Appendix C

Biological Assessment for the Extension of Runway 14-32 and Connected Actions

C-1: Biological Assessment

C-2: Section 7 Consultation

C-1: Biological Assessment

Errata Note: The Biological Assessment (BA) identified a large stormwater feature (Surface Water (SW) 18) as wetland habitat. Based upon the prior binding jurisdictional determinations (figure below), and as codified in SFWMD Environmental Resource Permit No. 50-02617-S (issued March 14, 2011), these areas are considered “other surface waters” (OSWs) and not wetlands. This created an overstatement of wetland impacts in the BA which was corrected in the Draft EA. The wetland acreages in the Draft EA are correct.

EXHIBIT 3 APPLICATION 101116-7 Page 1 o

Biological Assessment for the Extension of Runway 14-32 and Connected Actions

North Palm Beach Country General Aviation Airport (F45)

December 2022

Prepared for
Palm Beach County, Department of Airports
846, Palm Beach International Airport
West Palm Beach, FL 33406

Federal Aviation Administration (FAA)
800 Independence Avenue, SW
Washington, DC 20591

By
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1.0 Introduction

This Biological Assessment (BA) is prepared in support of the Federal Aviation Administration (FAA)'s consultation with the United States Fish and Wildlife Service (FWS) for a Proposed Project to extend an existing runway at the North Palm Beach County General Aviation Airport (F45) in Northern Palm Beach County, Florida.

Section 7 of the federal Endangered Species Act (ESA) of 1973 directs federal agencies, in consultation with and with the assistance of the Secretary of the Interior FWS and/or National Marine Fisheries Service (NMFS), to ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat of such species. Section 7 applies to management of federal lands as well as other federal actions that would affect listed species such as federal approval of private activities through the issuance of federal permits, licenses, or other actions. The purpose of a BA is to evaluate the potential effects of the action on ESA listed and proposed species and designated and proposed critical habitat and determine whether any such species or habitat is likely to be adversely affected by the action.

F45 is classified as a Regional General Aviation Airport and is a designated reliever airport for Palm Beach International Airport (PBI) in Palm Beach County, Florida. This airport is situated between PBI, which is located 12 miles to the southeast, and Witham Field/Martin County Airport (SUA) located 20 miles to the north. F45 opened in 1994 to relieve PBI by accommodating general aviation small aircraft activity, allowing PBI to focus on commercial and larger general aviation business jets. F45 was also developed to address the growing aviation demand needs of northern Palm Beach County and southern Martin County region. This growth has since attracted increased jet aircraft operations into F45.

The three runways at F45 primarily support business and recreational general aviation, including turboprop and small turbine business aircraft, as well as air charter and taxi service, military operations, and emergency medical and law enforcement services. Runway 9R-27L is 4,300 feet long and 100 feet wide, Runway 14-32 is 4,300 feet long and 75 feet wide, and the turf Runway 9L-27R is 3,679 feet long and 75 feet wide. In addition to the three runways, airport facilities include a terminal, a large storage hangar, an aircraft maintenance hangar, and 176 individual aircraft storage hangars. Businesses located on the airport include a Fixed Base Operator (FBO), aircraft maintenance shop, and both fixed-wing and helicopter flight schools.

Palm Beach County (County), through its Department of Airports (PBC DOA), proposes to extend and widen Runway 14-32, improve the taxiway and airport access and service roads, and construct an Air Traffic Control Tower (ATCT). A more detailed description of the Proposed Project is provided in Section 1.3.

The specific federal actions that would be associated with the Proposed Project are as follows:

1. Unconditional approval of those portions of the F45 Airport Layout Plan that may depict components of the Proposed Project pursuant to 49 U.S.C. Sections 40103(b), 44718, and 47107(a)(16), and Title 14 CFR (Code of Federal Regulations) Part 77.
2. Determination of eligibility for federal assistance under the federal grant-in-aid program authorized by the Airport and Airway Improvement Act of 1982, as amended (49 U.S.C. § 47101, et. seq.).

3. Approval of further processing of an application for federal assistance for eligible components of the Proposed Project as shown on the Airport Layout Plan, using federal funds from the Airport Improvement Program.
4. Approval of modification to existing or new approach procedures.

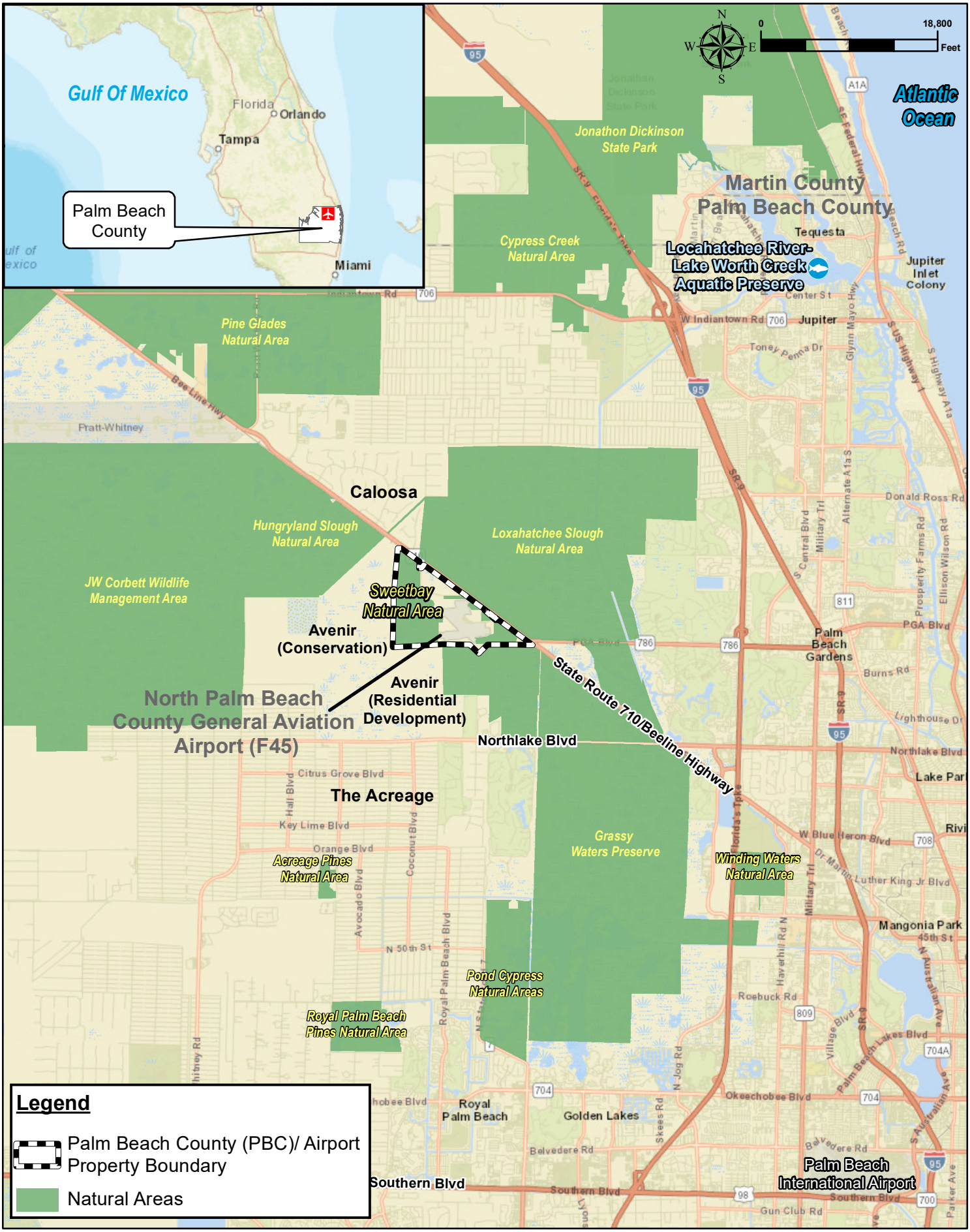
1.1 Project Site Location

The North Palm Beach County General Aviation Airport is located at 11600 Aviation Blvd, in West Palm Beach, Florida (**Figure 1**), southwest of State Road 710/Bee Line Highway and adjacent to Palm Beach County's Sweetbay Natural Area and the Loxahatchee Slough Natural Area. These natural areas consist of upland and wetland vegetative communities dedicated during the development of the airport for conservation purposes (**Figure 2**). Additionally, a portion of a new, mixed-use, and residential development (Avenir residential development) is currently under construction and located approximately 1.9 miles west and southwest from the airport. The Avenir residential development has conservation lands located adjacent to Sweetbay that, while privately owned, are protected under a conservation easement. Other natural areas in the vicinity of the airport are Grassy Waters Preserve, located approximately 4.3 miles southeast of the airport, J.W. Corbett Wildlife Management Area, located approximately 11 miles northwest of the airport, Pine Glades Natural Area, located approximately nine miles north of the airport, and Hungryland Slough Natural Area, located approximately 4.1 miles northwest of the airport. Existing residential developments, Caloosa and the Acreage, are located 2.4 miles north and 2.6 miles southwest of the Airport, respectively.

1.2 Purpose and Need for the Proposed Project

The purpose of the Proposed Project is to allow airport users to operate larger aircraft (including jets) with less operational restrictions currently imposed by runway length. While the current length of the airport's existing runway system is capable of supporting the smaller general aviation jet and turboprop fleet, various larger aircraft may incur operational restrictions imposed by inadequate runway length to reduce takeoff distance requirements by reducing aircraft weight. Pilots are occasionally required to reduce the number of passengers, the amount of payload, and/or the amount of fuel to depart from F45 under certain conditions. This practice creates inefficiencies.

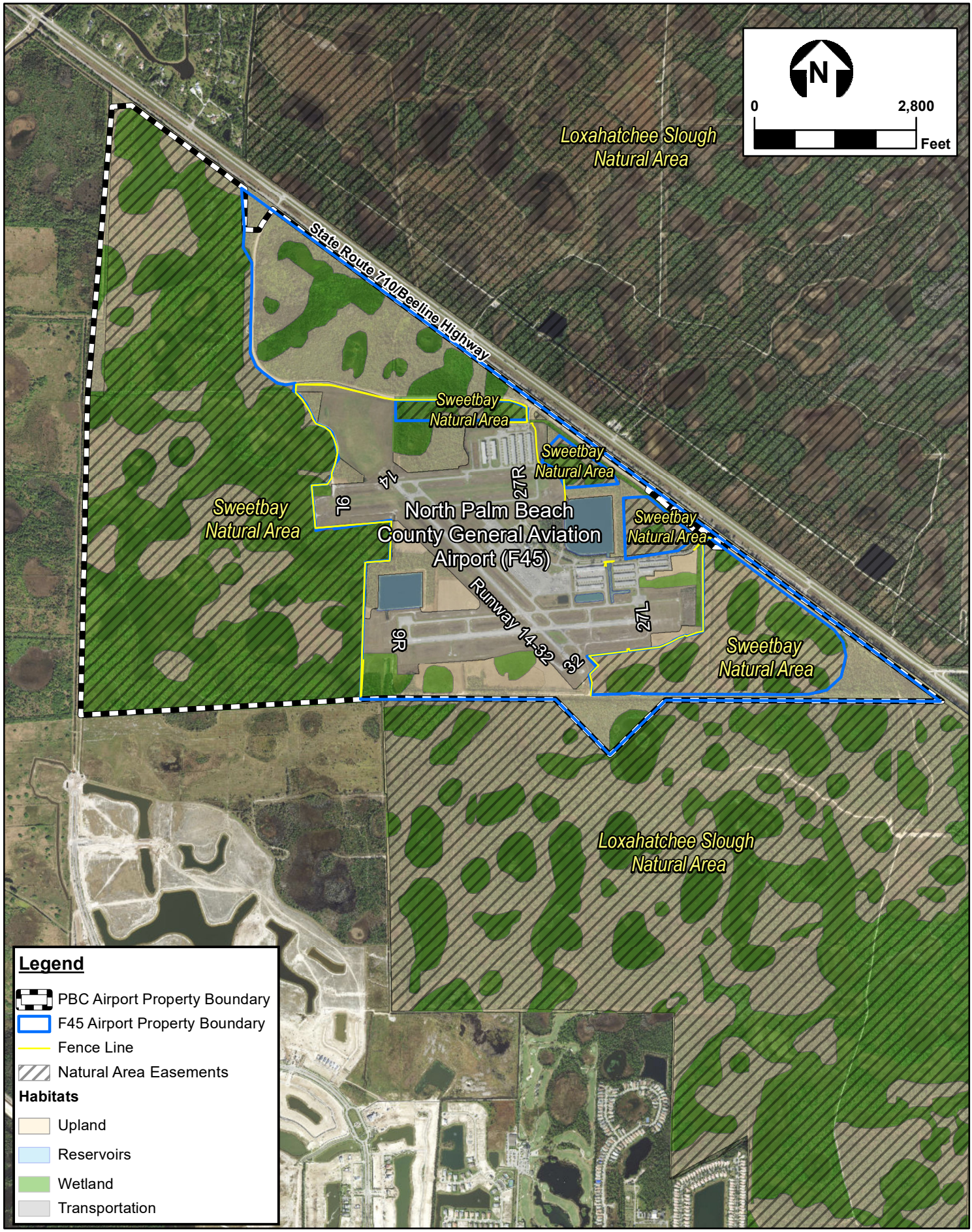
Planning efforts to allow the airport to better accommodate both the needs of existing users and larger corporate jet aircraft have been ongoing since the airport opened in 1994, and the F45 Airport Layout Plan has shown a future extension and improvements to Runway 14-32 since 2006. A Runway Extension Justification Study was prepared in 2018. This Study documents the types of aircraft using the airport and the issues, if any, that are associated with the lengths of the existing runways. Many of the current and potential users expressed the need for additional runway length to allow their aircraft to utilize F45, take on more passengers, and/or fuel when departing. The provision of a 6,000-foot runway supports the needs of existing users into the future and expands utility to a larger class aircraft. The 6,000-foot runway length provides reasonable operational capabilities between 60 and 90 percent of payload for 75 percent of the general aviation, business, and jet fleet, which is consistent with the needs of the users.



Source: FLMA, 2020

North Palm Beach County General Aviation Airport

Figure 1 - Airport Location Map



Source: SFWMD LCLU 2015, FLMA 2020

North Palm Beach County General Aviation Airport

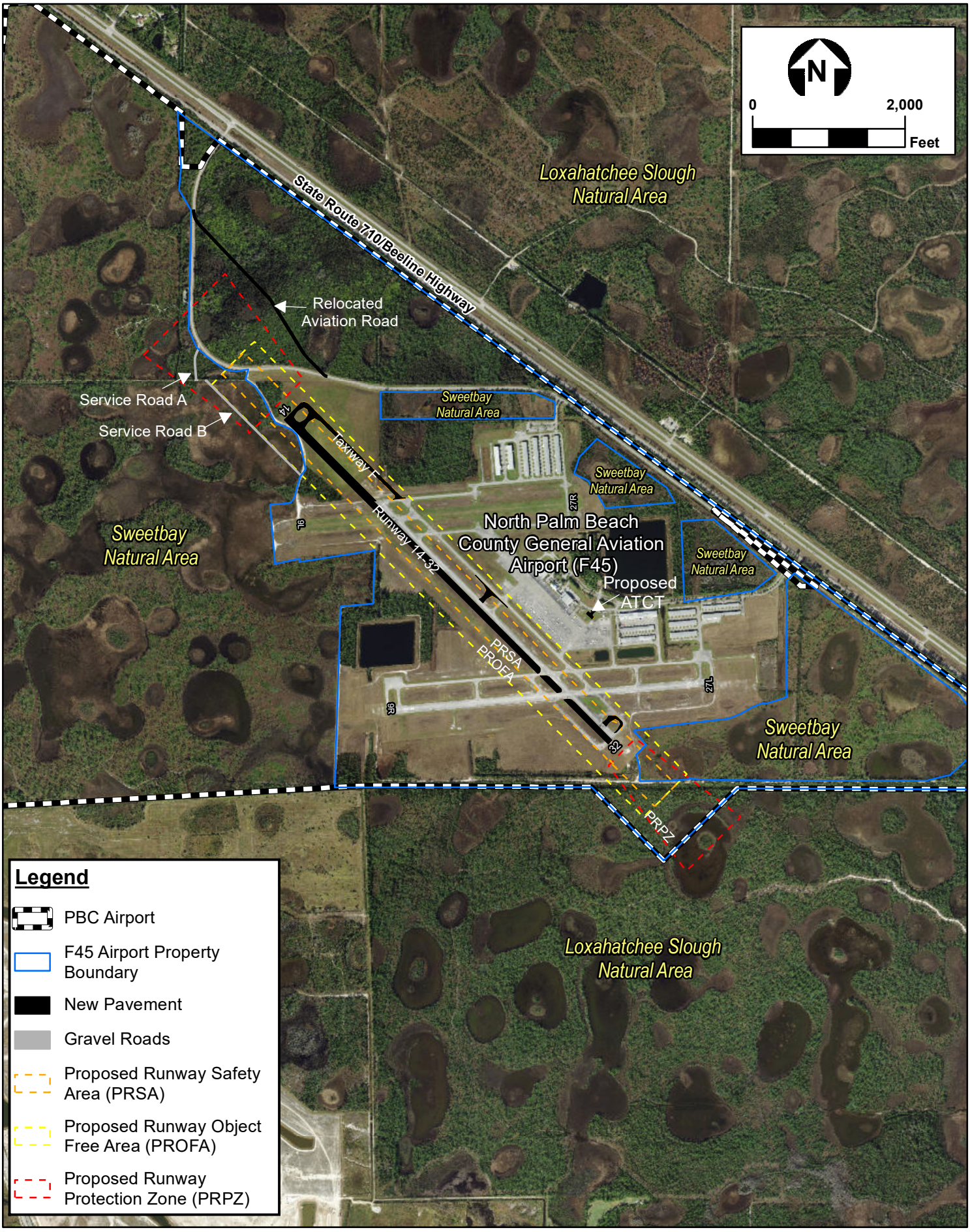
Figure 2 - Existing Site Layout

The Proposed Project is needed to better accommodate existing and prospective general aviation small airport users and to allow F45 to fully serve its intended role as a reliever airport to PBI; allowing PBI to focus on commercial and larger general aviation business jets. Improving the operational capabilities of F45 not only provides more direct access for many of the users traveling to or from northern Palm Beach County but improves the resilience of the growing region to significant events such as the major storms and other factors affecting the area. The 2006 F45 Master Plan and subsequent iterations have concluded that the proposed extension is a reasonable and economically realistic enhancement that does not duplicate facilities available within the Palm Beach County system of airports.

