and overland flows to Florida Bay. Benefits include restoring more natural hydro-periods and hydro-patterns, and improving ecological functionality throughout the central Everglades. The increased hydro-period benefits the area in many ways, including decreased soil loss due to oxidation, reduced water column total phosphorous, and improved habitat for many obligate aquatic species.

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# 5 EFFECTS OF THE PROPOSED ACTION ON FEDERALLY-LISTED SPECIES

This section discusses potential direct and indirect impacts of this project to the federally listed threatened or endangered species and/or their designated critical habitat. This section also evaluates the effects of the interrelated and interdependent system of STAs and the subsequent effects on each species at each project site. In addition, the proposed cumulative effects of the project and associated/assumed system operations planned in the surrounding areas would be evaluated.

The potential for listed species to be present was evaluated based on available suitable habitat and critical habitat, species biology, and geographic range of the species. The proposed project consists of the A-2 parcel and A-2 Expansion area sites. Because the proposed A-2 reservoir and A-2 STA in these areas would be working in conjunction with the A-1 FEB, STAs 2 and 3/4, the effects assessment will include the affected areas within existing facilities. Since the proposed project will discharge into WCA 3A, these areas will also be included in the assessment.

The USACE entered into formal consultation with USFWS on the Everglade snail kite, and its designated critical habitat; CSSS and its designated critical habitat; wood stork; and eastern indigo snake as part of the authorized CEPP project. A Programmatic BO was received on April 9, 2014, which clearly states that further consultation will be needed when more specific project details are finalized during the Planning, Engineering, and Design (PED) phase. While the CEPP BO does not authorize incidental take of three endangered avian species (CSSS, snail kite, and wood stork), it does describe the anticipated effects based on current information. Upon completing ESA Section 7 consultation for each Project Partnership Agreement (PPA) of CEPP, USACE will undertake the agreed-to avoidance and minimization measures and implementing terms and conditions (TCs). The Programmatic BO for CEPP concurred on the USACE's determination of may affect, but is not likely to adversely affect deltoid spurge, Garber's spurge, Small's milkpea, tiny polygala, American crocodile and its critical habitat, Florida panther, and West Indian manatee and its critical habitat. Furthermore, the USFWS concurred with all the "No Effect" determinations made by the USACE in regard to the applicable threatened or endangered species that are found in the action area. In the CEPP BO, incidental take was not provided for the Everglade snail kite, the CSSS and the wood stork; however it is anticipated that incidental take will be necessary for these three species as specific CEPP projects are moved to PED.

This biological assessment serves as a separate consultation document, which through formal consultation may authorize incidental take, and provide applicable reasonable and prudent measures (RPMs) and TCs. The preliminary conclusion is that the proposed project is not likely to jeopardize the continued existence of the species listed above and are not likely to adversely modify critical habitat, where designated. Incidental take of eastern indigo snake is likely during construction and operation of the A-2 reservoir and A-2 STA. The amount of take includes 17,000 acres of agricultural lands currently in sugar cane and row crops that will become inundated and mostly unusable to indigo snakes.

**No Effect Determinations**

Although many federally-listed species could potentially be found within Palm Beach County, several species are not affected by the proposed project or are limited in geographic range:

**Listed plants and lichens:** The beach jacquemontia, Cape sable thoroughwort, crenulate lead-plant, Florida prairie-clover, four-petal pawpaw, Johnson's seagrass, and Florida perforate cladonia are located on sandy soils along coastal counties. The Okeechobee gourd has a low potential of occurrence within the project area, as its preferred habitat consists of Lake Okeechobee shores and islands, and floodplain forests along the St. Johns River. No Okeechobee gourds were observed during the field reviews. Johnson's seagrass does not occur in the project area as it is a saltwater species, and is unlikely to be impacted by downstream effects as its limited distribution is along the eastern coastline as opposed to Florida Bay or the western coastline. Therefore, the project would have no effect on these federally listed plant or lichen species.

**Invertebrates:** Populations of Bartram's hairstreak butterfly and Florida leafwing butterfly rely on populations of pineland croton for larval development. The last known documentation of pineland croton in Palm Beach County occurred in the 1960s, and this plant species is unlikely to occur in the project area due to ongoing disturbance related to agricultural activities that dominant the area. Miami blue butterfly is a coastal species, and is unlikely to occur in the project area. Schaus swallowtail butterfly is only known to occur in tropical hardwood hammocks in the Florida Keys, and therefore is unlikely to occur in the project area. Stock Island tree snail is native to Stock Island, but has been introduced to other areas, including the ENP (USFWS 2009). It is not anticipated that project activities will affect this population, due to their arboreal habits and likely insignificant impact to their preferred hardwood hammock habitats. Therefore, the project would have no effect on these federally listed invertebrate species.

**Piping plover, southeastern beach mouse**: Piping plover and southeastern beach mouse are coastal species, which are not within the project footprint or within the potential downstream affected area. Therefore, the project would have no effect on piping plover or southeastern beach mouse.

**Florida scrub-jay:** Florida scrub-jays are non-migratory, and in Florida they are known to occur in three subregions, none of which are located in or near the project area (USFWS 1999). Known nesting pairs of Florida scrub-jay within Palm Beach County are only found along the coast (USFWS 1999) and the nearest eBird observations are greater than 25 kilometers from the Project area (eBird 2017d). Florida scrub-jay is unlikely to occur in the project area, therefore, the project would have no effect on the Florida scrub-jay.

**Ivory-billed woodpecker:** Ivory-billed woodpeckers are thought to be extinct, and the project area does not contain suitable habitat to support this species. Therefore, the project would have no effect on the ivory-billed woodpecker.

**Kirtland's warbler**: Occurrence of Kirtland's warbler within Palm Beach and Broward counties have all been on the east coast of Florida. Therefore, Kirtland's warbler is unlikely to occur in the project area, and the project would have no effect on this species.

**Red-cockaded woodpecker**: The red-cockaded woodpecker is not found within the project site or the downstream affected habitat, and the area is outside of the consultation area. Therefore, the project would have no effect on the red-cockaded woodpecker.

**Florida bonneted bat:** Surveys for Florida bonneted bat have determined this species is restricted to areas within Charlotte, Collier, Lee, Miami-Dade, and Monroe counties (Timm and Genoways 2004, FFWCC 2013). This species is not expected to occur in Palm Beach County (USFWS no date b). Range information available from the USFWS for Florida bonneted bat does not include Palm Beach County (USFWS no date b); however, the USFWS Consultation Area for the Florida bonneted bat was recently expanded to include all of Palm Beach County as well as the nearly entire area of the SFWMD footprint. Although bats in south Florida are thought to roost primarily in trees and manmade structures (78 FR 191, October 2, 2013), it is important to note that available information on roosting sites for this species is extremely limited. Roosting and foraging areas appear varied, with the species occurring in forested, suburban, and urban areas. Bonneted bats are closely associated with forested areas because of their tree-roosting, but specific information is limited. It is unlikely that suitable roosts with protective cover would occur in the project area, and along with the range information available for Florida bonneted bat, this species is unlikely to occur. Although the project is not expected to affect the Florida bonneted bat, any constructed structures will be monitored using acoustic equipment to ensure bonneted bats are not present.

**Roseate tern:** The roseate tern is a coastal species and is not known to be found within the project site or the affected downstream habitat. The coastal areas inhabited by the species are outside of the likely area of downstream effects and therefore the project would have no effect on this species.

**May Affect Determinations**

Several listed species that have the potential to be affected by the project are evaluated further in this assessment and include deltoid spurge, Garber's spurge, Small's milkpea, tiny polygala, smalltooth sawfish, American crocodile, eastern indigo snake, green sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, loggerhead sea turtle, northern crested caracara, bald eagle, CSSS, Everglade snail kite, red knot, wood stork, Florida panther, and West Indian manatee. These species and the projects affects determination for each species are listed in Table 5-1, followed by species descriptions.

