

NATURAL RESOURCE EVALUATION

Florida Department of Transportation

District Five

Neptune Road Project Development and Environment Study

Limits of Project: Partin Settlement Road to US 192

Osceola County, Florida

Financial Management Number: 445415-1

ETDM Number: 14402

Date: July 2020

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

Natural Resource Evaluation Report

Neptune Road PD&E

FPID: 445415-1

PS-18-9905-DG

ETDM: 14402

Federal Aid Project Number: N/A

Prepared for:



**Osceola County, Florida
Department of Transportation and Transit
1 Courthouse Square, Suite 3100
Kissimmee, FL 34741**

JULY 2020

Prepared by:
Kimley-Horn and Associates, Inc.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	ES-1
1.0 INTRODUCTION	1
2.0 PROJECT DESCRIPTION	2
3.0 PURPOSE AND NEED	4
4.0 ALTERNATIVES ANALYSIS	5
4.1 NO-BUILD ALTERNATIVE	5
4.2 TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS ALTERNATIVE	5
4.3 MULTIMODAL ALTERNATIVES	5
4.4 BUILD ALTERNATIVES	6
4.4.1 PARTIN SETTLEMENT ROAD TO OLD CANOE CREEK ROAD	6
4.4.2 OLD CANOE CREEK ROAD TO US 192	8
5.0 EXISTING ENVIRONMENTAL CONDITIONS	10
5.1 METHODOLOGY FOR ACCESSING NATURAL AND BIOLOGICAL FEATURES	10
5.2 EXISTING AND FUTURE LAND USE	10
5.2.1 EXISTING LAND USE	10
5.2.2 FUTURE LAND USE	10
5.2.3 HABITAT AND VEGETATIVE COVER	11
5.2.4 SOILS	22
6.0 WETLANDS EVALUATION	30
6.1 DATA COLLECTION	30
6.2 WETLAND CHARACTERIZATION	31
6.3 WETLAND AND SURFACE WATER IMPACTS ANALYSIS	39
6.3.1 DIRECT IMPACTS	39
6.3.2 SECONDARY IMPACTS	41
6.3.3 STORMWATER POND SCREENING	42
6.4 FUNCTIONAL ASSESSMENT	44
6.4.1 METHODOLOGY	44
6.4.2 UMAM RESULTS	44
6.5 CONCEPTUAL MITIGATION	45
6.6 CUMULATIVE EFFECTS	46
7.0 PROTECTED SPECIES AND HABITAT ASSESSMENT	48
7.1 DATA COLLECTION	48
7.2 LISTED SPECIES	49
7.3 FIELD SURVEYS	51
7.4 HABITAT IMPACTS	53
7.4.1 POTENTIAL PROJECT IMPACTS	53

7.5 LISTED SPECIES SURVEY RESULTS AND IMPACTS..... 53
7.5.1 FEDERAL LISTED FAUNA..... 53
7.5.2 STATE LISTED FAUNA 57
7.5.3 LISTED PLANT SPECIES 60
7.5.4 NON-LISTED SPECIES..... 65
7.6 INDIRECT EFFECTS..... 67
8.0 IMPLEMENTATION MEASURES AND DESIGN CONSIDERATIONS.....70
9.0 PERMITTING REQUIREMENTS AND COORDINATION71
10.0 CONCLUSIONS AND RECOMMENDATIONS.....72
11.0 COMMITMENTS.....74
12.0 REFERENCES75

TABLES

Table ES-1: Direct Wetland and Surface Water Impacts by Alternative (Acres)..... ES-2