1.3 Description of the Proposed Project

The Proposed Project at F45 consists of the airfield and access improvements listed below (see **Figure 3**).

- Runway 14-32 improvements:
    - Shift Runway 14-32 approximately 60 feet to the southwest to provide 300 feet centerline separation from Taxiway F.
    - Extend Runway 14-32 to the northwest 1,700 feet to provide a new runway length of 6,000 feet.
    - Widen Runway 14-32 from its present width of 75 feet to 100 feet.
    - Remove sections of existing runway pavement.
    - Reconstruct, rehabilitate, and re-pave sections of remaining existing runway pavement to match the new sections of runway pavement.
- Culvert approximately 2,280 linear feet of the existing drainage ditch/canal located southeast of Runway 14-32.
- Extend parallel Taxiway F to the northwest 1,700 feet and construct a connector taxiway to the new Runway 14 threshold. Reconstruct, rehabilitate, and re-pave sections of existing Taxiway F pavement.
- Clear and grub trees and vegetation and remove objects within the proposed Runway 14-32 and Taxiway F Safety Areas. Cleared Runway Safety Area and Object Free Area will be graded, compacted, filled, and maintained in accordance with airport design standards. Clear or trim trees, vegetation, and objects that rise into all 14 CFR Part 77 imaginary surfaces (e.g., Threshold Siting Surface, Departure Surfaces, Approach/Transitional Surfaces, or Runway Object Free Area) and continuously maintain vegetation below a designated height that does not encroach into and obstruct these surfaces.
- Realign sections of Aviation Road out of the proposed Runway Protection Zone.
- To continue to facilitate airport and Sweetbay Preserve maintenance access requirements, single-lane, gravel service roads will be constructed to replace loss of service roads in the proposed Runway Protection Zone, Object Free Area, and Safety Area. Service roads will be designed, and final routes will be placed to avoid wetlands to the extent practicable and to minimize fragmentation.
- Construct a new Air Traffic Control Tower.
- Modify the existing airport stormwater management system to accommodate the Proposed Project.



Source: ESA

North Palm Beach County General Aviation Airport

Figure 3 - Proposed Project Components

Table 1 details the preliminary development schedule for the components of the Proposed Project. Assuming the Proposed Project is approved, permits issued, and adequate funding is available. Construction activities are anticipated to begin in 2024 and the project year opening would be 2026. Note that stormwater modifications will be implemented as designed in association with each individual, site-specific project element and thus are considered within each project element's timeline.

TABLE 1
CONCEPTUAL PROJECT SCHEDULE

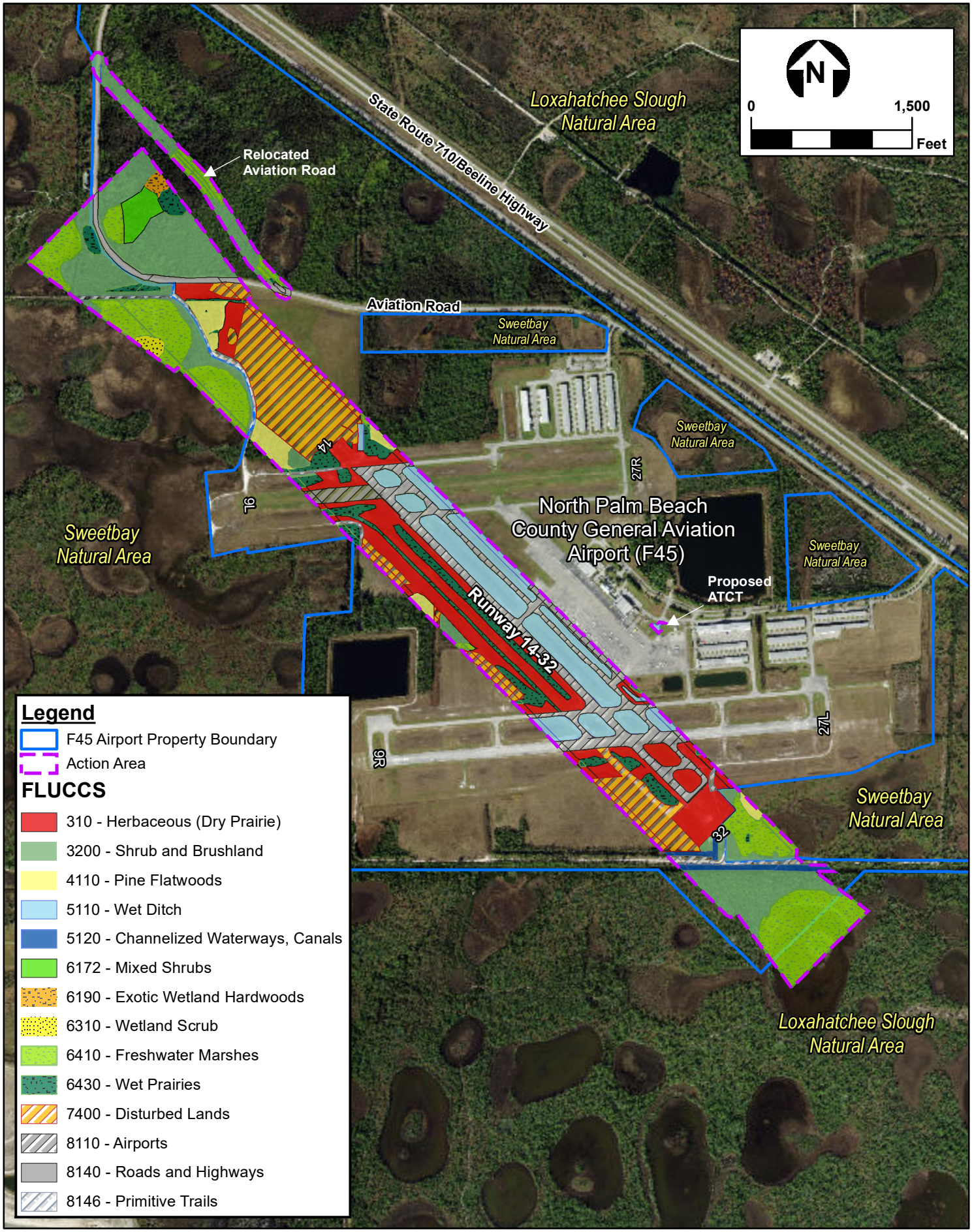
Project Element	Projected Initiation (year)	Anticipated Construction Duration	Construction Complete
Extend Runway 14 and Taxiway F			
Design	2024		
Construction	2024	18 months	2025
Realign Access Road			
Design	2024		
Construction	2024	4 months	2024
Construct Airport Traffic Control Tower			
Design	2024		
Construction	2024	22 months	2026
Construct Aircraft Parking Apron (if needed)			
Design	2024		
Construction	2024	9 months	2025

2.0 Identification of Project Action Area/Study Area

In general, the Action Area (see **Figure 4**) includes areas that will be directly and indirectly impacted by the Proposed Project, including the Proposed Runway Protection Zone and a 50-foot zone outside the proposed limit of construction. Direct impacts are those where construction and ground disturbance will occur and impacts are permanent, including the Runway shift and expansion, Proposed Runway Safety Area, Proposed Runway Object Free Area, culvert of the drainage ditch, relocation of Aviation Road, and construction of Service Roads A and B. Indirect impacts are temporary in nature and the habitat function will be reduced. Indirect impacts for the project include tree trimming and maintenance areas and include the Proposed Runway Protection Zone and a 50-foot buffer around the direct impact areas. All direct and indirect impacts are included in the Action Area. The Study Area (see **Figure 5**) encompasses the Action Area and extends one mile from the existing airport, which includes all pertinent species buffers. Per a Technical Data Collection Meeting with FWS on September 2, 2021, FWS' species review will focus on those areas directly impacted by the Preferred Alternative. See **Appendix A** for a summary of that meeting.

3.0 Existing Environment

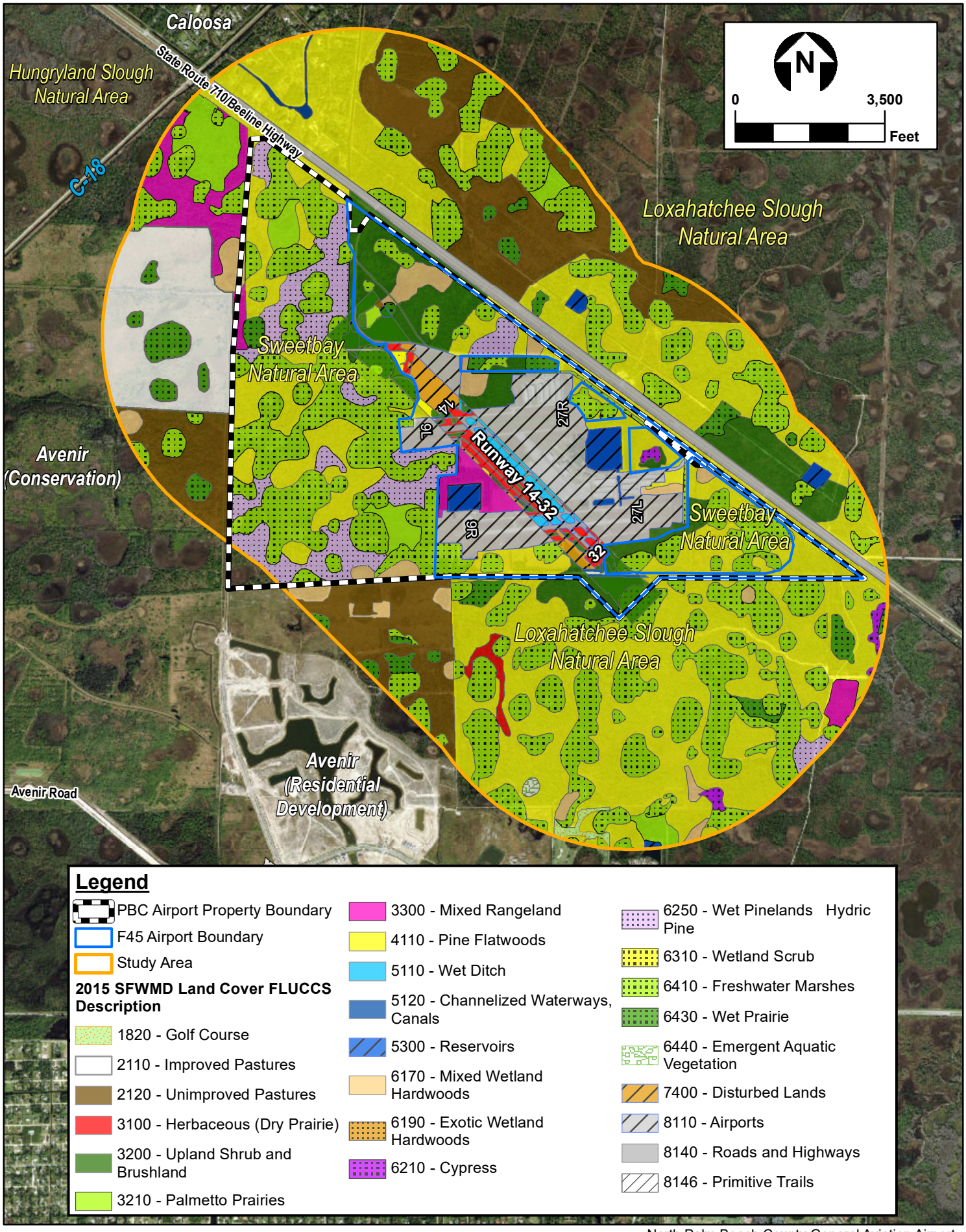
The F45 Airport opened in 1994. The active airport encompasses approximately 738 acres with the remaining 1,094 acres onsite dedicated to environmental preserves (Sweetbay Natural Area) (see **Figure 2** previously mentioned).



Source: ESA, CECOS Field Reviews, 2020

North Palm Beach County General Aviation Airport

Figure 4 - Action Area/ Habitat Map



Source: ESA, CECOS Field Review, 2020 and SFWMD LCLU, 2015

North Palm Beach County General Aviation Airport

Figure 5 - Study Area/Habitat Map

3.1 Conservation Areas

Two (2) publicly owned natural areas are present within and adjacent to the Action Area. Palm Beach County's Sweetbay and Loxahatchee Slough Natural Areas are located adjacent to the airport and portions of each are contained within both the Action and Study Areas. Additionally, a portion of a new mixed use and residential development (Avenir) is currently under construction (SFWMD permit number 50-11383-P) and located west and southwest of the airport's property boundary. This private development has conservation lands located adjacent to Sweetbay that, while privately-owned, are protected under conservation easement. Sweetbay and Loxahatchee Slough consist of co-mingled natural uplands and wetlands. Sweetbay Natural Area consists of 1,094 acres and Loxahatchee Natural Area consists of 12,957 acres; for a total of 14,051 acres of existing natural uplands and wetlands under public ownership and dedicated for conservation purposes. Approximately 34.6 acres of Sweetbay and 6.6 acres of Loxahatchee Slough are located within the Action Area. Other natural areas in the vicinity of the airport but outside the Action Area are Grassy Waters Preserve (City of West Palm Beach) to the southeast and Hungryland Slough Natural Area to the northwest (Palm Beach County).

3.2 Survey Methodology

Reviews of publicly available resources, including environmental resources management plans, aerial photographs, local soil survey, prior studies, and observed site conditions were conducted to characterize the biological resources within the Action and Study Areas. The following resources were reviewed as part of this literature review:

- FWS Information for Planning and Consultation (IPaC) database,
- Environmental Conservation Online System (ECOS),
- FWS South Florida Ecological Field Office South Florida Listed Species & Consultation Areas,
- FWS Critical Habitat Mapper,
- FWS NWI Mapper,
- FWS Wetland Mapper
- Florida Natural Areas Inventory (FNAI) Biodiversity Matrix, FNAI Florida Conservation Lands Mapper,
- Natural Resource Conservation Service's (NRCS) Web Soil Survey.
- Florida Fish and Wildlife Conservation Commission (FWC) Bald Eagle Nest Locator, and
- Florida Department of Agriculture and Consumer Services (FDACS) Endangered, Threatened and Commercially Exploited Plants of Florida.

To identify overall wetland habitats and surface waters within the Action Area, the FWS' National Wetlands Inventory (NWI) database and the SFWMD Land Cover Land Use (LCLU, 2014-2015) database were reviewed prior to initiating fieldwork. The FWS NWI database is a federal resource that provides information on the abundance, characteristics, and distribution of wetlands and surface waters within the US. The SFWMD Land Cover Land Use (2014, 2015) database provides documentation of land cover and land use within SFWMD's coverage area. Habitats were described using the (FDOT) Florida Land Use, Cover, and Forms Classification System (FLUCCS), dated 1999 and wetland habitats were also described using the FWS Classification of Wetlands and Deepwater Habitats of the United States. Soil types within the Action Area were identified using data from the Natural Resource Conservation Service (NRCS) Web Soil Survey.