**Table 5-1. Federally Protected Species in the Project-Affected Regions That May be Affected by the Proposed Project.**

| Common Name | Scientific Name | Federal Status[1] | Project Affects Determination |
|---|---|---|---|
| **PLANTS** | | | |
| Deltoid spurge | *Chamaesyce deltoidea* spp. *Deltoidea* | E | May Affect, but not likely to Adversely Affect |
| Garber's spurge | *Chamaesyce garberii* | T | May Affect, but not likely to Adversely Affect |
| Small's milkpea | *Galactia smallii* | E | May Affect, but not likely to Adversely Affect |
| Tiny polygala | *Polygala smallii* | E | May Affect, but not likely to Adversely Affect |
| **FISHES** | | | |
| Smalltooth sawfish | *Pristis pectinata* | E | May Affect, but not likely to Adversely Affect |
| **REPTILES** | | | |
| American crocodile | *Crocodylus acutus* | T | May Affect, but not likely to Adversely Affect |
| Eastern indigo snake | *Drymarchon corais couperi* | T | May Affect |
| Green sea turtle | *Chelonia mydas* | T | May Affect, but not likely to Adversely Affect |
| Hawksbill sea turtle | *Eretmochelys imbricata* | E | May Affect, but not likely to Adversely Affect |
| Kemp's ridley sea turtle | *Lepidochelys kempii* | E | May Affect, but not likely to Adversely Affect |
| Leatherback sea turtle | *Dermochelys coriacea* | E | May Affect, but not likely to Adversely Affect |
| Loggerhead sea turtle | *Caretta caretta* | T | May Affect, but not likely to Adversely Affect |
| **BIRDS** | | | |
| Northern crested caracara | *Caracara cheriway* | T | May Affect, but not likely to Adversely Affect |
| Bald eagle | *Haliaeetus leucocephalus* | BGEPA | May Affect, but not likely to Adversely Affect |
| Cape Sable seaside sparrow | *Ammodramus maritimus mirabilis* | E | May Affect, likely to Adversely Affect; would not Adversely Modify Designated Critical Habitat |
| Everglade snail kite | *Rostrhamus sociabilis plumbeus* | E | May Affect, but not likely to Adversely Affect; would not Adversely Modify Designated Critical Habitat |
| Red knot | *Calidris canutus rufa* | T | May Affect, but not likely to Adversely Affect |
| Wood stork | *Mycteria americana* | T | May Affect, but not likely to Adversely Affect |
| **MAMMALS** | | | |
| Florida panther | *Felis concolor coryi* | E | May Affect, likely to Adversely Affect |
| West Indian manatee | *Trichechus mantus* | T | May Affect, but not likely to Adversely Affect |

1 – BGEPA – Bald and Golden Eagle Protection Act; E – federally endangered; T – federally threatened
Source: USFWS 2017c

## 5.1 Deltoid Spurge

Deltoid spurge is found in pine rocklands of Miami-Dade County, including ENP (USFWS 1999). This habitat type provides open shrub canopy and exposed limestone, with minimal organic matter; generally habitat conditions associated with periodic fires. It is a small prostrate perennial herb, with small ovate leaves and fruit approximately 1 millimeter long and wide. It flowers from April to November, producing explosive seedpods for seed dispersal.

The major threat to the species is habitat destruction. Within pine rockland habitat, it is found within the larger authorized CEPP project area, specifically around Frog Pond, although it is not found within the current project action area or buffers. Various structure and flow modifications will occur in coordination with the main project activities, and these activities could result in changes in water levels near suitable pineland habitat. Because no project actions are planned for, nor are they anticipated to impact pine rockland habitat, the project **may affect, but not likely to adversely affect** deltoid spurge.

## 5.2 Garber's Spurge

Garber's spurge is a short-lived perennial herb endemic to south Florida. It is found on pine rocklands, coastal flats and grasslands, as well as beach ridges in both Miami-Dade and Monroe counties. Abundant on Cape Sable and found in small numbers throughout the Florida Keys, it occurs at low elevations on thin sandy soils or on limestone (USFWS 1999). Within ENP, it also has been reported from hammock edges, open grassy prairies, and back dune swales (USFWS 1999).

The major threat to the species is habitat destruction. Within pine rockland habitat, it is found within the larger authorized CEPP project area, specifically around Frog Pond, although it is not found within the current project action area or buffers. Various structure and flow modifications will occur in coordination with the main project activities and these activities could result in changes in water levels near suitable pineland habitat. Because no project actions are planned for, nor are they anticipated to impact pine rockland habitat, the project **may affect, but not likely to adversely affect** Garber's spurge.

## 5.3 Small's Milkpea

Small's milkpea is a small perennial legume, endemic to the pine rocklands of Miami-Dade County, Florida (USFWS 1999). Its current distribution is spotty and limited to the Redland pine rocklands in the southern part of the county due to habitat availability. The preferred habitat is within higher elevations with relatively low shrub cover and few exotic species (USFWS 1999).

The major threat to the species is habitat destruction. Within pine rockland habitat, it is found within the larger authorized CEPP project area, specifically around Frog Pond, although it is not found within the current project action area or buffers. Various structure and flow modifications will occur in coordination with the main project activities and these activities could result in changes in water levels near suitable pineland habitat. Because no project actions are planned for, nor are they anticipated to impact pine rockland habitat, the project **may affect, but not likely to adversely affect** Small's milkpea.

## 5.4 Tiny Polygala

Tiny polygala is a small short-lived milkwort endemic to southern Florida (USFWS 1999). Previously considered endemic to the pine rocklands of Miami-Dade County, it is now known to occur along the Atlantic Ridge of southeast Florida. The species occurs in pine rockland, scrub, high pine, and open coastal spoil habitats, which are all dry habitats prone to periodic fires. In Broward County, the population occurs on previously cleared scrub habitat, while in Palm Beach County, the population occurs in scrub-flatwoods that established on dredged spoil from the intercoastal waterway (USFWS 1999).

The major threat to the species is habitat destruction. Within pine rockland habitat, it is found within the larger authorized CEPP project area, specifically around Frog Pond, although it is not found within the current project action area or buffers. Various structure and flow modifications will occur in coordination with the main project activities and these activities could result in changes in water levels near suitable pineland habitat. Because no project actions are planned for, nor are they anticipated to impact pine rockland habitat, the project **may affect, but not likely to adversely affect** tiny polygala.

## 5.5 Smalltooth Sawfish

Smalltooth sawfish are usually found in shallow coastal tropical waters (less than 10 meters deep) and often in protected bays and estuaries (NOAA 2015). Coastal habitats such as mangroves serve as important nursery areas for juvenile smallmouth sawfish. In the U.S., smalltooth sawfish are only found in the peninsula area of Florida, common only in the southern area of the state within the Everglades region (NOAA 2015). Critical habitat was designated for the U.S. population in 2009 (74 FR 453353), which included the Charlotte Harbor Estuary Unit (near the mouth of the Caloosahatchee River) and the Ten Thousand Islands/Everglade Unit (from Florida Bay at the southern tip of Florida, north along the west coast to just south of Marco Island). Smalltooth sawfish is not expected to occur in the project area, therefore, **no direct effects** to smalltooth sawfish are expected from the proposed project.