Table ES-2: Secondary Wetland Impacts by Alternative (Acres)..... ES-3

Table ES-3: Potential Federal and State Protected Fauna and Flora ES-3

Table ES-4: Federally Listed Species Effects Determinations..... ES-6

Table ES-5: State Listed Species Effects Determinations ES-7

Table 1: Summary of Land Cover/Land Use within the Study Area 12

Table 2: NRCS Soils Identified in the Study Area in Osceola County..... 23

Table 3: Wetland and Surface Water Characteristics within the Study Area 32

Table 4: Direct Wetland and Surface Water Impacts by Alternative (Acres)..... 40

Table 5: Secondary Wetland Impacts by Alternative (Acres)..... 41

Table 6: Summary of Stormwater Pond Screening 42

Table 7: Summary of UMAM Scores 44

Table 8: Potential Wetland Functional Loss..... 45

Table 9: Potential Federal and State Protected Fauna and Flora 49

Table 10: Wildlife Species/Signs Observed Within the Study Area..... 51

Table 11: Habitat Impacts by Alternatives (Acres)..... 53

Table 12: Wood Stork Suitable Foraging Biomass Analysis for the Preferred Alignment 56

Table 13: Direct Wetland and Surface Water Impacts by Alternative (Acres)..... 72

Table 14: Secondary Wetland Impacts by Alternatives (Acres) 73

FIGURES

Figure 1: Project Location 2

Figure 2: Project Limits..... 3

Figure 3: Alternative 1 – Typical Section from Partin Settlement Road to Old Canoe Creek Road 6

Figure 4: Alternative 2 – Typical Section from Partin Settlement Road to Ames Haven Road..... 7

Figure 5: Alternative A – Typical Section from Old Canoe Creek Road to US 192 8

Figure 6: Alternative B – Typical Section from Old Canoe Creek Road to US 192 9

Figure 7A: FLUCFCS Map (1 of 4)..... 14

Figure 7B: FLUCFCS Map (2 of 4)..... 15

Figure 7C: FLUCFCS Map (3 of 4)..... 16

Figure 7D: FLUCFCS Map (4 of 4) 17

Figure 8A: Osceola County FLU Map (1 of 4) 18

Figure 8B: Osceola County FLU Map (2 of 4)..... 19

Figure 8C: Osceola County FLU Map (3 of 4)..... 20

Figure 8D: Osceola County FLU Map (4 of 4) 21

Figure 9A: NRCS Soils Map (1 of 4)..... 25

Figure 9B: NRCS Soils Map (2 of 4)..... 26

Figure 9C: NRCS Soils Map (3 of 4)..... 27

Figure 9D: NRCS Soils Map (4 of 4) 28

Figure 10A: Wetlands and Surface Water Maps (1 of 4) 35

Figure 10B: Wetlands and Surface Water Maps (2 of 4)..... 36

Figure 10C: Wetlands and Surface Water Maps (3 of 4)..... 37

Figure 10D: Wetlands and Surface Water Maps (4 of 4) 38

Figure 11: Potential Stormwater Pond Alternatives Map..... 43

Figure 12: Listed Species Map..... 68

Figure 13: Bald Eagle Nest Map 69

APPENDICES

Appendix A: AN Comments

Appendix B: FNAI Standard Data Report

Appendix C: USFWS IPaC Trust Resources Report

Appendix D: Wetlands and Surface Waters Photographic Log

Appendix E: Uniform Mitigation Assessment Method (UMAM) Data Sheets

Appendix F: Historical Aerials

Appendix G: USFWS Maps of Consultation Areas

Appendix H: Florida Bonneted Bat Survey Report (July 2020)

Appendix I: Crested Caracara Survey Report (May 2019)

Appendix J: South Florida Wood Stork Effect Determination Key

Appendix K: Standard Protection Measures for the Eastern Indigo Snake

Appendix L: Agency Coordination

Appendix M: South Florida Water Management District (SFWMD) Right-of-Way Letter

EXECUTIVE SUMMARY

In accordance with Presidential Executive Order 11990, Federal Highway Administration (FHWA) Technical Advisory T6640.8A, Section 7(c) of the Endangered Species Act (ESA) of 1973 (ESA, P.L. 93-205) and the Florida Department of Transportation (FDOT) *Project Development and Environment (PD&E) Manual*, Part 2, Chapters 9 and 16 (January 14, 2019), a Natural Resources Evaluation (NRE) was conducted for the proposed widening of Neptune Road. The improvements being evaluated include alternatives for the widening from Partin Settlement Road to US 192. The project is in Osceola County, Florida (see **Project Location Map - Figure 1**). The following Natural Resource Evaluation (NRE) summarizes the results of these assessments. An Advance Notification (AN) package was distributed to the agencies on August 31, 2018 and the project was screened through the Efficient Transportation Decision Making (ETDM) process on August 27, 2019 (ETDM #14402).