Those areas within the Action Area subject to ground disturbance (direct effects) including the Runway shift and expansion, Proposed Runway Safety Area, Proposed Runway Object Free Area, culvert of the drainage ditch, relocation of Aviation Road, and construction of Service Roads A and B were surveyed via pedestrian transects and visual observations recorded. Field review dates were May 28, 2020, June 2, 2020, June 16, 2020, July 1, 2020, July 8, 2020, and July 9, 2020. Land cover and habitats within the Action Area subject to indirect impacts (e.g., noise, air emissions, stormwater runoff, for example) including areas approximately 50-feet outside the Proposed Runway Object Free Area, Aviation Road relocation, Service Roads, and the entire Proposed Runway Protection Zone by construction and/or operation were evaluated using a combination of aerial imagery, literature review, and ground-truthing. It should be noted that indirect impacts associated with the Runway/Proposed Runway Safety Area are encompassed by the direct impacts associated with the Proposed Runway Object Free Area. Therefore, this area was assessed based on direct impacts resulting from the Proposed Object Free Area. All areas within the Study/Action Areas were assigned a FLUCCS code, reflecting their existing land use / vegetative cover, and mapped accordingly. The location and acreage of each vegetative community within the Action Area were determined using a combination of GPS location coordinate collection for habitat boundaries observed in the field (typically used for wetlands), as well as marking boundaries on aerial photographs (typically used for uplands). The methods for determining the potential occurrence of listed species were based on the results of the desktop review, observations in the field of, and within, those habitats typically associated with those listed species with a likelihood of occurrence within the Action Area and Study Area.

3.3 Habitat Types

Vegetative reviews of the Action Area were conducted during field reviews and vegetative cover typically defined by the dominant plant species composition. As previously stated, upland, wetland, and other surface water habitat types within the Action Area were identified using the FDOT FLUCCS, 1999 as modified by SFWMD (see **Table 2)**. See **Figure 4** for the existing land cover and vegetative FLUCCS communities associated with the Action Area and further described below. Additional habitats were identified within the Study Area using SFWMD FLUCCS maps (see **Figure 5**).

Upland Habitat Descriptions

Herbaceous Dry Prairie (FLUCCS 3100) – Identified within the Action Area surrounding the runways. These communities consist of upland prairie grasses which occur on non-hydric soils but may occasionally be inundated by water. Herbaceous dry prairies are generally treeless with a variety of vegetation types dominated by grasses, sedges, and other herbs with some saw palmetto (*Serenoa repens*) present. Dominant vegetation observed during the field reviews consisted of Bermuda grass (*Cynodon dactylon*), love vine (*Cassytha filiformis*), as well as other species such as Baldwin's milkwort (*Polygala balduinii*), Leavensworth tickseed (*Coreopsis leavenworthii*), and shrubby false buttonweed (*Spermacoce verticillata*). These areas were likely created during construction of the airport and mostly located adjacent to the existing runways outside the runway drainage swales.

Table 2 – EXISTING LAND COVER AND VEGETATIVE COMMUNITIES WITHIN THE ACTION AREA

Vegetative Community/Land Cover	FLUCCS Classification Code	Overall Acreage Within the Action Area
Upland Communities		
Herbaceous Dry Prairie	3100	35.72
Upland Shrub and Brushland	3200	42.54
Pine Flatwoods	4110	5.89
Disturbed Land & Transportation		
Disturbed Land	7400	31.50
Airports	8110	21.72
Roads and Highways	8140	2.61
Primitive Trails	8146	4.49
Wetland Communities		
Exotic Wetland Hardwoods	6190	0.71
Wetland Scrub	6310	0.83
Freshwater Marsh	6410	36.53
Wet Prairie	6430	15.60
Other Surface Waters		
Swale/Wet Ditch	5110	23.51
Channelized Waterways, Canals	5120	2.55
Total Acreage:		224.20

SOURCE: CECOS 2020 field reviews; SFWMD, LULC 2014-2015; FDOT FLUCCS, 1999

Upland Shrub and Brushland (FLUCCS 3200) – Identified surrounding the Action Area and to the southeast within the Loxahatchee Slough Natural Area. Dominant vegetation observed during the 2020 field reviews consisted of saw palmetto and cocoplum (*Chrysobalanus icaco*), mixed with other woody species such as pond apple (*Annona glabra*), coastal plain willow (*Salix caroliniana*), wax myrtle (*Myrica cerifera*), Brazilian pepper (*Schinus terebinthifolia*), and a variety of grasses.

This community was also identified between Aviation Road and State Road 710/Beeline Highway. Large areas within this habitat were completely dominated by non-native, highly invasive, Old World climbing fern (*Lygodium microphyllum*). Old World climbing fern is known to dominate habitats by forming dense horizontal canopies that smother underlying native species. Other species observed included: muscadine grape (*Vitis rotundifolia*), cocoplum, saw palmetto, slash pine (*Pinus elliottii*), coastal plain willow, and melaleuca (*Melaleuca quinquenervia*).

Pine Flatwoods (FLUCCS 4110) – Identified within the Action Area on the northwest and southeast portions, and south of Aviation Road, within the Sweetbay Natural Area. This habitat is also adjacent, south of the airport, within the Loxahatchee Slough Natural Area. Dominant vegetation observed during the 2020 field reviews consisted of slash pine with understory species such as saw palmetto, cocoplum, wax myrtle, Brazilian pepper, muscadine grape, swamp fern (*Blechnum serrulatum*), and myrsine.

Disturbed Land/Transportation Descriptions

Disturbed Land/Fill Areas (FLUCCS 7400) – Identified within the Action Area as undeveloped areas that were altered due to human activities. For example, those areas associated with the wildlife hazard mitigation areas south of Aviation Road and southwest of Runway 14-32 fall into this category. The area in the northern portion of the airport property, south of Turf Runway 9L-27R and east of Runway 14-32 was also identified as disturbed land due to field observations of newly planted grass and fill material. Additionally, in the southern portion of the airport property, north of Loxahatchee Slough Natural Area, a disturbed area is located south of Paved Runway 9L-27R and west of Runway 14-32. These areas were previously filled to minimize wildlife habitat in close proximity to the runway and support airport operations. These areas currently support upland grasses and shrubs as well as occurrences of freshwater wetland plants pioneering into lower filled areas. Note that as part of the wildlife habitat mitigation project, the Palm Beach County Department of Airports permitted impacts through the USACE [Permit No. SAJ-1991-00402 (IP-EGR)] and SFWMD (Permit No. 50-02617-S) and then mitigated those impacts to historical wetlands.

Transportation – Airport (FLUCCS 8110) – The active airfield and supporting structures associated with F45 within the Action Area. Onsite areas associated with this FLUCCS code were indicative of an industrial area with very little natural vegetative community available.

Roads and Highways (FLUCCS 8140) – Paved/concrete access roads within the Action Area. This classification includes the current location of Aviation Road.

Primitive Trails (FLUCCS 8146) – Any non-paved, lime rock/dirt access roads or embankments within the Action Area. Includes various maintenance/access roads.

Wetland Habitat Descriptions

Exotic Wetland Hardwoods (FLUCCS 6190, PEM1C-Palustrine/Emergent/Persistent/Seasonally Flooded) – This wetland community is dominated by melaleuca and is located along the proposed relocation of Aviation Road within the Action Area. This habitat is hydrologically connected to mixed wetland shrub and freshwater marsh habitats.

Wetland Scrub (FLUCCS 6310, PEM1C-Palustrine/Emergent/Persistent/Seasonally Flooded) – This community is located within Sweetbay Natural Area, and the Action Area south of Aviation Road as well as on the airport's south end. It consists of depressional wetlands with poorly drained soil dominated by wetland tolerant woody vegetation and characterized, in some locations, by a variety of woody vegetation less than 20 feet in height. Dominant vegetation observed during the 2020 field reviews consisted of wax myrtle, cocoplum, St. John's wort (*Hypericum* spp.), marsh fleabane (*Pluchea odorata*), spadeleaf (*Centella* spp.), buttonbush (*Cephalanthus occidentalis*), duck potato (*Sagittaria latifolia*), and sapling slash pine. Some areas within this habitat type, located along the proposed roadway, were dominated by the invasive, exotic Old World climbing fern. Additional areas within the Loxahatchee Slough Natural Area adjacent to the southeast side of the airport were also identified as this wetland type.

Freshwater Marsh (FLUCCS 6410, PEM1C-Palustrine/Emergent/Persistent/Seasonally Flooded) – This community is similar to a wet prairie but typically has greater water depth and duration of inundation, which typically results in an increase in obligate wetland species. Freshwater marsh communities were observed in multiple locations within the Action Area and the adjacent Sweetbay and Loxahatchee Slough Natural Areas. Dominant vegetation observed during the 2020 field reviews consisted of spike rush (*Eleocharis cellulosa),* duck potato, pickerelweed (*Pontederia cordata*), spatterdock (*Nuphar advena*), spadeleaf, and marsh fleabane, with other species such as sawgrass (*Cladium jamaicense*), thistle (*Cirsium*

horridulum), dogfennel (*Eupatorium capillifolium*), broom sedge (*Andropogon virginicus*), swamp lily (*Crinum americanum*) and wax myrtle.

Wet Prairie (FLUCCS 6430, PEM1C-Palustrine/Emergent/Persistent/Seasonally Flooded PEM1C) – This community consists of predominantly grassy vegetation on hydric soils and is different from marshes as it typically has less standing water, shorter herbaceous vegetation, and shorter hydroperiods. This wetland type is located in the Action Area. Dominant vegetation observed during the 2020 field reviews consisted of St. John's wort, spadeleaf, marsh fleabane, with other species such as spike rush, marsh pink (*Sabatia stellaris*), white-top sedge (*Rhynchospora colorata* sedge (*Carex* spp.), shrubby false buttonweed (*Spermacoce verticillata*), pineland heliotrope (*Euploca polyphylla*), lemon bacopa (*Bacopa caroliniana*), panic grasses (*Panicum* spp.), yellow-eyed grass (*Xyris* spp.) and skyflower (*Hydrolea corymbosa*).

Other Surface Waters

Swale/Ditches (FLUCCS 5110, FWS N/A) – Various swales exist adjacent to the runway and taxiways within the Action Area and along Aviation Road. These swales/ditches convey stormwater runoff from the runways and road and are part of the surface water management system. Sporadic wetland vegetation, particularly torpedo grass, was observed within these ditches.

Channelized Waterways (FLUCCS 5120, R2UBHx – Riverine/Lower Perennial/Unconsolidated Bottom/Permanently Flooded/Excavated) – Several canals and ditches were identified throughout the site. These conveyances differ from the swales/wet ditches in that standing water was typically observed. These areas also exhibited steeper side slopes than swales, further supporting their use for water conveyance. Vegetation consists of giant leather fern (*Acrostichum danaeifolium*), coastal plain willow (*Salix caroliniana*), spike rush, cattail (*Typha*, spp.), duck potato, spatterdock, and marsh pennywort (*Hydrocotyle umbellata*).

4.0 Habitat Impacts

Approximately 79.91 acres of upland habitat (herbaceous dry prairie, upland shrub and brushland, pine flatwoods, and disturbed land) with the potential for use as habitat by those species listed above will be directly impacted and 36.21 acres will be indirectly impacted. It should be noted that the majority of these directly impacted uplands are located inside the Action Area with a portion surrounded by a perimeter fence, limiting wildlife ingress and egress. Approximately 53.63 acres of wetlands (exotic wetland hardwoods, wetland scrub, freshwater marsh, and wet prairie) are anticipated to be impacted, which consists of 25.51 acres of direct impact and 28.12 acres of indirect impact. Note that wetlands indirectly impacted will remain post-project; whereas directly impacted wetlands will be lost and mitigated by PBC DOA per regulatory requirements. Direct and indirect impacts associated with the Preferred Alternative are summarized in **Table 3** and shown on **Figure 6**. Direct impacts are those where construction and ground disturbance will occur and impacts are permanent, including the Runway shift and expansion, Proposed Runway Safety Area, Proposed Runway Object Free Area, culvert of the drainage ditch, relocation of Aviation Road, and construction of Service Roads A and B. Indirect impacts are temporary in nature and the habitat function will be reduced. Indirect impacts for the project include tree trimming and maintenance areas and include the Proposed Runway Protection Zone and a 50-foot buffer around the direct impact areas.

Table 3 – DIRECT AND INDIRECT IMPACTS WITHIN THE ACTION AREA

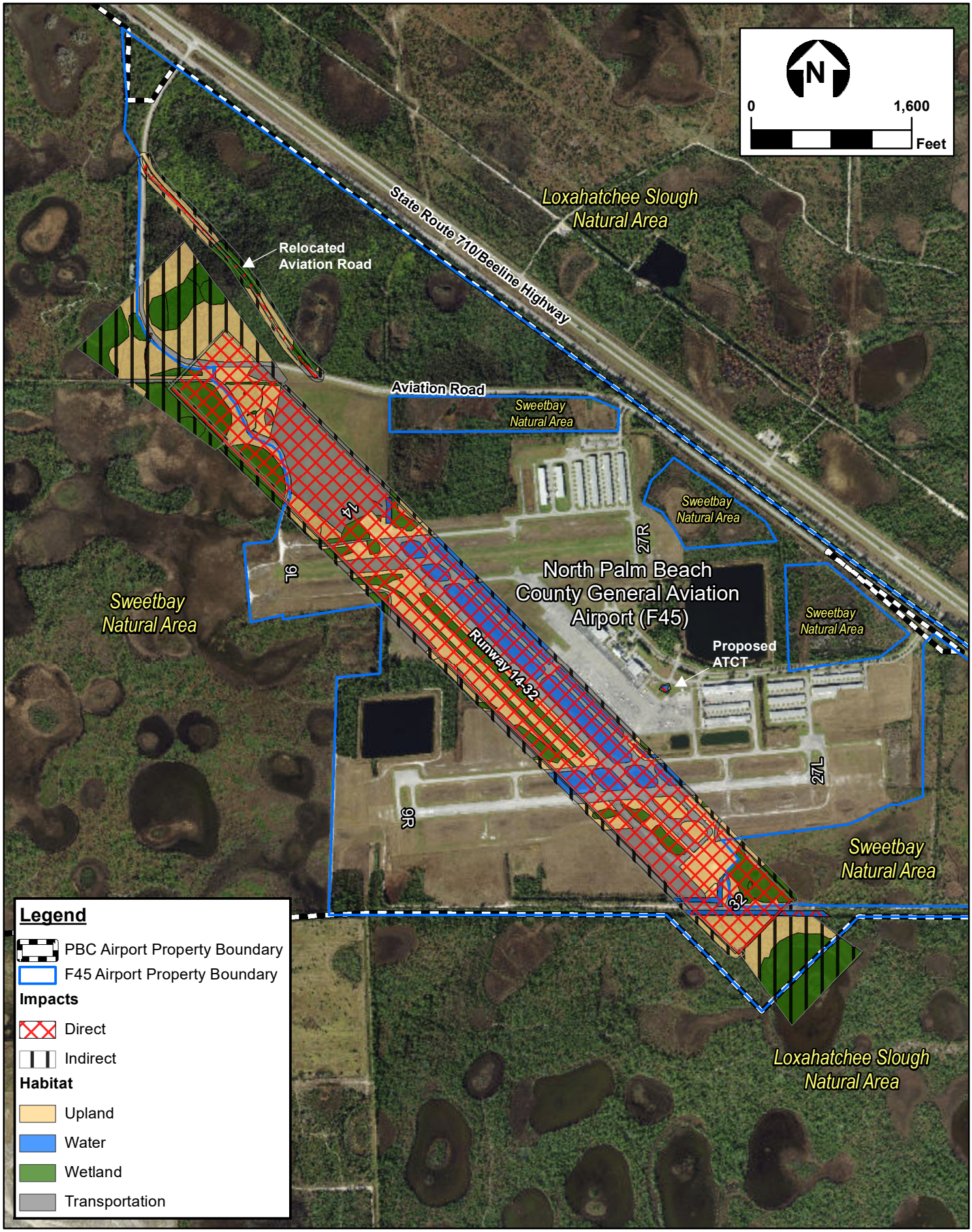
Vegetative Community/Land Cover	FLUCCS Classification Code	Direct Impact	Indirect Impact*
Upland Communities			
Herbaceous Dry Prairie	3100	34.09	1.63
Upland Shrub and Brushland	3200	14.50	28.49
Pine Flatwoods	4110	4.34	1.56
Total: Upland Communities		**52.93**	**31.68**
Disturbed Land & Transportation			
Disturbed Land	7400	26.98	4.53
Airports	8110	19.84	1.87
Roads and Highways	8140	0.92	1.69
Primitive Trails	8146	3.54	0.95
Total: Disturbed Land & Transportation		**51.28**	**9.04**
Wetland Communities			
Exotic Wetland Hardwoods	6190	0.00	0.71
Wetland Scrub	6310	0.07	0.76
Freshwater Marsh	6410	12.91	23.63
Wet Prairie	6430	12.53	3.02
Total: Wetland Communities		**25.51**	**28.12**
Other Surface Waters			
Swale/Wet Ditch	5110	21.28	2.23
Channelized Waterways, Canals	5120	2.53	0.02
Total: Other Surface Waters		**23.81**	**2.25**

SOURCE: CECOS 2020 field reviews; SFWMD, LULC 2014-2015; FDOT FLUCCS, 1999

*Indirect impacts assumed in the PRPZ and within a 50-ft. zone outside the POFA, Aviation Road, and Service Roads.