The proposed project is anticipated to have indirect beneficial impacts on the smalltooth sawfish by improving salinity fluctuations within the coastal waters the fish inhabit. Minor beneficial effect to smalltooth sawfish are expected from increased freshwater flows into the coastal wetlands adjoining Florida Bay, which would be provided by more natural overland flows. The proposed project has the potential to provide a minor beneficial effect to the smalltooth sawfish and its critical habitat by further reducing the volume of high-level flows from Lake Okeechobee to the Northern Estuaries. Reduction in flows to the Northern Estuaries would improve the overall salinity regime and habitat quality. Improving freshwater delivery to downstream estuaries in ENP and Florida Bay may further reduce salinity fluctuations and increase habitat suitability for the smalltooth sawfish.

Specifically, the proposed project has the potential to provide a minor beneficial effect to the smalltooth sawfish and its critical habitat by reducing excessive freshwater flows from Lake Okeechobee to the Caloosahatchee River during the wet season. These damaging flows from Lake Okeechobee have adverse effects on estuarine flora and fauna. The project

may provide minor beneficial effects to the smalltooth sawfish by improving the salinity regime throughout the Caloosahatchee Estuary; and by increasing freshwater flows into the coastal wetlands adjoining Florida Bay, subsequently reducing the duration and occurrence of hypersaline conditions. With the expectation of improved nearshore habitat, no utilization of the project area, the proposed project **may affect, but not likely to adversely affect** smalltooth sawfish. The proposed project is expected to have an **overall minor beneficial effect** on the smalltooth sawfish.

## 5.6 American Crocodile

American crocodiles live in salt water or brackish water areas, and can be found in ponds, coves, lakes and creeks in mangrove swamps (FFWCC 2018d); occasionally finding their way inland through the extensive canal system. Degraded hydrological conditions, habitat loss and predation are key factors limiting this species (Everglades National Park Florida 2018).

American crocodile occurs south of the project site and along coastal waters. This species is not typically found inland where the project is proposed, however project operations are likely to modify habitat frequented by the species. The project would slightly increase freshwater flows to the southern Estuaries, ultimately reducing salinity fluctuations, which would be expected to provide minor beneficial effects and improve habitat suitability. Therefore, this project **may affect, but is not likely to adversely affect** the American crocodile. Overall, the proposed project is expected to have a **minor beneficial effect** to American crocodiles.

## 5.7 Eastern Indigo Snake

Upland and dry habitats (flatwoods, dry prairies, tropical hardwood hammocks, and coastal dunes) are the preferred habitats of eastern indigo snakes (USFWS 1999). While drier, upland habitat is limited in the project-affected regions, these species may also forage along the edges of freshwater marshes and in agricultural fields in the EAA.

The proposed project is anticipated to have a **direct impact** on the eastern indigo snake through loss of habitat and any impacts associated with the construction of the A-2 reservoir and A-2 STA.

Construction of the A-2 reservoir and A-2 STA would result in the conversion of approximately 17,000 acres of sugar cane agricultural fields to stormwater treatment wetlands and above ground water storage reservoir. Eastern indigo snake may forage along the edges of the A-2 reservoir and A-2 STA during drier periods, but conditions within the impoundments would generally not be suitable because these areas are anticipated to be permanently inundated. Eastern indigo snakes have a high probability of occurrence within the proposed project site and as a result of construction of project components within the A-2 parcel and A-2 Expansion area, are likely to be displaced, thereby removing approximately 17,000 acres of potential habitat and having a significant and unavoidable major adverse effect. Construction activities may result in eastern indigo snakes leaving the area, abandoning den sites, and possibly losing foraging and mating opportunities. In addition, construction activities associated with the earth-moving equipment may increase the likelihood of adverse impacts to eastern indigo snake. Heavy machinery, which would

be re-contouring ground levels, removing and relocating berms, and constructing roads, may unearth eastern indigo snakes and cause inadvertent impacts to occur. Construction workers would need to be aware of the potential presence of eastern indigo snake within suitable habitats, and be informed on how to identify the snake if found. The standard protection measures for the Eastern indigo snake will be implemented during construction to minimize impacts. The USFWS' Standard Protection Measures for the Eastern Indigo Snake (USFWS 2016b) would be required to be adhered to during all construction activities.

**Indirect impacts** to the eastern indigo snake are assessed from additional activities that may occur as a result of construction activities, and changes to the operation and maintenance of the A-2 reservoir and A-2 STA once they are operational.

Indirect effects include an increase in traffic and noise. An increase in traffic may increase the potential for mortality of the eastern indigo snakes on project roadways. In addition, the filling of the impoundment with water may also result in eastern indigo snakes leaving the area, abandoning den sites, and possibly losing foraging and mating opportunities. Routine mowing of the levees and berms may cause an increase in mortality to the eastern indigo snake. The increase in noise levels is not expected to cause an unacceptable adverse effect to eastern indigo snakes.

STA 2 and STA 3/4 are currently operational and maintained as STAs, and therefore, the wetland cells (STAs are man-made wetlands that are divided into several cells) do not contain suitable habitat. The cells are utilized as wetland systems, which is not prime habitat; however, the sites contain levees and berms, which may be suitable habitat for burrows for the eastern indigo snake. Although the STAs would allow for seasonal fluctuations in water levels, the operations of the STAs are not expected to change water levels that may flood existing burrows. Therefore the continued operation of these STAs would not have an adverse indirect impact on the eastern indigo snake.

The changes in water levels within WCA 2A and WCA 3A are minor. The WCAs are currently wetlands and do not support habitat for the eastern indigo snake. Therefore, there are no adverse indirect effects expected to occur to the eastern indigo snake as a result of the change in hydrology in WCAs 2A and 3A.

Potential impacts to eastern indigo snake may occur due to mortality during the movement of construction equipment and vehicles, construction activities, earth moving, operation and maintenance of the project, and habitat destruction and degradation including conversion of current habitat to open water habitat. Additional impacts may occur to the eastern indigo snake resulting from sudden increases in water levels within the A-2 reservoir and A-2 STA. However, the berms will be constructed in a manner to allow for the snake to escape the wetland areas of the A-2 reservoir and A-2 STA. Protective measures alerting the construction contractors of the potential presence of this species and its protected status shall be utilized during construction to avoid adverse impacts to this species. Therefore, the project **may affect the eastern indigo snake.**

## 5.8 Sea Turtles

Sea turtles live in tropical and subtropical waters and are found foraging in nearshore seagrass habitats within the Northern Estuaries, Southern Estuaries, and Florida Bay. No suitable nesting habitat for sea turtles is present in the project area. As such, sea turtles are not expected to occur in the project area, and **no direct effects** to sea turtles are expected from the proposed project.

Decreased high-level freshwater flows to the Northern Estuaries in the project would reduce stress on submerged aquatic vegetation and promote increases in seagrass density and aerial extent. Increased freshwater flows to Florida Bay estuaries would reduce salinity fluctuations and produce overall salinity beneficial to seagrass. Optimal salinity ranges result in higher seagrass productivity, ultimately providing increased foraging opportunities for sea turtles. The project has the potential to provide a minor beneficial effect to sea turtles as a result of the improved salinity regime within the Northern Estuaries and Florida Bay. The proposed project **may affect, but is not likely to adversely affect** sea turtles. Overall, the proposed project is expected to have a **minor beneficial effect** to sea turtles.

## 5.9 Northern Crested Caracara

The northern crested caracara prefers open fields, pine flatwoods, dry prairie, and wet prairie. The caracara nests primarily in cabbage palm trees and forages in vegetated areas less than 1-foot in height. The USFWS defines the primary protection zone for this species as 985 feet outward from a nesting tree (USFWS 2004). The secondary zone is 4,920 feet outward from an active nesting tree. The project is located within the crested caracara consultation area.

**Direct** impacts to the northern crested caracara include impacts associated with the construction and operation of the A-2 reservoir and A-2 STA.

There are no freestanding cabbage palm trees within the project site, and no signs of previous or new crested caracara nesting activity. No known nest sites are located within 4,920 feet of the project site (Figure 3-2). Currently, many areas of the site contain vegetation higher than one foot or are inundated with water. Therefore, there is a low potential for the caracara to utilize the existing project area for nesting or foraging habitat due to lack of preferred habitat. Post-project conditions in the project site also would not be high-use areas for the caracara, as the interior of the site would contain emergent wetlands. The project site may improve foraging habitat for caracara by creating levees for the caracara to rest.

**Indirect** impacts include an increase in traffic and noise levels.

An increase in traffic may increase the quantity of wildlife mortality along the project roadways. Caracaras are seen frequently along roadways feeding on the wildlife that has been killed by vehicle strikes. Although increasing feeding opportunities, the caracara also has a risk of being struck by vehicles. The increase in noise levels is not expected to cause an adverse effect to caracaras.

The STA 2 and STA 3/4 are within the northern crested caracara's consultation area, but the impoundments are currently operated as wetland treatment systems. The sites do not contain free-standing trees, and consist of EAV and submerged aquatic vegetation (SAV). Therefore, the STAs do not contain nesting or foraging habitat. The existing levees may provide foraging habitat or areas for resting. The operations of these STAs are not expected to change any potential foraging habitat for the northern crested caracara. Therefore, the continued operation of these STAs would not have a direct impact on the caracara.

A small portion of the western area of WCA 2A is located within the northern crested caracara's consultation area (Figure 3-2). The changes in water levels within WCA 2A and WCA 3A are minor. The wetland habitats in the WCAs are not prime foraging or nesting habitat for the caracaras as they prefer upland areas. Access to prey availability would not change in the WCAs. Therefore, the change in hydrology in the WCA 2A and WCA 3A is not expected to cause an unacceptable adverse impact to the caracara.

The project site and downstream areas are located within the USFWS consultation area for the crested caracara, but are outside known juvenile gathering areas. The Species Conservation Guidelines for Crested Caracara (USFWS 2004) state that no effect from the project is anticipated on the caracara if on-site surveys of suitable habitat within the consultation area do not detect caracara nests. Prior to construction, wildlife surveys and coordination with appropriate agencies will be conducted to identify known nesting or potential for nesting of crested caracara. The change in hydrology in downstream areas is not expected to alter the caracara's available nesting or foraging habitat. Therefore, the project **may affect, but is not likely to adversely affect** the caracara.

## 5.10 Bald Eagle

Bald eagle uses forested habitats for nesting and roosting, and expanses of shallow fresh or salt water for foraging. Nesting habitat generally consists of mature canopy trees located along the edges of water systems used for foraging, which provide an unobstructed view of the surrounding area. High quality foraging habitat for bald eagle contains a diversity and abundance of prey, access to shallow water and tall trees or structures for perching. Prey items primarily include fish, birds, and small mammals. They occasionally will scavenge road kill or other available carcasses.

The National Bald Eagle Management Guidelines published by the USFWS (USFWS 2007) provides recommendations for avoiding disturbance at nest sites, including recommendations for keeping a distance between disturbing activities and the nest (distance buffers); maintaining preferably forested (or natural) areas between the disturbing activity and around the nest trees (landscape buffers); and avoiding certain activities during the breeding season.

**Direct** impacts to the bald eagle include impacts associated with the construction and operation of the A-2 reservoir and A-2 STA.

The project area lacks suitable nesting trees, and no bald eagle nests have been documented on or in proximity to the project area. Therefore, there is a low potential for the bald eagle to utilize the existing project area for nesting. However, bald eagles are likely to use both the A-1 and A-2 sites for foraging, and they are commonly observed during the spring and early summer months during Avian Protection Plan surveys. Although bald eagle have

been documented in the project area, the project area does not contain an abundance or diversity of suitable prey. Post-project conditions in the project site would not be high-use areas for bald eagle, as the interior of the site would contain emergent wetlands, and are not likely to contain large fish. The project site also does not contain suitable structures or tall trees for perching.

**Indirect** impacts include an increase in traffic and noise levels during construction.

An increase in traffic may increase the quantity of wildlife mortality along the project roadways. Bald eagles may occur along roadways if there are roadkill or other carcasses present, increasing their risk of being struck by vehicles. The increase in noise levels is not expected to cause an unacceptable adverse effect to bald eagle, as the project area is not known to contain any nesting sites. Similar to the project site, adjacent STAs and WCAs do not contain suitable nesting trees, and quality of foraging habitat is low. Operations of the STAs are not expected to change any potential bald eagle foraging habitat, therefore, the continued operation of these STAs would not have a direct impact on bald eagle.

The wetland habitats in the WCAs are not prime foraging for the bald eagle, as they require large expanses of open water that contain large fish. Access to prey availability would not change in the WCAs. Therefore, the change in hydrology in the WCA 2A and WCA 3A is not expected to cause an unacceptable adverse impact to the bald eagle.

The change in hydrology in downstream areas is not expected to alter bald eagle nesting or foraging habitat, and downstream hydrology would improve to provide benefit to bald eagle due to the increased flows resulting in deeper areas of open water for foraging. Therefore, the project **may affect, but is not likely to adversely affect** bald eagle.

## 5.11 Cape Sable Seaside Sparrow

The incremental effects of the minor increase in hydro-period durations are anticipated to cause a minor to moderate negative effect on the CSSS nesting pattern as compared to the FWO accept for sub-population F which shows a moderate negative effect. However, the mitigation efforts associated with the adverse effects created by the FWO (implementation of CEPP project features) would be expected to continue.

Since CSSSs are not located in the project area, no direct impacts are expected to occur. However, the proposed project alternative has the potential to alter hydrologic patterns downstream slightly, and the project may have an indirect effect on CSSS. Therefore, the USACE has determined that the proposed project **may affect, likely to adversely affect** the CSSS; however, it would not adversely modify its critical habitat.

CSSSs are non-migratory and known only to occur in the Everglades region of Miami-Dade and Monroe counties in South Florida (USFWS 1999). Due to their restricted range, CSSS are unlikely to occur in the project area; however, downstream changes to hydro-period due to operations of the A-2 reservoir and A-2 STA may effect this species. For the authorized CEPP Project, a Programmatic Biological Opinion (BO) was received from USFWS on April 9, 2014, which stated that further consultation will be needed when more specific project details are finalized during project design and implementation activities. While the BO does not authorize incidental take of three endangered avian species (CSSS, Everglade snail kite, and wood stork), it does describe the anticipated effects based on

current information. When the USACE or the SFWMD is closer to constructing phases of the authorized CEPP that will affect listed species, it is expected that USFWS will provide separate consultation document(s) which may authorize incidental take, and provide applicable RPMs and TCs.

## 5.12 Everglade Snail Kite

The Everglade snail kite's preferred habitat consists of large open freshwater marshes and shallow water bodies containing low density emergent vegetation. This protected bird is non-migratory and depends on apple snails as a primary food source. The project site, STAs 2 and 3/4, and WCAs 2A and 3A are within the Everglade snail kite USFWS consultation area (USFWS 2003b).

The wetland systems within the project site may provide habitat for apple snails and thus provide foraging habitat for the Everglade snail kite. Studies have shown that apple snails use a variety of aquatic and wetlands plants to deposit eggs, but prefer sawgrass, pickerelweed (*Pontederia cordata*), and duck potato (*Sagittaria latifolia*) (USACE 2009). Apple snail clutches occurred at a greater density along the edges of sawgrass marshes and were not found in deep marsh habitats. In a marsh in central Florida, apple snail clutches usually occurred on plants with broad stems (exceeding 6 millimeters in diameter).