5.0 Species Considered

This section considers species protected under the ESA and federal candidate species with the potential to occur within the Proposed Action Area. A desktop review of available information was conducted to develop an understanding of the potential for occurrence of listed species within the Action Area which was then coupled with field reviews of the Action Area. The desktop review included information from resource management plans, surveys and other technical documents containing information on locations and the types of biological resources having potential to exist within the Action Area.



North Palm Beach County General Aviation Airport

Source: ESA, CECOS Field Reviews, 2020

Figure 6 - Direct/Indirect Habitat Impacts

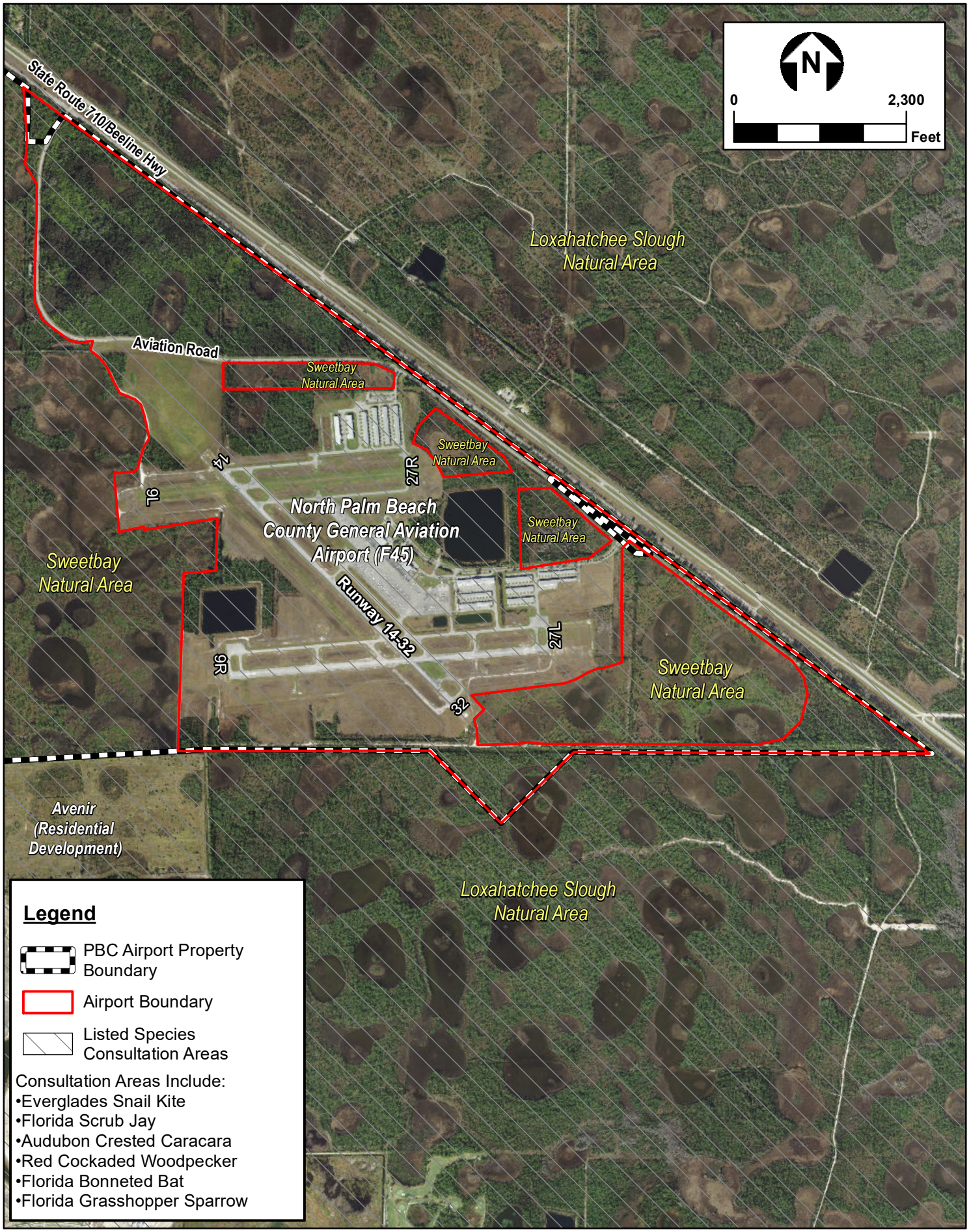
From this review, habitats for federally listed and candidate species, as well as designated and/or proposed critical habitat, with the potential to occur in the Action Area were field verified during the site assessments coupled with SFWMD FLUCCS maps (**Figures 4 & 5**). Those federally listed species that could occur, based on the amount and quality of habitat type available, are listed in **Table 2**. Each species was then assigned a potential for occurrence based on quality of suitable habitat, their ranges, and known occurrences or direct observations within the Action Area. A designation of "none, low, moderate, or high" likelihood of occurrence within the Action Area are based on the following criteria:

- **None** – The Action Area is outside the species' known range, or the area is within the species' known range, but no suitable habitat for, or previous documentation of, this species occurs within the Action Area. Also, the species and/or its habitat were not observed during field reviews.
- **Low** – The Action Area is located within the species' known range and minimal/marginal quality habitat is present within or adjacent to the area. However, there are no documented occurrences of the species in the vicinity of the Action Area, and it was not observed during field reviews.
- **Moderate** – The Action Area is within the species' range and suitable habitat exists; but there are no known occurrences of the species, and it was not observed during field reviews.
- **High** – The Action Area is within the species' known range, suitable habitat exists within the areas of interest, there is a minimum of one documented occurrence of the species, and/or the species was observed during field reviews.

The Action Area falls within FWS Consultation Areas for the Florida bonneted bat, Everglade snail kite, Florida scrub-jay, Audubon's crested caracara, Florida grasshopper sparrow, and red-cockaded woodpecker (see **Figure 7**). No active wood stork colonies exist within the Action Area; however, the area falls within the Core Foraging Area (CFA) of two active wood stork colonies (see **Figure 8**). Per the FWS IPaC database, no designated FWS Critical Habitat occurs within the Action Area.

Based on the existing site conditions, species-specific habitat requirements, desktop review, and multiple field reviews, it was found that the Action Area may support 13 federally-listed species: American alligator, eastern indigo snake, Audubon's crested caracara, Florida grasshopper sparrow, Florida scrub-jay, Ivory-billed woodpecker, Everglade snail kite, red-cockaded woodpecker, wood stork, Florida bonneted bat, Florida panther, Bartram's scrub-hairstreak butterfly, and Florida leafwing butterfly. Additionally, the Action Area may support one federal candidate species: the gopher tortoise.

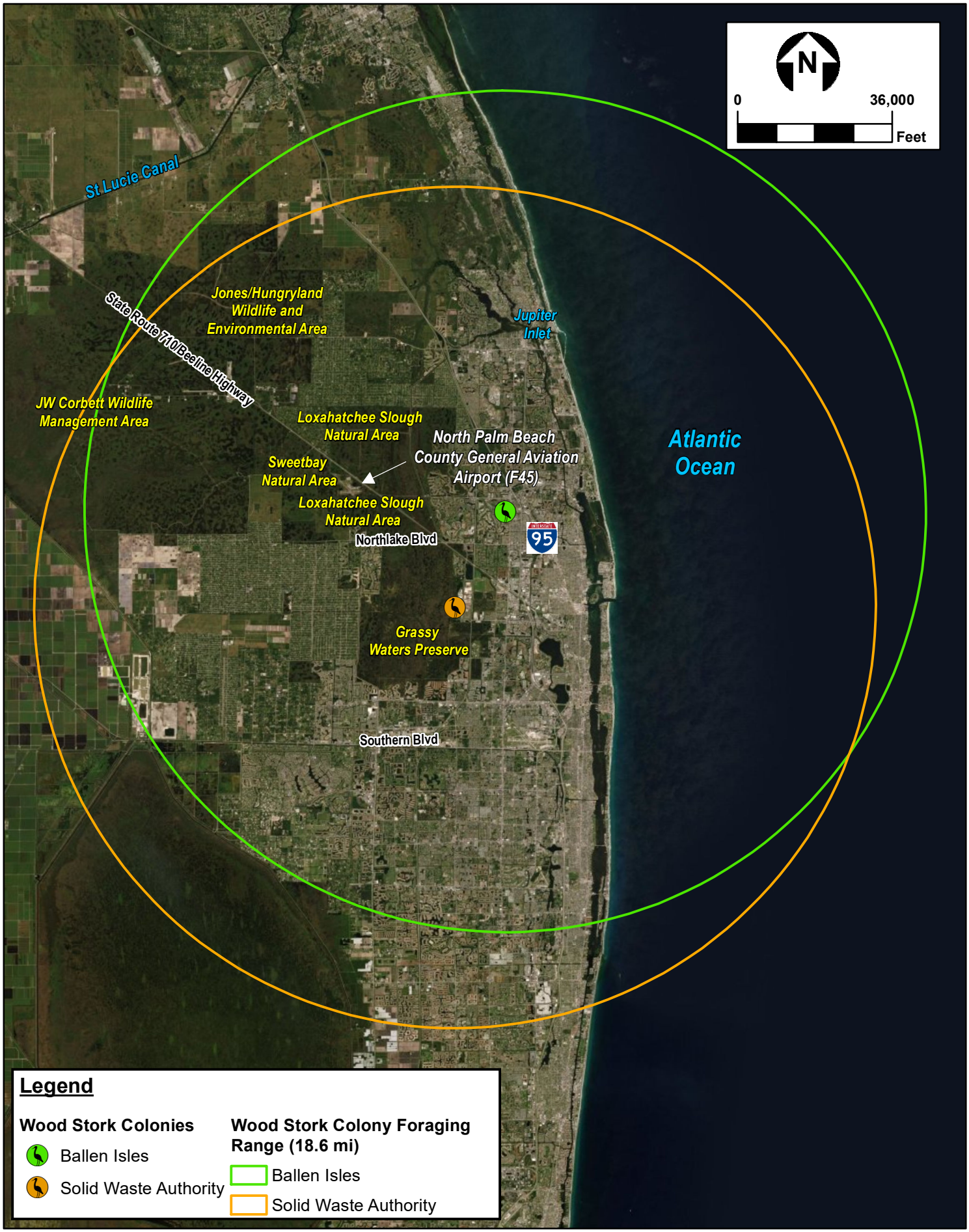
A discussion of occurrence for each of the 13 federally listed species and one candidate species are provided in **Table 4**. Note that species listed as federally endangered or threatened are also listed by the State of Florida as endangered or threatened. Species listed as having no potential for occurrence are not carried forward for further review/discussion. See **Table 3** for acreages of direct and indirect impacts per habitat type within the Action Area and **Table 2** for acreages of habitats per type reported within the overall Action Area.



Source: USFWS 2020

North Palm Beach County General Aviation Airport

Figure 7- Species Consultation Areas



Source: USFWS 2019

North Palm Beach County General Aviation Airport

Figure 8 – Wood Stork Core Foraging Areas

Table 4 - FEDERALLY LISTED SPECIES POTENTIALLY OCCURRING WITHIN THE ACTION AREA

Common Name	Scientific Name	Federal Listing	Potential Occurrence within Action Area	Rationale for Likelihood of Occurrence
Reptiles				
American alligator	*Alligator mississipiensis*	FT(S/A)	**High**	Listed due to resemblance to the American crocodile where their ranges overlap, which does not occur at the airport. Although the Action Area supports alligator habitat (permanent bodies of freshwater, marshes, lakes, canals) it does not support crocodile habitat nor do crocodiles exist within this region of Florida. While alligator observations were documented within the airport's boundaries, and individuals were observed during field reviews, this species is not listed in the vicinity of the airport.
Eastern indigo snake	*Drymarchon corais couperi*	FT	**Moderate**	Habitat requirements for this snake are broad, ranging from scrub and sandhills to wet prairies and disturbed uplands. Moderate quality habitat is present in the Action Area including pine flatwoods, wet prairies and marshes. These snakes often inhabit gopher tortoise burrows; but these burrows were not observed within the Action Area. No individuals were observed during field reviews.
Gopher Tortoise	*Gopherus polyph*emus	C	**High**	The tortoise prefers sandy, well-drained upland areas and is known for excavating deep burrows shared by many other faunal species, including the eastern indigo snake. No gopher tortoises or their burrows were observed within the Action Area but have been historically observed on airport property. Sufficient, moderate, upland area was observed during the 2020 field reviews to support this species.
Birds				
Audubon's crested caracara	*Caracara cheriway**	FT	**Moderate**	The Action Area is located within the FWS Caracara Consultation Area. Although nesting habitat does not exist within the Action Area, potential foraging habitat does. While there have been no recorded nesting or sightings within the Action Area, observations of transient use have been recorded adjacent to it.
Florida grasshopper sparrow	*Ammodramus savannarum floridanus**	FE	**None**	No habitat exists within the Action Area. This species requires large areas of dry prairie that is frequently burned with patchy, open areas for foraging. While dry prairie is present adjacent to the runways, it is not frequently burned as that would conflict with airport operations. None were observed during field reviews.
Florida scrub-jay	*Aphelocoma coerulescens**	FT	**None**	No habitat exists within the Action Area. This bird inhabits fire-dominated, low-growing, oak scrub habitat on well-drained sandy soils. None were observed during field reviews.
Ivory-billed woodpecker	*Campephilus principalis*	FE	**None**	No habitat exists within the Action Area. This woodpecker inhabits large, contiguous forests with numerous large trees. A significant portion of the forest must also be in some stage of decay, providing a continuous supply of food. None were observed during field reviews.
Everglade snail kite	*Rostrhamus sociabilis plumbeus**	FE	**Moderate**	Moderate foraging habitat exists within the Action Area, which is located within the kite's FWS Consultation Area. Nesting habitat is within freshwater marsh habitats containing willow, melaleuca, pond cypress, sawgrass, cattail, bulrush and typically over water. No nests have been recorded and none were observed in the Action Area. The kite forages in shallow water with herbaceous vegetation frequented by apple snails (*Pomacea paludosa*). Apple snail eggs were observed on vegetation within the freshwater marsh habitat adjacent to the Action Area, but individuals were not. Snail kites may forage in the Action.
Red-cockaded woodpecker	*Picoides borealis**	FE	**Low**	Marginal habitat exists within the Action Area. Typical foraging habitat is mature pine flatwoods containing trees with 6–10-inch diameter at breast height (DBH). This woodpecker nests in mature, established pine trees, more than 80 years old. Habitat present within the Action Area includes pine flatwoods, but minimal mature slash pines were observed during field reviews. Individuals were not observed during field reviews.

Common Name	Scientific Name	Federal Listing	Potential Occurrence within Action Area	Rationale for Likelihood of Occurrence
Wood stork	*Mycteria americana*	FT	**High**	Moderate to high foraging habitat exists within the Action Area. The wood stork inhabits tree thickets and wetland habitats and has been known to forage in roadside swales. None were observed during field reviews, but other observations were previously documented.
Mammals				
Florida bonneted bat	*Eumops floridanus**	FE	**Moderate**	Marginal to moderate habitat exists within the Action Area. The project is located within the FWS Consultation Area for the Florida Bonneted Bat. Potential foraging habitat (wetlands, open water, uplands) and minimal roost sites (tree cavities, large cavity trees, snags, and buildings) for this species exist within the Action Area, but no individuals or roosts were observed during field reviews.
Florida panther	*Puma concolor coryi*	FE	**Low**	Marginal to moderate habitat exists within the Action Area but access is limited due to perimeter fences. The Action Area is not within the Panther Focus Area. No panthers were observed during field reviews.
Insects				
Bartram's scrub-hairstreak butterfly	*Strymon acis bartrami*	FE	**None**	Marginal habitat potentially exists within the Action Area. This species is restricted to pine rocklands and associated habitat (i.e., hydric pine flatwoods), specifically those containing its larval host plant, pineland croton. Pine flatwoods occur in the Action Area. However, these pine flatwoods are not associated with pine rocklands. No Bartram's scrub-hairstreak individuals were observed during field reviews.
Florida leafwing butterfly	*Anaea troglodyta floridalis*	FE	**None**	Marginal habitat potentially exists within the Action Area. This species is restricted to pine rocklands and associated habitat (i.e., hydric pine flatwoods), specifically those containing its larval host plant, pineland croton. Pine flatwoods occur in the Action Area. However, these pine flatwoods are not associated with pine rocklands. Individuals were not observed during field reviews.