The project site contains suitable habitat for the snail kite and the apple snail. Everglade snail kite has been documented nesting in nearby STAs and WCAs, and has been observed foraging in the project area. The closest snail kite nesting sites in relation to the project are located in the south and southeastern portions of the Rotenberger Wildlife Management Area approximately 4 miles from the A-2 STA footprint.

Approximately 17,000 acres of agricultural lands would be converted to aquatic habitats. The snail kite has a highly specialized diet typically composed of apple snails, which are found in palustrine, emergent, long-hydroperiod wetlands. As a result, the snail kite's survival is directly dependent on the hydrology and water quality of its habitat (USFWS 1999). Snail kites require foraging areas that are relatively clear and open to visually search for apple snails. Suitable foraging habitat for the snail kite is typically a combination of low profile marsh and a mix of shallow open water. Shallow wetlands with emergent vegetation such as spike rush (*Eleocharis* spp.), maidencane, sawgrass, and other native emergent wetland plant species provide good snail kite foraging habitat, as long as the vegetation is not too dense to locate apple snails.

Rehydration and vegetation shifts within WCA 2A and WCA 3A, conversion of uplands to treatment wetlands in the A-2 parcel and A-2 Expansion area, and decreases in the frequency and duration of extreme low lake stages in Lake Okeechobee may increase suitable habitat for apple snails, thereby increasing spatial extent of suitable foraging opportunities for snail kites, providing a minor beneficial effect. Everglades snail kite designated critical habitat (emergent aquatic vegetation) within Lake Okeechobee, WCA 1, or WCA 2 would not be affected by the project.

**Indirect impacts** from the project would include increased traffic levels as well as changes in hydrology and vegetation in affected regions, primarily the WCAs. The three main parameters considered in the evaluation of potential indirect impacts of the project are

traffic, the cycle and duration of dry-down events, and changes in vegetation, each of which are described below.

Increased traffic from post-construction maintenance and operational activities within the project area could result in a higher risk of direct mortality; however, since the snail kites do not typically forage along roadways, increases in traffic is not expected to cause an unacceptable adverse effect.

Indirect effects include increased noise from traffic and new pump stations. The increase in noise levels is not expected to cause an unacceptable adverse effect. Therefore, the operation of the A-2 reservoir and A-2 STA would not have an adverse indirect impact on the Everglade snail kite.

**Dry-Down Events:** Apple snails require EAV to thrive. Both apple snail and snail kite population success are directly affected by depth and duration of marsh flooding (USACE 2009). The following are the hydrologic parameters/criteria that have been considered in evaluating potential impacts to snail kites and apple snails:

- Dry-down periods with a 1–2-month period are considered optimal for apple snails, while greater than a 2-month dry-down period is considered unfavorable;
- A dry-down period between March and April is considered unfavorable as this time period has been documented to be the peak for apple snail egg cluster production (USACE 2009);
- Dry-down events occurring in a 3–5-year cycle are considered optimum snail kite habitat; and
- Dry-down events occurring in a 2–3-year cycle (slightly drier than optimum), or occurring in a 5-year cycle (slightly wetter than optimum) are considered marginal snail kite habitat.

The STA 2 and STA 3/4 are currently operated as STAs and contain suitable foraging habitat for the Everglade snail kite. The cells are utilized as wetland systems, which is habitat for the apple snail and foraging habitat for the Everglade snail kite. The A-2 reservoir and A-2 STA are designed to minimize the dry-down events in STA 2 and STA 3/4, and therefore would improve conditions for the Everglade snail kites utilizing the STAs. Therefore, the continued operation of the STAs would not have a direct impact on the Everglade snail kite.

Reduced frequency and duration of extreme low lake stages on Lake Okeechobee, rehydration and vegetation shifts within WCA 2A and WCA 3A, and conversion of 6,500 acres of agricultural lands to treatment wetlands may increase suitable habitat for apple snails, thereby increasing spatial extent of suitable foraging opportunities for Everglade snail kites, providing a minor beneficial effect. The project may have a minor beneficial effect on Everglade snail kite critical habitat.

**Vegetation:** Because the project would decrease phosphorus loads and concentrations within the WCAs, the project would not contribute to cattail expansion within the WCAs. By meeting the water quality criteria for phosphorus in the EPA, improvements to the Everglade snail kite foraging habitat are anticipated. Everglade snail kites forage by either still-hunting from a perch or by flying above the water surface and visually locating prey. Relatively clear and open marshes and littoral zones with low profile marshes (3 meters or

less in depth) and shallow open water are ideal foraging habitat for the Everglade snail kite (USFWS 1999). Increased levels of phosphorus in Lake Okeechobee and the Everglades have resulted in dense stands of emergent invasive vegetation that has replaced native foraging habitat for the Everglade snail kite. A decrease in cattail coverage is considered beneficial to the Everglade snail kite and its designated critical habitat.

The project site and the downstream areas are located within snail kite consultation area. Provided the USFWS Draft Snail Kite Management Guidelines (USFWS 2006) is adhered to during construction of the project and certain activities are limited during snail kite nesting season (December 1–July 1), the project **may affect but is not likely to adversely affect** the Everglade snail kite, nor would it adversely modify its designated critical habitat.

## 5.13 Red Knot

Red knot is a generally a coastal species, but is occasionally found in inland areas. Nesting and breeding occur inland near the Arctic coast. Wintering and stop-over habitats are generally coastal marine and estuary habitats that contain large areas of exposes intertidal sediments. They occasionally occur in inland areas as stop-over migrants. Red knot was observed north of the project area in 1983.

**Indirect impacts** from the proposed project may include increased traffic and noise levels, as well as changes in hydrology and vegetation in affected regions, primarily the WCAs. Indirect effects also would occur from changes to foraging habitats as a result of a change in vegetative communities with reductions in total phosphorous loads and concentrations entering the WCAs. Therefore, it is anticipated that the increased water deliveries, and achieving the future goal of decreasing phosphorous concentration into the ENP would improve potential stop-over habitat for the red knot over the long-term.

Indirect effects associated with construction and operations of the A-2 reservoir and A-2 STA include an increase in traffic and noise levels. Construction activities and noise associated with the proposed work are not expected to adversely affect red knot. Because red knots are mobile, an increase in traffic in the area is not expected to cause a measurable risk. It is not anticipated that red knot would be adversely affected by noise and traffic.

An overall anticipated regional trend toward restored water quality is expected to improve vegetative communities, water quality, and fish and wildlife habitat in WCA 2A and WCA 3A. It is anticipated that this improvement would likewise enhance potential stop-over habitat for red knot.

Potential stop-over habitat for red knot would improve on the project site. The STAs would have less potential to dry-down, thereby increasing the quality of potential stop-over habitat. The water quality entering into WCA 2A and WCA 3A would meet water quality standards, thereby improving the vegetative communities and fish and wildlife habitat. In addition, any impacts to wetlands and waters of the U.S. would be offset. Therefore, the proposed project **may affect, but is not likely to adversely affect** the red knot.

## 5.14 Wood Stork

The preferred nesting habitat for wood stork consists of inundated forested wetlands, including cypress stands, mixed hardwood swamps, sloughs, and mangroves. The USFWS

Standard Local Operating Procedures for Endangered Species defines the CFA for wood storks to be within an 18.6-mile radius of breeding colonies. The project site contains freshwater marshes which are preferred foraging habitats for wood storks. Based on USFWS databases, the project site is located within the geographic range of the wood stork, but is not located within the 18.6-mile CFA of any known active wood stork nesting colony. However, wood storks have been observed on the project site.

**Direct impacts** from construction of the A-2 reservoir and A-2 STA could occur as a result of conversion of approximately 17,000 acre of agricultural habitat to open water reservoir habitat. Anticipated direct impacts from construction of the A-2 reservoir and A-2 STA would likely increase the preferred aquatic foraging habitat available to the wood stork from the conversion of agricultural lands to higher quality habitat, which would increase prey abundance. The project would provide some increases in hydroperiods, and any increase in hydroperiod provides longer duration foraging, as long as depths do not exceed 18 inches. This is particularly important for wood storks because of their long nesting season and the need to fledge nestlings before the summer rains arrive.

**Indirect effects** would occur from changes to foraging and nesting habitats as a result of a change in vegetative communities with reductions in total phosphorous loads and concentrations entering the WCAs. It is anticipated that the increased water deliveries, and achieving the future goal of decreasing phosphorous concentration into the EPA would improve habitat for the wood stork over the long-term.

Indirect effects associated with construction and operations of the A-2 reservoir and A-2 STA include an increase in traffic and noise levels. Construction activities and noise associated with the proposed work are not expected to adversely affect the wood stork. Because storks are mobile, an increase in traffic in the area is not expected to cause a measurable risk. It is not anticipated that wood storks would be adversely affected by noise and traffic.

The A-2 reservoir and A-2 STA would reduce the frequency of dry-downs within STA 2 and STA 3/4. Therefore, the proposed project features would improve wood stork foraging habitat within the STAs.

An overall anticipated regional trend toward restored water quality is expected to improve vegetative communities, water quality, and fish and wildlife habitat in WCA 2A and WCA 3A. It is anticipated that this improvement would likewise enhance wood stork foraging habitat and access to prey items in these areas. Wood storks typically forage in water depths of 18 inches or shallower.

Wood stork foraging and nesting habitat would improve on the project site. The STAs would have less potential to dry-down, thereby increasing the quality of wood stork foraging habitat. The water quality entering into WCA 2A and WCA 3A would meet water quality standards, thereby improving the vegetative communities and fish and wildlife habitat. In addition, any impacts to wetlands and waters of the U.S. would be offset. Therefore, the proposed project **may affect, but is not likely to adversely affect** the wood stork**.**

## 5.15 Florida Panther

Florida panther may utilize the project site. Panther telemetry data for 1981–2005 show panthers within the EAA, including areas directly adjacent to the project site and in STA 3/4, WCA 3A, and Holey Land Wildlife Management Area (USACE 2009). Panthers may hunt on the project site, but it is unlikely that they would use these areas for any extended length of time because of the lack of suitable long-term panther habitat. Panthers have not been observed on the project site; however, they have been documented to occur within 10 miles of the project.

Direct impacts, which are primarily habitat based, may include the permanent loss and fragmentation of panther habitat. Because the existing habitat quality is generally poor, as it is primarily composed of agricultural lands and exotic plant wetland communities, direct impacts to the panther associated with the permanent loss and fragmentation of habitat that supports panther prey is lessened by the fact that the sites are located adjacent to existing STAs and conservation lands.

The project has the potential to have an adverse effect on both the Primary and Secondary Zones for Florida panther habitat. Since potentially suitable habitat occurs within the action area, increased water deliveries to EPA could affect Florida panther habitat. **Direct impacts** to panthers from the construction of the A-2 reservoir and A-2 STA would likely occur from conversion of approximately 17,000 acres of agricultural habitat within the A-2 parcel and A-2 Expansion area that could be potentially used by Florida panther to transverse the area to wetland habitat, thereby eliminating potential habitat within the panther Secondary Zone in this region. Panthers would not be able to traverse through these lands or use them for hunting or resting after they are converted to a A-2 reservoir and A-2 STA. The A-2 reservoir and A-2 STA would reduce potential habitat for feral hogs and white-tailed deer in on the project site, two prey items for the panther. Although this habitat is currently not ideal for panther foraging, the conversion could decrease the hunting ability of the panther. The berms and levees will provide hunting habitat, and provide corridors for traveling.

The project has the potential to have adversely affect Florida panther habitat. Construction of the STA on the 4,551-acre A-2 Expansion area would result in conversion of upland habitat that could be potentially adverse to the Florida panther's ability to move between natural habitats.

**Indirect impacts** on panthers include increased traffic levels, increased noise disturbance and reduction in value of panther habitat adjacent to the project due to habitat fragmentation. In past years, several road kills have occurred on County Road 835/833 as a result of vehicles entering in and off the project boundaries (Figure 3-7).

Project construction will result in increased traffic consisting of heavy equipment and construction vehicles, and an increase in traffic traveling to and from the site. There is a risk that a panther may get struck by a vehicle. However, all vehicles would be required to adhere to the posted speed limits for off-road and improved-road travel. Impacts associated with construction traffic would be localized due to construction occurring in phases such that panthers can avoid the areas that are under construction. Additionally, all entrances to the project area would be secured with gates to control access. Noise levels also would be

localized as the different phases are under construction. The increase in noise levels is not expected to cause an unacceptable risk to the panther.

Slight changes to the hydrological conditions in WCA-2A and WCA 3A are anticipated, but these changes are not anticipated to impact the Florida panther.

The A-2 Expansion area of the project contains 25.1 acres of the Florida panther primary management zone, and 5.9 acres of the Florida panther secondary management zone. Additional primary and secondary habitat management zone areas abut the project site to the south and west (Figure 3-7). STA 2 is not located within the primary or secondary zones for Florida panther, nor is it within the consultation area. The southern portion of STA 3/4 is located within the secondary zone for the Florida panther, with the southern-most portion located within the primary zone. These STAs are currently operational. The cells are utilized as wetland systems, which is low quality foraging habitat for the panther. Operations of the STAs are not expected to change water levels that may alter hydrologic conditions which would affect the foraging habitat of the Florida panther. Therefore the continued operation of these STAs would not have an adverse indirect impact on the Florida panther.

All vehicles will be required to obey posted speed limits for off-road and improved-road travel. Impacts associated with construction traffic will be localized due to construction occurring in phases such that panthers can avoid the area under construction. Additionally, all entrances will be secured with gates to control access. Based on this information, and the fact that the Florida panther is a wide-ranging species with the majority of sightings west of the action area, the proposed action may have an adverse effect on the Florida panther. The project would convert upland habitat that could be potentially adverse to the Florida panther's ability to move between natural habitats. The project **may have an adverse effect** on the Florida panther.

## 5.16 West Indian Manatee

The West Indian manatee is found in freshwater, brackish water, and marine habitats, and feeds on submerged, emergent and floating vegetation (USFWS 2001). Boat strikes are a significant threat to the Florida population, as is the long-term availability of warm-water refuges.

The affected waterbodies are not accessible to the West Indian manatee, as manatee barriers have been placed to preclude their access to Everglades region canals from Lake Okeechobee at water control structures S-351, S-352 and S-354. These structures regulate the flow of water into the L-14 Canal (Hillsboro Canal) the L-20 Canal (North New River), the L-10 Canal (West Palm Beach Canal) and the L-25 Canal (Miami River), respectively.

Although West Indian manatees are unlikely to occur within the project area, the project is anticipated to have potential beneficial effects on their habitat. Reduction in high-volume flows from Lake Okeechobee to the Northern Estuaries would reduce stress to seagrass beds, thereby increasing foraging potential and provide minor benefits to habitat. Additionally, increasing flows to Florida Bay would improve salinity and reduce stress to seagrass beds, thereby increasing foraging potential and minor benefits to habitat. With the expectation of improved nearshore habitat and no utilization of the project area, the proposed project **may affect, but is not likely to adversely affect** the West Indian manatee. Overall, the proposed project is expected to have a **minor beneficial effect** to the West Indian manatee.