SOURCES: FWC. June 2020. Florida's Endangered Species, Threatened Species and Species of Special Concern. Official Lists; FNAI. 2020. Biodiversity Matrix; USFWS. 2020. ECOS; USFWS. June 2020. Florida Department of Agriculture and Consumer Services (FDACS) Endangered, Threatened and Commercially Exploited Plants of Florida (November 2018).

Status Codes:
Federal (USFWS = US Fish and Wildlife Service; State (FWC = Fish and Wildlife Conservation Commission)
FE = Listed as Federally Endangered
FT = Listed as Federally Threatened
S/A = Protected due to Similarity of Appearance to other protected species
C = Candidate species for listing under the Endangered Species Act (ESA)
* = Indicates the project is located within the consultation area of this species

5.1 American Alligator – Federally Threatened due to Similarity of Appearance

The American alligator is federally listed as threatened due to similarity of appearance to the American crocodile (*Crocodylus acutus*), but only where their ranges overlap, which does not occur within the Project's Action Area. The alligator typically inhabits permanent water bodies, freshwater marshes, canals, and lakes and is likely to occur within water features observed during the 2020 field reviews. The potential for alligators to occur is **High**, as in the Action Area as alligators were observed during previous field reviews of this area and available alligator habitat exists in the Action Area. **However, the alligator is not federally listed in this area.**

5.2 Eastern Indigo Snake – Federally Threatened

The eastern indigo snake is glossy, blue-black in color and may reach a length of 8.5 feet. A wide variety of habitats are utilized by this species; however, they prefer dry xeric habitat types, but can be found in freshwater marshes, wet prairies, and pine flatwoods (which are found within the Action Area). It will

readily utilize disturbed areas, including upland and even urban habitats such as roadside berms and swales. The eastern indigo snake was historically identified to be present in some of the natural areas in the vicinity of the airport and potential habitat was observed during the 2020 field reviews. Therefore, there is potential for this species to occur in the upland, freshwater marshes, wet prairies, and undeveloped, portions of the Action Area so the potential for this species to occur within the Action Area is **Moderate**. Individuals or evidence of eastern indigo snakes were not observed during the 2020 field reviews.

5.3 Gopher Tortoise – Candidate for Listing under the Endangered Species Act

Gopher tortoises are long-living reptiles that occupy upland habitat throughout Florida including forests, pastures, and other open areas. This tortoise prefers sandy, well-drained upland areas and is known for excavating deep burrows shared by many other faunal species, including the eastern indigo snake. No gopher tortoises or their burrows were observed within the Action Area but have been historically observed on airport property. Sufficient upland area was observed during the 2020 field reviews to support this species. The potential for this species to occur in the upland, undeveloped areas and/or berms of the Action Area is **High**.

5.4 Audubon's Crested Caracara – Federally Threatened

The Audubon's crested caracara is a large, boldly patterned raptor, with a crest and unusually long legs. In Florida, its preferred habitat is open country, including dry prairie and pasture lands with cabbage palm, cabbage palm/live oak hammocks, and shallow ponds and sloughs. Preferred nest trees are cabbage palms, followed by live oaks. The project is located within the FWS Caracara Consultation Area and potential foraging habitat exists within the Action Area. However, nesting habitat was not observed nor previously recorded. Caracaras were not observed during these field visits for this project, but Palm Beach County environmental staff have noted previous observations in the vicinity of the airport. One caracara individual was observed roosting on a fence post in 2015 on the adjacent Avenir property, outside of the Action Area. Per the environmental study prepared for Avenir, this use was transient and previous sightings in the area have not occurred in over ten years. Note the Avenir study was conducted in 2015-2016 by EW Consultants for Avenir Holdings. The purpose of this study was to provide environmental information as part of the Avenir development's permitting process. Unconfirmed observations submitted through eBird and compiled by TheCornellLab indicate an observation frequency of caracaras in the Action Area between 0 – 2% with the closest observation being directly adjacent to the east side of State Road (SR) 710, indicating potential feeding on roadkill. The potential for this species to occur in the Action Area is **Moderate**.

5.5 Florida Grasshopper Sparrow – Federally Endangered

The Florida grasshopper sparrow is a subspecies of grasshopper sparrow that is endemic to the dry prairie of central and southern Florida. This subspecies is extremely habitat specific and relies on fire every two to three years to maintain its habitat. While dry prairie habitat exists adjacent to the runways within the Action Area, it is not frequently burned as that would interfere with airport operations. None were observed during field reviews. The potential for this species to occur in the Action Area is **None**.

5.6 Florida Scrub-Jay – Federally Threatened

The Florida scrub-jay is a blue-jay sized bird that is blue with grey underparts and a white forehead and neck. They typically inhabit sand pine, xeric oak scrub, and scrubby flatwood habitats on well-drained, sandy soils. Scrub-jays prefer areas with large quantities of oak shrubs that average 3.28-6. No habitat exists within the Action Area and none were observed during field reviews. The potential for this species to occur in the Action area is **None**.

5.7 Ivory-Billed Woodpecker – Federally Endangered

The Ivory-billed woodpecker has black and white plumage with a white bill, yellow eye, and pointed crest. Males exhibit red from the nape to the top of their crest. They inhabit large, contiguous forests with numerous large trees. A significant portion of the forest must also be in some stage of decay, providing a continuous supply of food. None were observed during field reviews and no habitat exists within the Action Area. The potential for this species to occur in the Action area is **None**.

5.8 Everglade Snail Kite – Federally Endangered

The Everglade snail kite is a mid-sized raptor that feeds almost exclusively on apple snails. The preferred foraging habitat includes large, open, freshwater marshes or lakes with shallow water and a low density of emergent vegetation. The snail kite builds its nest over water, usually in a low tree or shrub, but could also nest in non-woody vegetation like cattail or sawgrass. Nesting sites are known to exist in the region (Grassy Waters Preserve and Loxahatchee Slough) and snail kites were historically observed foraging in marshes in the area, but nests have not been recorded within the airport, Action Area, or Sweetbay Natural Area. FWC snail kite nesting data from 2020 show recorded nests east of SR 710. Apple snail eggs were observed on emergent vegetation during the 2020 field reviews. The potential for this species to occur in the Action Area is **Moderate**. Individuals were not observed during the 2020 field reviews.

5.9 Red-Cockaded Woodpecker – Federally Endangered

Red-cockaded woodpeckers (RCW) maintain their territories throughout the year and inhabit open, mature pine woodlands that have a diversity of grass, forbs, and shrub species. The RCW uses slash pine flatwoods, often hydric, as nesting and foraging habitat and prefer to nest within pinelands that have mature pine trees generally greater than 80 years old. Typical foraging habitat is mature pine flatwoods containing trees 6–10-inch DBH. Pine flatwoods are present in the Action Area. However, these habitats were not suitable as a majority of these pine trees were not mature. The potential for this species to occur in the Action Area is **Low**. Individuals were not observed during the 2020 field reviews.

5.10 Wood Stork – Federally Threatened

Wood storks are large wading birds that inhabit freshwater and estuarine wetlands. These birds nest primarily in cypress or mangrove swamps. This stork feeds in shallow freshwater marshes, narrow tidal creeks, or flooded tidal pools. The Action Area is located within the CFA, i.e., within 18.6 miles of two wood stork colonies (**Figure 8**). Water features observed during the 2020 field reviews support foraging habitat; therefore, the potential for this species to occur in the Action Area is **High**. Individuals of this

species were not observed during the 2020 field reviews but are known to be present within and adjacent to the Action Area.

5.11 Florida Bonneted Bat – Federally Endangered

The Florida bonneted bat (FBB) (also known as the Florida mastiff bat) is the largest bat species in Florida. This species is non-migratory and inhabits a variety of natural habitats including tropical hardwoods, pinelands, and mangrove habitats, as well as man-made areas such as golf courses, bridges, buildings, and neighborhoods. The Action Area is included within the FWS Consultation Area for the FBB. Suitable foraging habitats (wetlands, open water, uplands), and minimal roost sites (pine flatwoods) for this species were observed within the Action Area. An acoustical Florida bonneted bat survey was conducted October 18- November 18, 2021, and general visual observations of the pine flatwoods within the Action Area were also conducted during the 2020 field reviews. No individuals or roosts were observed and no echolocations from the FBB were heard (2022 Florida Bonneted Bat Acoustic Survey Technical Report by ESA). The potential for this species to occur in the Action Area is **Moderate**.

5.12 Florida Panther – Federally Endangered

The Florida panther is one of the most endangered species in the world. While the Action Area is not within the Panther Focus Area, there is potential suitable habitat adjacent to it due to the extensive, publicly owned, natural lands adjacent to the airport. The Florida panther lives in both wetlands, including cypress forests, thicket swamps and freshwater marshes, and dry lands, such as hardwood hammocks, saw palmetto woodlands and pine flatwoods. Per the FWC panther data, a single adult male's death was recorded on 11/02/2019 along SR 710 approximately 15 miles west of the Aviation Road/SR 710 intersection. Note this location does not fall within the Project's/Action Area; but panthers have large territorial ranges (between 75 and 195 square miles), making overlap possible. However, active portions of the airport, on the west side, are separated from the natural areas by a perimeter security fence, eliminating access to these areas. Therefore, conflicts between airport operations and panthers are not anticipated and the likelihood of occurrence in the Action Area and surrounding is **Low**.

5.13 Bartram's Hairstreak Butterfly – Federally Endangered

The Bartram's hairstreak butterfly is a federally endangered butterfly that occurs in the pine rockland habitat and associated habitat (pine flatwoods) of south Florida. Its populations have declined throughout their historic range and its distribution is now extremely limited. The causes of population decline likely include destruction and alteration of pine rockland habitat associated with development, fire suppression, and the introduction of exotic plant and insect species. Population decline is also attributed to insecticide use and collection. This species is easy to recognize by the broad white bands with a black edge. Marginal habitat potentially exists within the Action Area. However, this species is restricted to pine rocklands and associated habitat (i.e., hydric pine flatwoods), specifically those containing its larval host plant, pineland croton (*Croton linearis*). While pine flatwoods occur in the Action Area, they are not associated with pine rocklands. Unverified observations of pineland croton exist approximately seven miles southwest near Northlake Boulevard. No Bartram's scrub-hairstreak individuals were observed during field reviews. The potential of occurrence for this species within the Action Area is **None**.

5.14 Florida Leafwing Butterfly – Federally Endangered

The federally endangered Florida leafwing is a butterfly that occurs in the pine rockland habitat and associated habitat (pine flatwoods) of south Florida. Its populations have declined throughout their historic range and its distribution is now extremely limited. The causes of population decline likely include destruction and alteration of pine rockland habitat associated with development, fire suppression, and the introduction of exotic plant and insect species. Population decline is also attributed to insecticide use and collection. This species is easily identified by its bright orange dorsal wing surface. At rest, the cryptic coloration of the ventral wing surface give the butterfly the appearance of a dead leaf, which is why it is referred to as the Florida leafwing. Florida leafwing occurs in pine rocklands and associated habits (pine flatwoods) that retain its only known hostplant, pineland croton. Pine flatwoods occur in the Action Area. However, these pine flatwoods are not associated with pine rocklands. Unverified observations of pineland croton exist approximately seven miles southwest near Northlake Boulevard. The potential of occurrence for this species within the Action Area is **None**.

5.15 Other Species

Other species have the potential to occur within the Action Area that are protected under other regulations that include the bald eagle which is protected under the *Bald and Golden Eagle Protection A*ct and State-listed species protected by the State of Florida, pursuant to *Florida Statute 379.411*; such as the Florida pine snake (under review by FWS), tricolored heron, sandhill crane, limpkin, snowy egret, white ibis, little blue heron, and roseate spoonbill. Bird species potentially present within the Action Area may be protected under the *Migratory Bird Treaty Act (MBTA)*. State-listed and migratory bird species will not be discussed in this Biological Assessment as this document is prepared to assess project-related impacts to species protected under the *Endangered Species Act*.

For the bald eagle, marginal foraging habitat exists within the Action Area. No nests were identified within the Study Area (closest nests are located approximately four (4) and four and one-half (4.5) miles southeast and west of the Action Area (Audubon EagleWatch)), individuals were not observed during field reviews. The likelihood of occurrence for this species within the Action Area is **None**.

6.0 Species Under Review and Analysis of Effects

Habitats in the Action Area are potentially suitable for eight (8) federally listed species under FWS jurisdiction. These federally listed species include:

- American alligator (*Alligator mississipiensis*)
- Eastern indigo snake *(Drymarchon corais couperi*)
- Audubon's crested caracara (*Caracara cheriway*)
- Everglade snail kite (*Rostrhamus sociabilis plumbeus*)
- Red-cockaded woodpecker (*Picoides borealis*)
- Wood stork (*Mycteria americana*)
- Florida bonneted bat (*Eumops floridanus*)
- Florida panther (*Puma concolor coryi*)

Each federally listed species and one candidate species, gopher tortoise, are described in the text below. The species determinations of effect are summarized in **Table 5**. Note that the FWS' IPaC database indicates no designated FWS Critical Habitat occurs within the Action Area.

6.1 American Alligator – Federally Threatened due to Similarity of Appearance

The American alligator is currently listed as threatened due to similarity of appearance to the American crocodile (*Crocodylus acutus*), but only where their habitats/ranges overlap. The crocodile's habitat and range do not include the Action Area; therefore, the alligator is not protected at this location. Alligators can use the water features onsite (lakes, canals, marshes) and were observed during field reviews. The Preferred Alternative does not impact existing onsite reservoirs and only minor impacts are proposed to canals. Freshwater marshes impacted by the project are located within the interior of the Action Area but may still be accessible to alligators. As previously stated, this species is only protected when its range overlaps that of the American crocodile, which does not occur within the Project/Action Area. Therefore, an ESA determination is ***Not Applicable*** to this species for this proposed project.

Table 5 - SPECIES DETERMINATIONS OF EFFECT

Common Name	Scientific Name	Potential Occurrence within Action Area	Determination of Effect
Reptiles			
American alligator	*Alligator mississipiensis*	**High**	***Not Applicable***
Eastern indigo snake	*Drymarchon corais couperi*	**Moderate**	***No Effect***
Gopher tortoise*	*Gopherus polyphemus*	**High**	***No Effect***
Birds			
Audubon's crested caracara	*Caracara cheriway*	**Moderate**	***No Effect***
Everglade snail kite	*Rostrhamus sociabilis plumbeus*	**Moderate**	***No Effect***
Red-cockaded woodpecker	*Picoides borealis*	**Low**	***No Effect***
Wood stork	*Mycteria americana*	**High**	***May Affect, Not Likely to Adversely Affect***
Mammals			
Florida bonneted bat	*Eumops floridanus*	**Moderate**	***No Effect***
Florida panther	*Puma concolor coryi*	**Low**	***No Effect***

*Candidate for federal listing

6.2 Eastern Indigo Snake – Federally Threatened

Moderate habitat is present within the Action Area for this snake. Specifically, pine flatwoods, herbaceous dry prairie, and shrub and brushland. Per coordination with FWS staff during a Technical Data Meeting on September 2, 2021 (see **Appendix A**), sightings of this snake have not been reported within 0.62-miles (the typical home range of a male indigo snake) of the Action Area. In addition, no observations of indigo snakes have been historically reported nor observed during current field reviews. Based on no historical or current

observations within the Action Area and no reported sightings within 0.62-miles of the Action Area a ***No Effect*** determination is recommended for this species.