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# 6 CONSERVATION MEASURES

The following commitment is being made in association with the project:

- During construction, special provisions shall be implemented to protect eastern indigo snakes and Everglade snail kites (Appendix A);
- Mitigation would offset the loss of wetland function and values;
- Speed limits would be posted; and
- The District will provide Protected Species Training, Qualified Eastern Indigo Snake Observer Training, and Ground Nesting Bird Training to all staff accessing the project site prior to commencement of activities.

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# 7 CONCLUSIONS

The goals and objective of the CEPP PACR is to reduce damaging discharges to the Northern Estuaries and send additional flows south to the central Everglades. This should improve conditions for Everglade snail kite, wood stork, and other wading birds and their habitats in south Florida, while also striving to maintain nesting season requirements for the CSSS.

Temporary displacement of threatened and endangered species is expected during construction but is not expected to pose an unacceptable adverse impact. Although construction impacts may temporarily affect some of the listed species, the proposed project will not directly or adversely affect these species or the preferred nesting or foraging habitats of these species. In addition, the enhancement and restoration efforts associated with this project will result in a net benefit to the overall quality of the Northern Estuaries and the wetland and upland habitats within and adjacent to the project area. As a result, federally listed plant and animal species within the project area will benefit from the proposed project. Therefore, the proposed project:

- May affect, but is not likely to adversely affect deltoid spurge;
- May affect, but is not likely to adversely affect Garber's spurge;
- May affect, but is not likely to adversely affect Small's milkpea;
- May affect, but is not likely to adversely affect tiny polygala;
- May affect, but is not likely to adversely affect smalltooth sawfish, nor would it adversely modify its designated critical habitat;
- May affect, but is not likely to adversely affect American crocodile, nor would it adversely modify its designated critical habitat;
- May affect eastern indigo snake;
- May affect, but is not likely to adversely affect listed sea turtles;
- May affect, but is not likely to adversely affect northern crested caracara;
- May affect, but is not likely to adversely affect bald eagle;
- May affect, likely to adversely affect CSSS; however, it would not adversely modify its critical habitat;
- May affect, but is not likely to adversely affect Everglade snail kite, nor would it adversely modify its designated critical habitat;
- May affect, but is not likely to adversely affect red knot;
- May affect, but is not likely to adversely affect wood stork;
- May have an adverse effect on the Florida panther; and
- May affect, but is not likely to adversely affect West Indian manatee.

The federally listed threatened and endangered species that could potentially be impacted by the proposed project that are listed above and identified in Table 5-1. Additional information to support these determinations and on the effects of the proposed project can be found in Section 5 of the CEPP PACR FS/EIS.

The project would not affect the beach jacquemontia, Cape Sable thoroughwort, crenulate lead-plant, Florida prairie-clover, four-petal pawpaw, Johnson's seagrass or its designated

critical habitat, Okeechobee gourd, small's milkpea, Florida perforate cladonia, Bartram's hairstreak butterfly, Florida leafwing butterfly, Miami blue butterfly, Schaus swallowtail butterfly, Stock Island tree snail, Florida scrub-jay, ivory-billed woodpecker, Kirtland's warbler, piping plover, red-cockaded woodpecker, Florida bonneted bat, and southeastern beach mouse.

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# APPENDIX A-1

## STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE

**U.S. Fish and Wildlife Service**
**August 12, 2013**

**(The following information and additional information for protection of eastern indigo snake is available from the USFWS North Florida Ecological Services Office and online at: https://www.fws.gov/northflorida/indigosnakes/20130812_eastern_indigo_snake_standard_protection_measures.htm)**

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

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

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

### POSTER INFORMATION

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

**DESCRIPTION**: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

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

**LIFE HISTORY:** The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. 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 UNDER FEDERAL AND STATE LAW:** The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "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.

**IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:**

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

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

- Cease clearing activities and immediately notify supervisor or the 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.

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

**North Florida Field Office – (904) 731-3336**
**Panama City Field Office – (850) 769-0552**
**South Florida Field Office – (772) 562-3909**

**PRE-CONSTRUCTION ACTIVITIES**

1. The applicant or designated agent will post educational posters in the construction office and throughout the construction site, including any access roads. The posters must be clearly visible to all construction staff. A sample poster is attached.
2. Prior to the onset of construction activities, the applicant/designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational brochure including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office (a final brochure for Plan compliance, to be printed double-sided on 8.5” x 11” paper and then properly folded, is attached). Photos of eastern indigo snakes may be accessed on USFWS and/or FWC websites.
3. Construction staff will be informed that in the event that an eastern indigo snake (live or dead) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Field Office. The contact information for the USFWS is provided on the referenced posters and brochures.

**DURING CONSTRUCTION ACTIVITIES**

1. During initial site clearing activities, an onsite observer may be utilized to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).
2. If an eastern indigo snake is discovered during gopher tortoise relocation activities (i.e. burrow excavation), the USFWS shall be contacted within one business day to obtain further guidance which may result in further project consultation.
3. Periodically during construction activities, the applicant’s designated agent should visit the project area to observe the condition of the posters and Plan materials, and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.

**POST CONSTRUCTION ACTIVITIES**

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

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# APPENDIX A-2

## STANDARD PROTECTION MEASURES FOR THE EVERGLADE SNAIL KITE

The following guidelines and additional protection measures for Everglade snail kite are available from the USFWS South Florida Ecological Services Office and online at: https://www.fws.gov/verobeach/ListedSpeciesBirds.html#esk)

These guidelines were developed to help resource managers and other interested parties avoid detrimental impacts to endangered Everglade snail kites and their habitat, and to provide information that will allow managers to improve conditions for snail kites. Everglade snail kites are listed as endangered under Federal and Florida State laws. Any disturbance to snail kites or their nests, including flushing perched birds, interrupting foraging, flushing adults from nest sites, interfering with feeding and protection of nestling kites, and impacting vegetation that supports kite nests is prohibited. Adherence to these guidelines will minimize the likelihood that actions result in prohibited impacts to snail kites. If you see snail kites, we always recommend that you simply avoid the immediate area where kites are present. If in doubt about whether an activity may affect kites, please contact a U.S. Fish and Wildlife Service (Service) or Florida Fish and Wildlife Conservation Commission (FWC) office.

### MINIMIZING IMPACTS TO KITE NESTING DURING BREEDING SEASON

During each nesting season (generally December 1 to July 31, but including all periods when active nests are known), locations of all known snail kite nests will be provided to the Service from researchers and resource managers, and then distributed to appropriate agency representatives. Maps and coordinates of nest sites, kite protection buffers, and priority kite management zones will be distributed to established points of contact for agencies and organizations that conduct management actions in kite habitat. These points of contact will be responsible for disseminating the information to personnel working on the ground.

**Nest Protection Buffers**

Two buffer zones will be established around every active snail kite nest. This includes all nests reported to the Service by researchers and any unreported nest that is encountered during other activities. These buffer zones will be in effect from when kites begin nest building through the time when breeding activity is no longer observed at the site. Because kites can renest, and often renest in the same area as previous attempts, buffer zones may remain in place past the time when fledglings leave the area if adult kites continue to show breeding activity, including courtship, in the general area. Kites do not exhibit fidelity to a specific nest site from year to year. Consequently, all restrictions within these buffer zones will be lifted once breeding activity has ceased.

1. **No-entry Buffer Zones** - A 500-foot (ft) (~150 meter) radius no-entry buffer zone will be established around all active nests that are discovered. The purpose of this buffer zone is to protect kites from direct disturbance that may affect the fate of nesting.
   - Airboats, personnel, helicopters, and other equipment and activity must stay outside of these areas at all times when kite breeding activity is occurring.
   - These buffers are slightly larger than the estimate of 430 ft (131 m) recommended in a study of disturbance to birds from airboats (Rodgers and Schwikert 2003). This larger buffer was selected because the disturbance tested in their study does not

necessarily represent the types of activity that may occur during land management activities because they monitored the responses of perched birds and not nesting birds.