6.3 Audubon's Crested Caracara – Federally Threatened

Foraging habitat (dry prairie) exists within the Action Area, but nesting habitat was not observed within the Action Area. Palm Beach County environmental staff have previously recorded caracara sightings in the surrounding areas, but no nests have been recorded in the Action Area. One caracara individual was observed roosting on a fence post in 2015 on the adjacent Avenir property, outside the Action Area. Per this environmental study, this use was transient and previous sightings in the area have not occurred in over ten years. The Sweetbay Habitat Management Plan, prepared in 1990 by the Palm Beach County Department of Environmental Resources Management, did not list this species as being observed or likely present on the North County General Aviation Airport site. Unconfirmed observations submitted through eBird and compiled by TheCornellLab indicate an observation frequency of caracaras in the Action Area between 0 – 2% with the closest observation being directly adjacent to the east side of SR 710, indicating potential feeding on roadkill. Caracaras were not observed during field reviews for this project. As discussed at the September 2, 2021, FWS Technical Data Meeting, FWS' review is focused on impacts to bird nesting (see **Appendix A**). Therefore, based on the lack of nesting trees/palms within the Action Area and lack of recorded nests a determination of ***No Effect*** is recommended.

6.4 Everglade Snail Kite - Federally Endangered

Nesting sites are known to exist in the region, specifically Grassy Water Preserve located approximately three miles east and southeast of the airport and Loxahatchee Slough Natural Area with the closest nest located approximately 1.5 miles east of the airport, north of PGA Boulevard (see **Appendix B**). All nests were recorded east of SR 710, north and south of PGA Boulevard, while the expected runway improvements are located west of SR 710. Snail kites were historically observed foraging in marshes in the vicinity of the airport, but nests have not been recorded within or adjacent to the Action Area. Nesting typically occurs over water in a low tree or shrub but can also occur in non-woody vegetation such as cattail or sawgrass. Apple snail eggs were observed on emergent vegetation during the 2020 field reviews and foraging habitat will be impacted by the Preferred Alternative. However, the adjacent wetlands, outside the Action Area, within Sweetbay and Loxahatchee Slough Natural Area will not be affected. These wetlands will continue to provide forage for this species, post-project. Individuals or nests were not observed during the 2020 field reviews. As discussed at the September 2, 2021, FWS Technical Data Meeting, FWS' review is focused on impacts to bird nesting (see **Appendix A**). Therefore, based on no recorded or observed nesting within the Action Area, a determination of ***No Effect*** is recommended.

6.5 Red-Cockaded Woodpecker – Federally Endangered

Marginal potential habitat for the RCW was observed within the Action Area (i.e., pine flatwoods). Those areas within the Action Area were not suitable for nesting as the majority of pine trees were not mature. Due to the lack of suitable habitat, a determination of ***No Effect*** is recommended for this species.

6.6 Wood Stork – Federally Threatened

The Action Area is located within the CFA, i.e., within 18.6 miles of two wood stork colonies (Ballen Isles, approximately 6.2 miles east of the airport, and the Solid Waste Authority, approximately 7.3 miles

southeast of the airport, see **Figure 8)**. Water features and wetlands observed during the 2020 field reviews support foraging habitat, but roosting or nesting habitat was not observed. Individuals of this species were not observed during the 2020 field reviews. Pursuant to the FWS' 2010 Wood Stork Key (see **Appendix C**), an analysis of foraging prey base losses is required if loss of suitable foraging habitat (SFH) is greater than five acres, which is applicable to this project. The proposed direct wetland impacts are 25.38 acres (12.78 acres of freshwater marsh and 12.54 acres of wet prairie). For the biomass analysis, the freshwater marsh was assumed, based on floral species composition, to be a long-hydroperiod wetland (Class 5, with inundation between 240-300 days). The wet prairie was assumed, based on floral species composition, to be a short hydroperiod wetland (Class 1, with inundation between 0-60 days). Assuming 0-25% exotic coverage for both habitats, the total biomass loss is 54.36 kg (49.25 kg associated with the marsh and 5.11 kg associated with the wet prairie). The FWS biomass worksheet is provided in **Appendix D**. The PBC DOA intends to mitigate the wetland and biomass impacts within their Pine Glades West Mitigation Area, a FWS-approved mitigation bank. In addition, the adjacent conservation areas (Sweetbay and Loxahatchee Slough) contain available wood stork foraging habitat which will remain during and post-construction. Per the FWS Technical Data meeting, FWS' review is focused on impacts to nesting birds. Pursuant to use of appropriate mitigation, available foraging habitat is to remain in the adjacent conservation areas during construction and post-construction, and no documented rookeries have been located within the Action Area. Due to impacts to SFH, and according to the Wood Stork Key, a determination of ***May Effect Not Likely to Adversely Effect*** is recommended for the wood stork.

6.7 Florida Bonneted Bat - Federally Endangered

Suitable foraging habitats (wetlands, open water, uplands), and roost sites (tree cavities, large cavity trees, snags, and buildings) for this species are present within the Action Area. No individuals or roosts were observed. However, as the project is within the FBB Consultation Area and contains potential foraging habitat within the Action Area, an acoustic/roost survey was performed pursuant to the criteria specified in the FWS October 2019 Florida Bonneted Bat Consultation Key. This survey resulted in no recorded echolocations from the FBB. To minimize adverse effects to the Florida bonneted bat, an additional survey will be performed prior to construction. Based on the FBB Consultation Key, a determination of effect of ***No Effect*** is recommended.

6.8 Florida Panther – Federally Endangered

This project is not located within a Panther Focus Area, but potential habitat in the vicinity of the Action Area exists due to the extensive publicly owned, surrounding natural lands. Per FWC panther data, a single adult male's death was recorded on 11/02/2019 along SR 710 approximately 15 miles west of the Aviation Road / SR 710 intersection. Note this location does not fall within the Action Area. An existing perimeter fence is located on the airport's west side adjacent to Sweetbay, prohibiting access to the active airfield. This fence, however, is not present on the south side adjacent to Loxahatchee Slough or the east side in the vicinity of SR 710. The conservation areas adjacent to the airport are also not contained within the panther focus area. Based on the project's location outside the panther focus area and limited access to the airfield, a determination of ***No Effect*** is recommended.

7.0 Conservation Measures

A number of conservation measures are proposed to mitigate impacts to federally listed/candidate species and their habitats. The list below represents mitigation and best practices that are recommended as the project continues through its development phase.

7.1 General Conservation Measures

- Construction activities will be phased to avoid breeding and nesting seasons.
- Project elements will be designed consistent with guidance in 14 Code of Federal Regulations (CFR) 1339 Section 139.337 and FAA Advisory Circular No. 150/5200-33C and reduce the potential to create wildlife conflicts with aviation operations.
- Temporarily disturbed work areas will be revegetated using original topsoil to serve as a seed source and supplemented, as needed, by sod or additional seeding.
- The relocated Aviation Road and construction of the service roads' design will be refined to avoid and/or minimize wetland and natural upland impacts.
- BMPs typically associated with runway and roadway construction projects will be properly implemented and maintained throughout construction activities. Construction activities will be designed to minimize impacts to adjacent habitats (uplands and wetlands) while allowing construction and traffic flow to occur. Silt fences/curtains will be installed adjacent to construction activities to contain soil disturbing activities such as stormwater runoff from exiting the construction zone and discharging into adjacent areas.
- The detailed wetland mitigation plan to compensate for the functional loss resulting from the project's direct and indirect impacts will be finalized through project permitting. Proposed mitigation includes the use of functionally suitable mitigation units from Palm Beach County's Pine Glades West Mitigation Area.
- Coordination with Palm Beach County regarding the availability of mitigation functional units at Pine Glades Mitigation Area to offset wetland direct and indirect impacts will continue through design and permitting.
- Coordination with Palm Beach County regarding mitigation for impacts to native upland trees resulting from this project will be completed.
- Construction Specification/Final Plans will require removal of the invasive Old World climbing fern within the Project Footprint/Area. Note: it is dominant in the area between Aviation Road and State Road 710/Beeline Highway within the Project Area.

7.2 Species-Specific Conservation Measures

- Conduct a gopher tortoise survey 90 days prior to construction to confirm tortoise burrows are not within 25-feet of the proposed earthwork or staging activities. Should burrows be observed, a tortoise relocation permit will be obtained from FWC prior to construction commencement.
- Conduct other preconstruction species specific surveys (as applicable).
- To minimize adverse effects to the Florida bonneted bat, an additional survey will be performed prior to construction.

Therefore, no significant, adverse effects are anticipated to any of the above-listed species due to the presence of significant natural habitats surrounding the Action Area and the mitigation measures proposed.

8.0 Cumulative Effects

Cumulative effects are effects resulting from future activities that are reasonably certain to occur within the Action Area. The adjacent natural areas, Sweetbay and Loxahatchee Slough consist of co-mingled natural uplands and wetlands. As mentioned earlier, Sweetbay Natural Area consists of 1,094 acres and Loxahatchee Natural Area consists of 12,957 acres; for a total of 14,051 acres of existing natural uplands and wetlands under public ownership and dedicated for conservation purposes. In addition, the private Avenir Development has conservation lands located adjacent to Sweetbay and Loxahatchee Slough that, while privately-owned, are protected under a conservation easement. The total direct and indirect upland and wetland impacts associated with the Preferred Alternative is 169.75 acres, which represents approximately 1.21% of the total publicly owned land (upland and wetland) currently protected from future development within the basin (note this overall acreage does not include the Avenir Development's conservation areas as they are not under public ownership).

The Preferred Alternative, the airport, and the adjacent Sweetbay Natural Area and Loxahatchee Slough Natural Area are located within the Loxahatchee River Basin (see **Figure 9**). The approximate wetland acreage (protected and unprotected) within the Loxahatchee River Basin was calculated using the SFWMD LAND USE AND COVER 20142016 Global Information Systems (GIS) shapefile clipped to the area of the Loxahatchee River Basin using the Florida Water Management District (WMD) Cumulative Impact Basins data layer. These freshwater wetlands were then overlaid with the following GIS shapefiles of protected and public lands in Florida to calculate the acreages that are protected and those that are unprotected.

- Conservation Lands – FL_SOLARIS_CLEAR_Conservation_Owned Lands
- Water Management District Lands in Florida –WMDL_JAN20
- Florida State Parks – STPARK_SEP19
- National Wildlife Refuges – NWRFLA_AUG19 Florida Forever Acquisitions – FF_ACQUIRED_MAY20
- Florida Managed Areas – FLMA_JUN20
- Mitigation Bank and In-lieu Fee Sites – RIBITS_2019

Within this basin, there are approximately 54,486 acres of freshwater wetlands (forested and herbaceous) that are either protected or unprotected. See **Table 6** below for a breakdown of these wetlands per forested and herbaceous habitats and protection status. Protected wetlands are those typically under public ownership and subject to development restrictions through designation as conservation/preservation land and/or other special protection status. Protected land can also encompass private land placed under conservation easement (for example, wetland mitigation sites). These lands are designated as important and protected due to its biological diversity and natural or cultural resources. Unprotected land is not restricted through land use designation and/or ownership and therefore potentially subject to future development via the regulatory permitting process.

While the Preferred Alternative directly impacts 25.51 acres of wetland communities and indirectly affects 28.12 acres, these impacts represent approximately 1.39% of the total, unprotected, herbaceous wetlands within the Loxahatchee River Basin. Therefore, the direct and indirect wetland impacts associated with the Preferred Alternative are not anticipated to result in an adverse cumulative impact to freshwater wetlands within the Loxahatchee River Basin, especially since proposed mitigation occurs within that same basin (Pine Glades West Mitigation Area).

Table 6 - WETLAND DISTRIBUTION WITHIN THE LOXAHATCHEE RIVER BASIN

Habitat Type	Protected (acres)	Unprotected (acres)
Forested wetlands	19,322	3,115
Herbaceous wetlands	28,178	3,871
Totals:	**47,500**	**6,986**

Therefore, significant impacts to upland and wetland habitats are not anticipated because of the Preferred Alternative. Due to the significant amount of publicly owned, protected natural uplands and wetlands directly adjacent to the Action Area and the proposed wetland mitigation at Pine Glades Natural Area, the Preferred Alternative should not result in a cumulative impact to these resources over time.

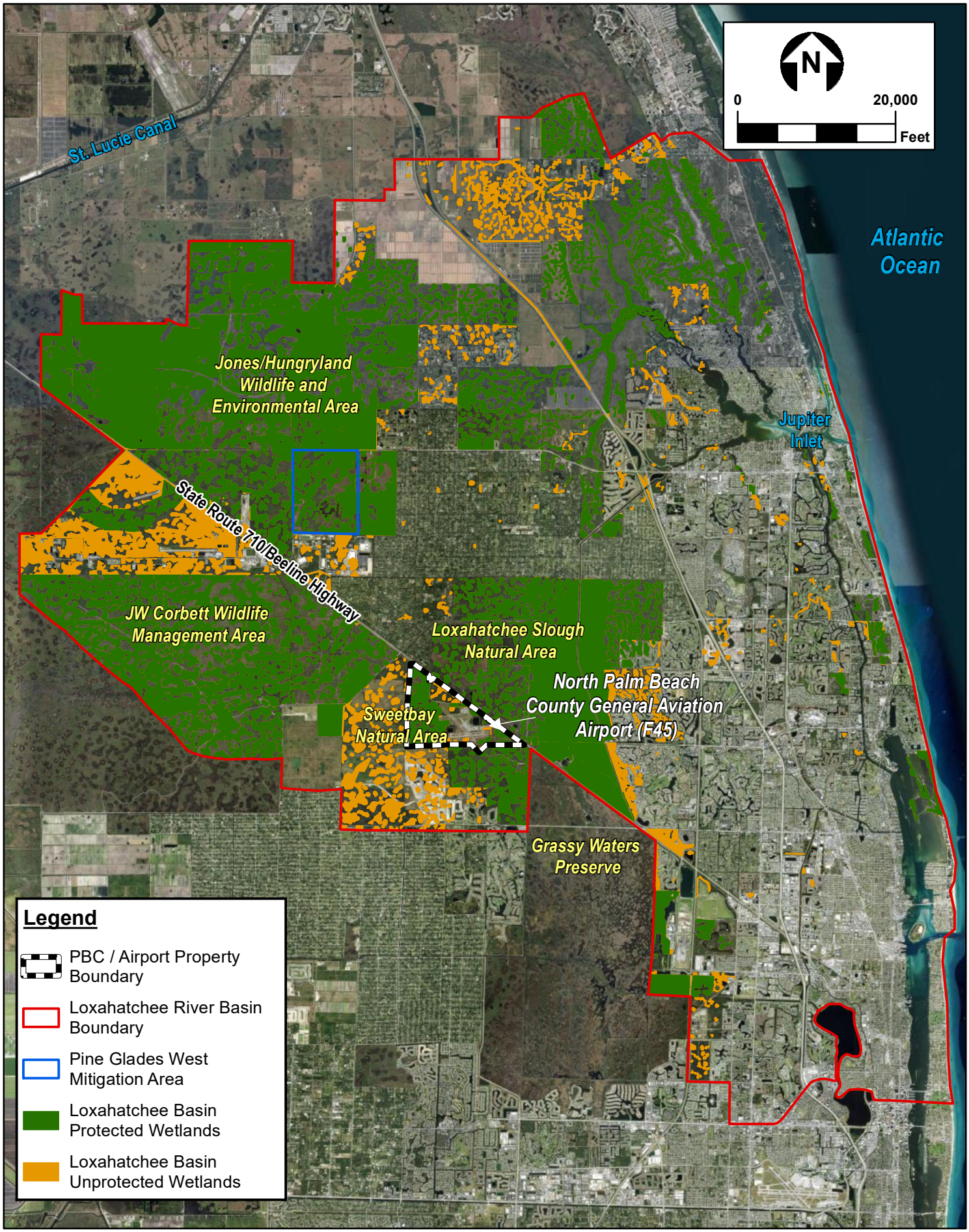
9.0 Compatibility with Airport Operations

The proposed project is compatible with current airport operations. Under a previous wildlife hazard mitigation project, it was determined that wetlands adjacent to the active airfield presented a safety risk. A prior Environmental Assessment was completed, and a Finding of No Significant Impact determination was signed by the FAA in 2012. As a result, wetlands adjacent to the existing airport operations were permitted, mitigated, and filled to address bird strikes/conflicts with moving aircraft as they were determined to be attractants for wildlife whose presence and activities are hazards to F45 aircraft operations. In addition, the airport recently completed installation of a new perimeter security fence along a portion of the active airport boundary. The Air Operations Area is surrounded by a perimeter fence which secures the facility and restricts access to the airfield by hazardous and potentially hazardous wildlife species.

Mitigation for unavoidable direct and indirect wetland impacts will be mitigated within the same drainage basin however, mitigation is not proposed onsite. In accordance with FAA Regulations and Guidance (including Advisory Circular (AC) 150/5200-33), "wetland mitigation must be designed so it does not create a wildlife hazard". As such, onsite mitigation creates a potential wildlife hazard, and therefore this option was not proposed nor evaluated further.