2. **Limited Activity Buffer Zones** - A 1,640 ft (500 meter) radius limited-activity buffer zone will be established around all active kite nests. This buffer zone is intended to maintain and protect foraging opportunities and habitat conditions around each nest to allow the nest to succeed. The goal is to maintain habitat conditions for the entire nesting period similar to those that were present when the birds selected the site.
   - Airboats, personnel, helicopters, and other equipment and activity should stay outside of this buffer when possible, and activity within the buffer should be limited to the minimum time necessary to complete appropriate management activities.
   - Only management activities that are expected to maintain or improve the existing kite foraging and nesting habitat within these areas should occur while there is evidence of kite breeding activity.
     - Exotic and invasive plant control efforts, including water hyacinth, water lettuce, and hydrilla, and similar invasive species that may rapidly encroach on native vegetation communities may be treated within limited-activity buffer zones during kite breeding, so long as treatments are not expected to result in impacts to vegetation species that contribute to snail kite and apple snail habitat. Treatments expected to result in changes > 10 percent in the cover or occurrence of native vegetation species including spike rushes, bulrushes, maidencane, and other emergent vegetation should be avoided.
     - Treatments of invasive and undesirable woody plants, cattails, tussocks, and other similar vegetation should not occur within these buffer zones during kite nesting. These treatments should be postponed until after kite breeding activity has ceased.
     - These buffer distances are intended to encompass the primary foraging area around a nest. The buffer distance is larger than the 820 ft (250 meter) radius recommended by Sykes (1987), and is a better representation of the area that kites use for foraging during nesting.

**Priority Kite Management Areas**

Snail kite nesting does not occur randomly within wetland systems. Instead, there are generally areas within wetlands, where kite nesting is concentrated. The density of kite nests, frequency of nesting within each area, and the sizes of these "priority kite nesting areas" are highly variable, but identifying these areas may help resource managers to focus management actions. In most years, the majority of kite nesting will occur within these areas, though new nesting areas may become active. At the end of each nesting season, primary kite nesting areas will be delineated based on the current year's nest locations and nesting in the previous 10 years.

- The polygons that delineate priority kite nesting areas, are 'kernels' that represent the 90 percent probability density function for kite nests over a 10-year period (1996-2005 in this case). These polygons were delineated under the assumption that the density of kite nests over the past 10 years indicates the likelihood of future kite nesting, and approximately 90 percent of the kite nesting, on average, will occur within these polygons if patterns of nest site selection continue as in the past.
- These areas will be provided to agency representatives soon after the end of the kite breeding season (July), and represent areas where resource management activities are likely to be limited due to kite nesting activity. Proposed management

actions should incorporate pre-treatment kite surveys, or avoid these areas during the early part of the following breeding season (from January 1 to May 31) when kites are selecting nesting sites. These also represent the areas where proactive management for snail kite foraging habitat may be most beneficial.

- This information will be provided (in most years) several months prior to the beginning of the kite breeding season to allow land managers to avoid impacts to kite nesting through early planning by timing proposed treatments in these areas to avoid critical periods for kites.
- The extent of these areas will generally not change dramatically from year-to-year.
- Management actions do not have to be excluded from these areas during the entire nesting season, but surveys for kite nesting activity should be conducted prior to working in these areas during the kite nesting season, and avoiding work in these areas during the breeding season is recommended whenever possible.
- There is good potential for kite nesting to occur outside of these areas, and resource managers should always look for evidence of snail kites and kite breeding activity prior to conducting management actions.

## MANAGING FOR SNAIL KITE HABITAT

Active management of wetlands to benefit snail kites has not been regularly conducted. However, there are several actions and considerations that resource managers can adopt that may benefit snail kites.

- Foraging habitat – maintaining Florida apple snail populations, and the vegetation types that support healthy Florida apple snail populations is critically important to maintaining snail kite habitat. Not all areas where there are abundant apple snails support snail kite nesting, but most of these areas provide foraging habitat for snail kites at some time.
    - Shallow wetlands with emergent vegetation such as spike rush, bulrush, and other native emergent wetland plant species provide good snail kite foraging habitat as long as the vegetation is not so dense that kites would have difficulty locating apple snails. The specific conditions and vegetation species that provide good snail kite foraging habitat vary depending on the specific conditions of each wetland (lake or marsh, variability in water depths, soil characteristics, etc.).
    - Control of exotic and invasive plant species such as water hyacinth and water lettuce may be necessary to maintain the open character of vegetation within kite foraging habitat.
    - Non-native species of apple snails may provide forage for snail kites. However, initial evidence suggests that these species are not consistent with maintaining sustainable wetland communities. Maintaining a healthy population of Florida's native apple snail, and working to control non-native snail species is a more sustainable management strategy.
- Nesting habitat – kites are not particularly discriminating about their nest sites, and they may nest in a wide variety of substrates and situations. However, kite nests are generally most successful in low woody species such as willow, buttonbush, pond apple, and other wetland shrubs that remain inundated for the entire nesting

period, and efforts to maintain or produce favorable nesting sites may help maintain kite nesting.

- Planting woody wetland species in areas that support snail kite foraging habitat and do not dry out completely during the kite breeding season may facilitate snail kite nesting and nest success. Any planted woody vegetation should be managed for long-term persistence.
- Nests that occur in dense cattails, bulrush, and other herbaceous species are more vulnerable to collapse than those in woody substrates.
- Potential nesting areas that dry out during the nesting period are vulnerable to landbased predators such as raccoons.
- Nesting areas are almost always located within areas of good foraging habitat.
- Invasive and exotic woody vegetation may be used by snail kites as nesting substrate, but these species are not components of sustainable snail kite habitat. Controlling invasive and exotic woody vegetation outside of snail kite nesting season, and replanting with native wetland woody plant species where needed will be a more effective long-term strategy for managing snail kite nesting habitat.

- Managing hydroperiod – Changes in water regimes and depth and duration of inundation are important characteristics for wetland vegetation that supports snail kite nesting and foraging habitat, Florida apple snails, and all aspects of snail kite and apple snail life history.
  - Continuous inundation and stabilized water levels for long periods will probably result in unfavorable vegetation conditions.
  - Long periods of drying (> 1-2 months) will detrimentally affect Florida apple snail populations, and reduce the likelihood of use by snail kites. However, occasional drying for shorter periods may be beneficial.
  - Rapid changes and large changes in the depth of water within wetlands have the potential to detrimentally affect kite nesting and apple snail populations.
    - Rapid and/or large drops in water level increase the risk of snail kite nest predation by drying out the substrate beneath nests and allowing landbased predators to access nests.
    - Rapid and/or large increases in water depth may detrimentally affect desirable vegetation, and can flood out Florida apple snail eggs, leading to reductions in apple snail populations and reduced snail kite foraging.

## COMMENTS, FEEDBACK, AND NEW INFORMATION

We always request feedback, new information, and recommendations for improving guidelines and snail kite management from resource managers and on-the-ground crews.

- We request that individuals report snail kite nesting activity outside of documented nesting areas.
- We welcome questions about managing snail kites, snail kite habitat, and apple snail populations.
- Additional information about snail kites and their habitat can be found at the Service's South Florida Ecological Services Office web site at: http://www.fws.gov/verobeach/index.htm

- Questions, comments, and inquiries can be directed to Tylan Dean by e-mailing: Tylan_Dean@fws.gov, or by calling (772) 562-3909, extension 284.

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