10.0 Conclusions

As stated above, it is anticipated that the Preferred Alternative will directly affect approximately 79.91 acres of upland habitat (herbaceous dry prairie, upland shrub and brushland, pine flatwoods, and disturbed land) will be directly impacted and 36.21 acres will be indirectly impacted. It should be noted that most of these upland areas are located inside the Action Area and typically surrounded by perimeter fences, limiting wildlife access/traffic. The 53.63 acres of impacted wetlands consist of 25.51 acres of direct impact and 28.12 acres of indirect impact (see **Table 3**). Note that wetlands indirectly impacted will remain post-project and will still be available for wildlife use, whereas wetlands directly impacted will be lost. Both impacts will be mitigated per regulatory criteria to ensure wetland functions lost are replaced. Determinations of effect for the species potentially present in the Action Area are summarized in **Table 7**.



Source: USGS 2021

North Palm Beach County General Aviation Airport

Figure 9 – Loxahatchee River Basin

Table 7 – SPECIES DETERMINATIONS OF EFFECT

Common Name	Scientific Name	Potential Occurrence within Action Area	Determination of Effect
Reptiles			
American alligator	*Alligator mississipiensis*	**High**	***Not Applicable***
Eastern indigo snake	*Drymarchon corais couperi*	**Moderate**	***No Effect***
Birds			
Audubon's crested caracara	*Caracara cheriway*	**Moderate**	***No Effect***
Everglade snail kite	*Rostrhamus sociabilis plumbeus*	**Moderate**	***No Effect***
Red-cockaded woodpecker	*Picoides borealis*	**Low/Low**	***No Effect***
Wood stork	*Mycteria americana*	**High/High**	***May Effect Not Likely to Adversely Effect***
Mammals			
Florida bonneted bat	*Eumops floridanus*	**Moderate**	***No Effect***
Florida panther	*Puma concolor coryi*	**Low/Low**	***No Effect***

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12.0 Report Preparation

ENVIRONMENTAL SCIENCE ASSOCIATES AND CYRIACKS ENVIRONMENTAL CONSULTING SERVICES, INC. PROJECT TEAM

Name	Title	Project Responsibility	Education	Years' Experience
Mike Arnold	Project Director	Project approach and QA/QC	B.S. Civil Engineering.	29
Sean Burlingame	Senior Airport Specialist	Mapping and QA/QC	B.S. Aviation Management	12
Doug DiCarlo	Aviation Program Manager	Proposed Project, aviation activity forecast, alternative analysis	M.B.A and B.S. Airway Science Management	24
Gary Gick	Production Coordinator, Word Processor	QA/QC and final document production		30
Amy Paulson	Senior NEPA Specialist / Project Manager	Project approach, impact evaluations, technical writing, and QA/QC	M.S. Conservation Biology and Sustainable Development, B.S. Ecology	23
Steve Goetzinger	Senior Noise and Air Quality Analyst	Air quality and noise analysis	M.S. and B.S. Aeronautics and Astronautics, M.S. Technology and Policy	8
Susan Shaw	Program Manager / Senior Scientist	Habitat and listed species evaluations, technical writing, and QA/QC	B.S. Limnology	20

Name	Title	Project Responsibility	Education	Years' Experience
Julie Sullivan	NEPA Specialist	Biological resources, agency coordination, NEPA guidance, water resources, and QA /QC	M.S. Biology B.S. Zoology	20
Mark Clark	Senior Environmental Scientist	Biological resources, NEPA Documentation, QA / QC	M.S. Entomology, B.S. Biology	30
Wendy Cyriacks	Chief Environmental Scientist	Biological evaluation, NEPA Documentation, QA / QC	M.S. Marine Biology, B.S. Biology	350
Francesca Fourney	Senior Environmental Scientist	Biological Resources, NEPA Documentation	M.S. Marine Biology, B.S. Marine Biolog	6
Aaron Duecaster	Environmental Scientist	GIS Mapping	M.S. Geoscience, B.S. Marine Science	4
Alex Martinez Held	Environmental Scientist	Biological Resources	B.S. Biology	2
Shannon Kelley	Senior Environmental Scientist	Biological Resources, NEPA Documentation	B.S. Biology	6

Appendix A

FWS Technical Data Meeting Summary

F45 Technical Data Discussion - Meeting Minutes

F45 Runway Extension and Associated Improvements
Palm Beach County, Florida

On September 2, 2021, a video conference was held between representatives of the US Fish and Wildlife Service (FWS) and the F45 technical consultant team for biological resources, including Environmental Science Associates (ESA) and Cyriacks Environmental Consulting Services, Inc. (CECOS). The purpose of this video conference was to discuss available data and other technical aspects relating to evaluation of impacts associated with the Proposed Project.

A summary of the items discussed is provided in the bullet list below. Comments and/or revisions to this summary should be provided within 10 days of receipt of the draft; otherwise, this summary will be considered final.

The following people attended:

Name	Affiliation	E-Mail	Phone
John Wrublik	FWS	john_wrublik@fws.gov	772-469-4282
Amy Paulson	ESA	apaulson@esassoc.com	251-654-7401
Susan Shaw	ESA	sshaw@esassoc.com	407-709-9615
Nick Gadbois	ESA	ngadbois@esassoc.com	561-865-7749
Wendy Cyriacks	CECOS	wc@cecosenvironmental.com	954-571-0290
Mark Clark	CECOS	mc@cecosenvironmental.com	954-571-0290

Discussion Items:

- **Species for Discussion**:
  - Florida bonneted bat
  - Crested caracara
  - Wood stork
  - Eastern indigo snake
  - Snail kite

- **Project Location:** The Proposed Action Area is located on North Palm Beach County General Aviation Airport and adjacent to two conservation lands (Sweetbay Natural Area and Loxahatchee Slough Natural Area) as well as within the vicinity of several other conservation lands.

- FWS indicated that their focus is on direct impacts to species located within the Proposed Project's direct impact footprint (i.e., they are not concerned with noise impacts or other indirect effects).

- **Florida bonneted bat (FBB)**
  - FWS referred the attendees to the FBB Key for potential roosting tree criteria (i.e., diameter at breast height (DBH) and height).
  - Per the FBB Key, if the overall/total project area (not just the area of potential bat habitat) is greater than 5 acres an acoustic survey is required.
  - FWS was not aware of any new FWS data indicating the presence of the FBB within the Action Area.

  - FWS indicated the results of an acoustic survey are required during the BA for FWS to determine and/or concur on a determination of effect. The results of an acoustic survey are typically valid for one year but could be extended to two years on a project-by-project basis.

- Crested caracara
  - FWS stated they did not have more recent data regarding caracaras within the Action Area.
  - FWS stated their focus is on impacts to active nests. Therefore, if no nests are observed, a caracara survey is not required and a No Effect determination would be appropriate, per FAA discretion.

- Wood stork
  - FWS confirmed the 2020 biomass worksheet remains valid.
  - The Action Area is located within the core foraging area of two wood stork rookeries; but no rookeries are located on site.
  - FWS did not have any data regarding new rookeries within the Action Area.
  - FWS stated their focus is on impacts to active nests. Therefore, if no nests are observed, a wood stork survey is not required and a No Effect determination would be appropriate.

- Eastern indigo snake
  - FWS data indicates that no observations have been made within 0.62-miles of the Action Area, and if there have been no additional observations of Eastern indigo snakes reported within the Action Area, a No Effect determination for this species would be appropriate. The 0.62-miles represents the typical male snake home range.
  - If the snake would not be affected by the Proposed Project, then implementation of protection measures is not required, per FAA discretion.

- Snail kite
  - FWS stated their review is focused on impacts to snail kites' nests (not foraging habitat).
  - FWS does not consider a minor loss of foraging habitat to constitute an effect to the species.
  - FWS stated if there is no nesting habitat present, then a No Effect determination for the snail kite is appropriate and a survey is not required.
  - 2020 nesting data provided by Florida Fish and Wildlife Conservation Commission (FWC) shows all nests north and south of PGA Boulevard, east of SR 710.
  - FWS did not have additional data regarding new nesting locations.

- Red cockaded woodpecker
  - FWS mentioned this species as potentially present; however, if no habitat is present, then the Proposed Project would have No Effect on the red cockaded woodpecker.

Prepared By: *Mark Clark*
Date Prepared: *09/7/2021*

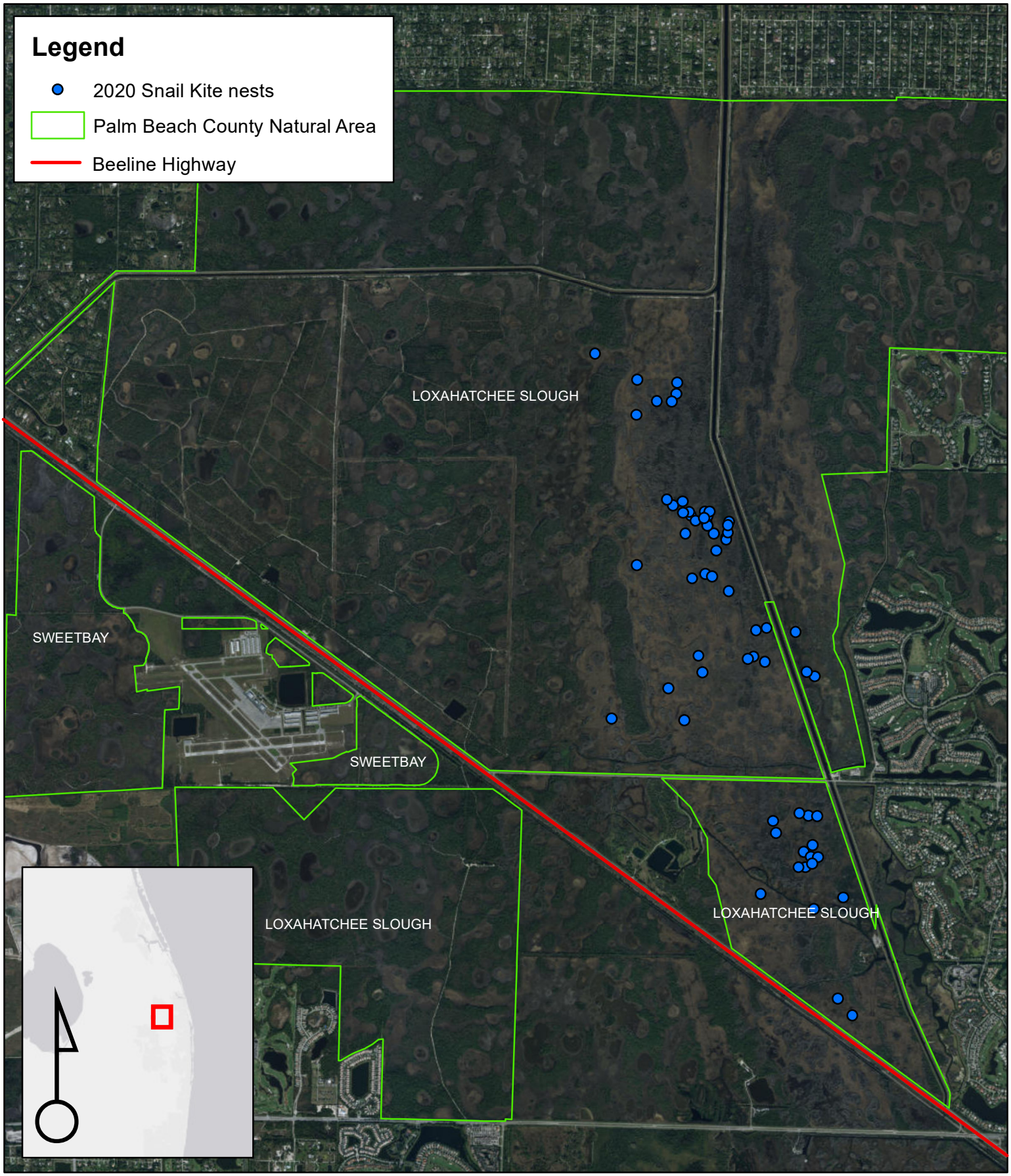
CC: *Attendees (via email)*

Appendix B
2020 Snail Kite Nesting Locations

2020 Snail Kite nesting in Loxahatchee Slough Natural Area

Snail Kite data courtesy of the University of Floirda
Natural Area source: Palm Beach County Information System Services

0 0.5 1 2 Miles



Appendix C
Wood Stork Key

United States Department of the Interior

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

May 18, 2010

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

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

Dear Mr. Kinard:

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

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

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

Wood stork

Habitat

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

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

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

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

Conservation Measures

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

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

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

The Key is as follows:

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

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

---

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Monitoring and Reporting Effects

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

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

Sincerely yours,

Paul Souza
Field Supervisor
South Florida Ecological Services Office

Enclosures

cc: w/enclosures (electronic only)
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EPA, West Palm Beach, Florida (Richard Harvey)
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HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

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HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Introduction

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

General

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

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

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

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

I. Feeding habitat.

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

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

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

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

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

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

II. Nesting habitat.

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

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

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

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

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

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

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

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

III. Roosting habitat.

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

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

IV. Management zones and guidelines for feeding sites.

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

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

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

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

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

V. Management zones and guidelines for nesting colonies.

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

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

2. Recommended Restrictions:

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

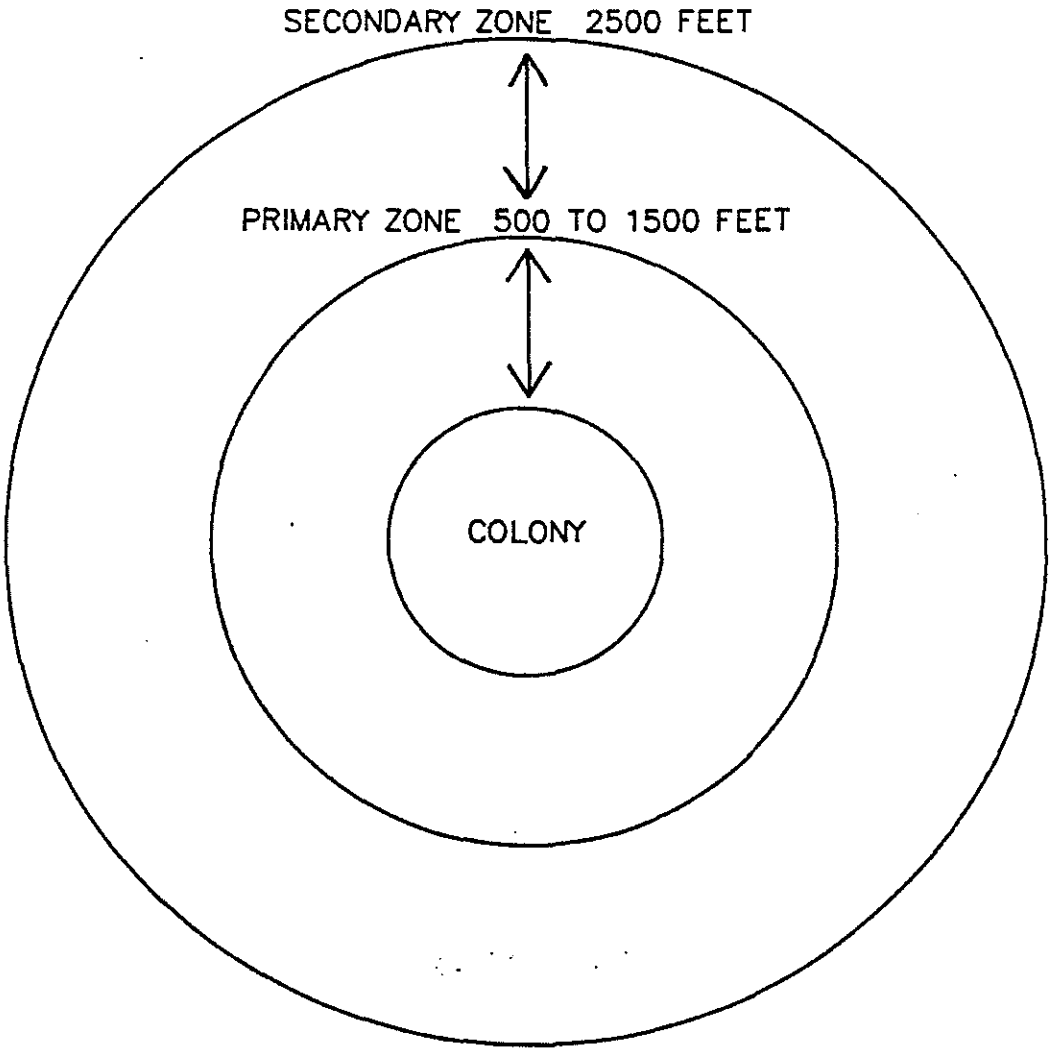
(1) Any lumbering or other removal of vegetation, and

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

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

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

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


SECONDARY ZONE 2500 FEET
PRIMARY ZONE 500 TO 1500 FEET
COLONY

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

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

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

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

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

2. Recommended Restrictions:

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

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

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

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

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

VI. Roosting site guidelines.

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

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

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

VII. Legal Considerations.

A. Federal Statutes

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

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

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

B. State Statutes

1. State of Alabama

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

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

2. State of Florida

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

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

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

3. State of Georgia

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

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

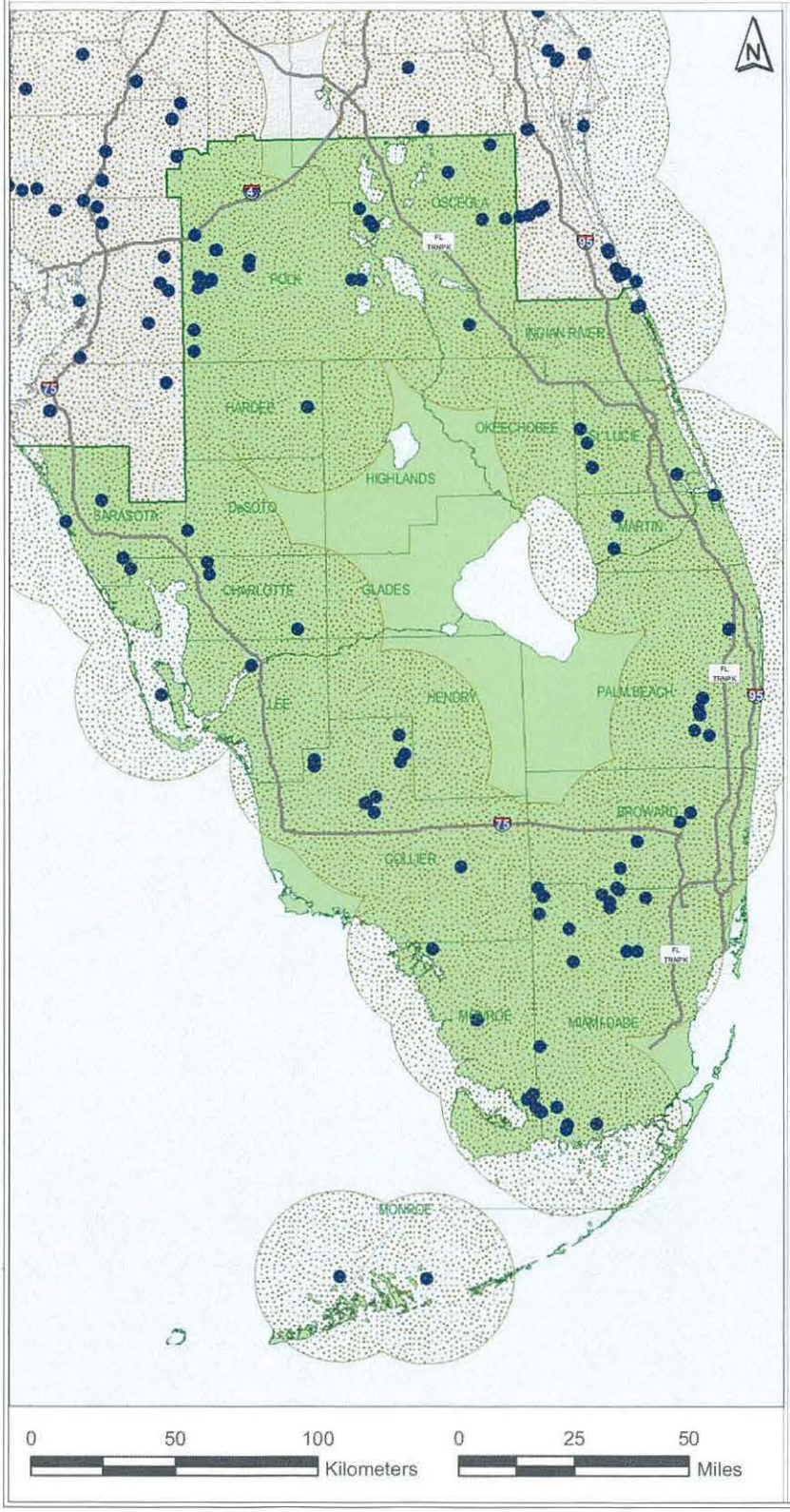
Section 27-3-22 states, in part, "It shall be unlawful for any person to hunt, trap, take, possess, sell, purchase, ship, or transport any hawk, eagle, owl, or any other bird or any part, nest, or egg thereof...".

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

4. State of South Carolina

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

Wood Stork



Nesting Colonies
Core Foraging Areas

1999 to 2005

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

U.S. FISH & WILDLIFE SERVICE

Produced by:
South Florida Ecological Services Office
http://verobeach.fws.gov
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Enclosure 3

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

Foraging Habitat

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

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

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

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

Table 1: Vegetation classes

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

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

Table 2: Habitat Foraging Suitability

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

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

Table 3. Foraging Suitability Percentages

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

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

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

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

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

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

Table 4. SFWMD Hydroperiod Classes – Everglades Protection Area

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

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

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

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

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

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

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

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

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

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

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

Table 6. Extrapolated Fish Densities for SFWMD Hydroperiods

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

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

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

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

Table 7. Extrapolated Mean Annual Fish Biomass for SFWMD Hydroperiods

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

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

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

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

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

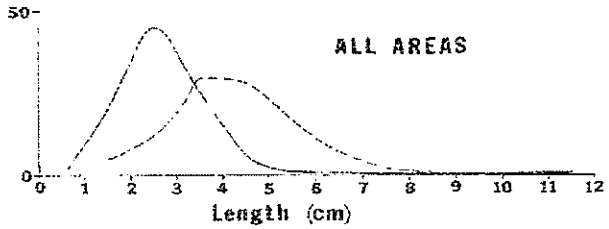

FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Table 10 Actual Biomass Consumed by Wood Storks

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

Sample Project of Biomass Calculations and Corresponding Concurrence Determination

Example 1:

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

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

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

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

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

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

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

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

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

Project Site Balance 2.98 kg- 2.92 kg = 0.07kg

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

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

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

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

Example 2:

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

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

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

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

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

Net increase: 8.62 kg-3.19 kg = 5.43 kg

Project Site Balance 5.43 kg- 2.92 kg = 2.51 kg

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

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

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

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Appendix D

FWS Wood Stork Biomass Worksheet

Hydroperiod	Existing Footprint		Preserve Areas				Net Change Per Hydroperiod Class	
			Pre Enhancement		Post Enhancement			
	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams
Class 1: 0 to 60 Days							0	0
Class 2: 60 to 120 Days							0	0
Class 3: 120 to 180 Days							0	0
Class 4: 180 to 240 Days							0	0
Class 5: 240 to 300 Days							0	0
Class 6: 300 to 330 Days							0	0
Class 7: 330 to 365 Days							0	0
TOTAL	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

% Exotics	F.S.V	Hydroperiods	Crayfish & Fish g/m^2
0-25	1	Class 1 (0-60 days)	0.31
25-50	0.64	Class 2 (60-120 days)	0.62
50-75	0.37	Class 3 (120-180 days)	1.32
75-90	0.03	Class 4 (180-240 days)	2.34
>90	0.03	Class 5 (240-300 days)	2.93
		Class 6 (300-330 days)	3.36
		Class 7 (330-365 days)	3.63

IMPACT AREA

Hydroperiods	Acres	% exotics	F.S.V	m^2	m^2 suitable	crayfish & fish g/m^2	available biomass	32.5% consum.	Biomass (kg)
Class 5 (240-300 days)	12.78	0-25	1	51,719.04	51,719.04	2.93	151,536.78	49,249.45	49.25
Class 1 (0-60 days)	12.54	0-25	1	50,747.79	50,747.79	0.31	15,731.81	5,112.84	5.11
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
TOTAL	**25.32**								**54.36**

PRESERVE AREA (PRE)

Hydroperiods	Acres	% exotics	F.S.V	m^2	m^2 suitable	crayfish & fish g/m^2	available biomass	32.5% consum.	Biomass (kg)
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00

			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
TOTAL	**0.00**								**0.00**

PRESERVE AREA (POST)

Hydroperiods	Acres	% exotics	F.S.V	m^2	m^2 suitable	crayfish & fish g/m^2	available biomass	32.5% consum.	Biomass (kg)
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
			FALSE	0.00	0.00	FALSE	0.00	0.00	0.00
TOTAL	**0.00**								**0.00**

Total Biomass within Existing Footprint	0.0		
Total Biomass within Preserve Area Pre-Enhancement	0.0	**Net Change**	0.0
Total Biomass within Preserve Area Post-Enhancement	0.0		

C-2: Section 7 Consultation

U.S. Department
of Transportation
Federal Aviation Administration

Orlando Airports District Office
8427 SouthPark Circle, Suite 524
Orlando, FL 32819
Phone: (407) 487-7720
Fax: (407) 487-7135

February 6, 2023

[via email: verobeach@fws.gov.]

Mr. John M. Wrublik
South Florida Ecological Services Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960-3559

RE: Section 7 Consultation
Proposed Runway Extension of Runway 14-32 and Associated Improvements
North Palm Beach County General Aviation Airport (Palm Beach County, Florida)

Dear Mr. Wrublik,

Palm Beach County, through its Airports Department, has requested approval from the Federal Aviation Administration (FAA) to extend Runway 14-32 at North Palm Beach County General Aviation Airport (F45) from its current length of 4,300 feet to 6,000 feet. The proposed project, which is described below, requires FAA actions and approval. These federal actions are subject to provisions in the *Endangered Species Act* (ESA). The actions are also subject to the *National Environmental Policy Act* (NEPA) and an Environmental Assessment is currently being prepared to meet FAA's obligations under NEPA.

The purpose of this letter is to initiate informal consultation with the U.S. Fish and Wildlife Service pursuant to Section 7 of the ESA and its implementing regulations at 50 CFR Part 402. The Biological Assessment prepared for the proposed project provides additional project information and evaluates the project's effect on special status fish, wildlife, and plant species. A copy of the BA can be downloaded using the link below.

https://oneesa.egnyte.com/fl/TfW53dJsPB/F45_BA_220901_.

Project Information

F45 is located on 1,832 acres in north Palm Beach County, two miles west of the city of Palm Beach Gardens and 12 miles northwest of the city of West Palm Beach. The airport is adjacent to State Route 710 (Beeline Highway), the Loxahatchee Slough Natural Area, and the Sweetbay Natural Area. The runway extension project proposed by Palm Beach County is summarized below. A more detailed description and graphics are provided in Section 1.3 of the Biological Assessment.

- Extend Runway End 14 to the northwest 1,700 feet. This would increase the length of the runway from 4.300 feet to 6,000 feet. The width of the proposed runway would be 100 feet, an increase of 25 feet from the runway's present width of 75 feet. The existing runway-

to-taxiway centerline separation would be increased from its present distance of 240 feet to 300 feet. This would be accomplished by shifting the runway centerline 60 feet to the southwest.

- Extend the existing parallel Taxiway F to the northwest 1,700 feet and construct a connector taxiway to the new Runway 14 end threshold.
- Clear, grade, and compact soils within the new Runway Safety Area (RSA)[1] and Taxiway Safety Area to support aircraft and emergency vehicles. The width of the RSA would be 500 feet (centered on the runway centerline) and extend 1,000 feet beyond each end of the runway. The width of the Taxiway Safety Area would be 118 feet (centered on the taxiway centerline). Clear grade, and compact soils within the proposed Runway 14-32 and Taxiway F Object Free Areas (OFAs). The width of the ROFA would be 800 feet (centered on the runway centerline) and extend 1,000 feet beyond each end of the runway.
- Realign a section of Aviation Road (airport entrance road) outside of the proposed Runway Protection Zone (RPZ). Replace sections of airport and Sweetbay Natural Area maintenance and service roads.
- Construct an Airport Traffic Control Tower
- Clear or trim trees, vegetation, and objects that penetrate proposed 14 CFR Part 77 airspace surfaces (e.g., Threshold Siting Surface, Departure Surfaces, Approach/Transitional Surfaces, or Runway OFA) and continuously maintain vegetation below a designated height that does not penetrate these surfaces.
- Culvert an existing drainage ditch and canal that runs through the proposed RSA and RPZ beyond the end of Runway 32.
- Modify the airport's stormwater management system to accommodate the proposed improvements.

Species Evaluation

The Action Area includes areas that will be directly and indirectly impacted by the proposed action. Direct impacts are those where construction and ground disturbance will occur and impacts are permanent. The indirect impact area includes those area where tree trimming and vegetation maintenance would occur. Approximately 79.91 acres of upland habitat (herbaceous dry prairie, upland shrub and brushland, pine flatwoods, and disturbed land) would be directly impacted and 36.21 acres would be indirectly impacted. Approximately 53.63 acres of wetlands (exotic wetland hardwoods, wetland scrub, freshwater marsh, and wet prairie) would be impacted (25.51 acres of direct impact and 28.12 acres of indirect impacts).

The proposed action has been reviewed for its effects on federally-listed threatened and endangered species, and designated critical habitat. Based on the analysis contained in the Biological Assessment (BA), FAA has determined that the following listed species occur, or have the potential to occur, in the vicinity of the airport and project site.

[1] The Runway Safety Area enhances safety for aircraft that undershoot, overshoot, or veer off the runway. It also provides accessibility for emergency vehicles.

American alligator (*Alligator mississipiensis*)
Eastern indigo snake (*Drymarchon corais couperi*)
Audubon's crested caracara (*Caracara cheriway*)
Everglade snail kite (*Rostrhamus sociabilis plumbeus*)
Red-cockaded woodpecker (*Picoides borealis*)
Wood stork (*Mycteria americana*)
Florida bonneted bat (*Eumops floridanus*)
Florida panther (*Puma concolor coryi*)

After reviewing the status of these federally-listed species; the effects of the Proposed Action; and the proposed conservation measures to avoid, minimize, and mitigate the effects, the FAA has determined that the project would have No Effect on the Eastern indigo snake, Audubon's crested caracara, Everglade snail kite, Red-cockaded woodpecker, Florida bonneted bat, and Florida panther. The American alligator, is currently listed as threatened due to similarity of appearance to the American crocodile (*Crocodylus acutus*), but only where their habitats/ranges overlap. The crocodile's habitat and range do not include the Action Area; therefore, the alligator is not protected at this location.

The Proposed Action would affect suitable foraging habitat for the Wood Stork. Based on habitat, field observations, available information, and the Wood Stork Key, FAA determined the proposed runway extension project May Affect, Not Likely to Adversely Affect the wood stork.

Request for Concurrence

FAA appreciates USFWS's review of the proposed action and the Biological Assessment. Please let us know if the USFWS concurs with the effect determinations listed above.

If you have any questions or would like to discuss the project and our determination, please contact me at peter.m.green@faa.gov or (407) 487-7296.

Sincerely,

Peter Matthias Green Digitally signed by Peter Matthias Green
Date: 2023.02.06 13:14:47 -05'00'

Peter M. Green, AICP
Environmental Protection Specialist

cc. Mr. Gary Sypek, Palm Beach County Department of Airports

From: Green, Peter M (FAA) <peter.m.green@faa.gov>
Sent: Monday, February 6, 2023 1:18:23 PM (UTC-05:00) Eastern Time (US & Canada)
To: Vero Beach, FW4 <verobeach@fws.gov>
Cc: Reed, Amy M (FAA) <amy.m.reed@faa.gov>; Gary Sypek <gsypek@pbia.org>; Julie Sullivan <JSullivan@esassoc.com>; Chris Jones <CJones@esassoc.com>
Subject: [EXTERNAL] Section 7 Consultation - Runway Extension at North Palm Beach County General Aviation Airport

Dear Mr. Wrublik,

Palm Beach County has requested approval from the Federal Aviation Administration to extend Runway 14-32 at the North Palm Beach County General Aviation Airport from its current length of 4,300 feet to 6,000 feet. The attached letter serves as FAA's request to initiate Section 7 consultation with the US Fish and Wildlife Service. I am also forwarding a link to download a copy of the Biological Assessment that was prepared for the project.

https://oneesa.egnyte.com/fl/TfW53dJsPB/F45_BA_220901_

Let me know if you have any questions about the proposed project, the Biological Assessment, or FAA's determinations.

Regards,

Peter Green

Peter M. Green, AICP
Environmental Protection Specialist
Orlando Airports District Office
Federal Aviation Administration
8427 SouthPark Circle, Suite 524
Orlando, Florida 32819
407-487-7296
peter.m.green@faa.gov

Florida Ecological Services Field Office

Service Project Code No. 2023-0042958

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

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

JOSE RIVERA

Digitally signed by JOSE RIVERA
Date: 2023.02.09 12:11:00 -05'00'

Environmental Review Supervisor