The purpose of this report is to identify wetlands and other surface waters within the project area, evaluate potential wetland and surface water impacts, identify measures to avoid and minimize impacts, and identify conceptual mitigation options. The purpose of this report is also to determine if the proposed project is likely to adversely affect, will jeopardize the continued existence of, or will result in the destruction or adverse modification of any critical habitat of any endangered or threatened species (listed species).

The proposed “action” under consideration is the widening of Neptune Road from Partin Settlement Road to US 192 including pedestrian and bicyclist facilities and construction of stormwater management facilities. Four alternatives were evaluated and are discussed in Section 2.4.

Wetlands

Per the *Wetlands Evaluation*, two types of surface waters and three types of wetlands were identified within the study area. The following two tables summarize the direct and secondary impacts to surface waters and wetlands for the four alternatives. Alternative A and B had no direct or secondary impacts to wetlands.

Table ES-1: Direct Wetland and Surface Water Impacts by Alternative (Acres)

SW/WL NUMBER	ALT 1	ALT 2	ALT A	ALT B
SW 2	0.18	0.33	-	-
SW 3	1.57	1.54	-	-
SW 5	-	0.06	-	-
SW 6	0.20	0.20	-	-
SW 7	0.22	0.22	-	-
SW 9	0.04	0.04	-	-
SW 10	0.01	0.01	-	-
SW 11	0.01	0.01	-	-
SW 13	-	-	0.03	0.05
Total Surface Water Impacts	2.23	2.41	0.03	0.05
WL1	0.30	1.20	-	-
WL2	0.19	0.52	-	-
WL4	0.22	0.22	-	-
WL5	0.21	0.06	-	-
WL6	0.13	0.04	-	-
WL7	0.15	-	-	-
WL8	0.04	-	-	-
WL9	0.16	-	-	-
WL11	0.05	-	-	-
WL12	0.09	-	-	-
WL15	0.20	0.20	-	-
WL17	0.83	0.83	-	-
Total Wetland Impacts	2.57	3.07	-	-
Grand Total Surface Water and Wetland Impacts	4.80	5.48	0.03	0.05

Table ES-2: Secondary Wetland Impacts by Alternative (Acres)

WL Number	Alt 1	Alt 2
WL1	0.49	0.56
WL2	0.36	0.34
WL4	0.42	0.42
WL5	0.24	0.23
WL6	0.12	0.12
WL7	0.24	0.22
WL8	0.06	0.06
WL9	0.23	0.23
WL11	0.07	0.07
WL12	0.06	0.05
WL15	0.69	0.69
WL17	0.39	0.39
Total Secondary Wetland Impacts	3.37	3.38

Protected Species and Habitat

Per the *Protected Species and Habitat Assessment*, 21 federally-listed species and 22 state-listed species may occur within the study area, as shown in **Table ES-3** below. Pedestrian surveys for gopher tortoise burrows and listed plant species were conducted on November 30, 2018 and February 19, 2019 and no gopher tortoises or listed plant species were observed within the alignments. Audubon’s crested caracara surveys were conducted January through April 2019, documenting that crested caracaras are not nesting within the alignments of any of the alternatives. A Florida bonneted acoustic and roost survey was conducted May 2020 through June 2020, documenting that this species was not recorded within any of the alternatives. Effect determinations made for the federally listed species evaluated are shown in **Table ES-4**.

Table ES-3: Potential Federal and State Protected Fauna and Flora

Common Name	Scientific Name	Federal Status	State Status	Likelihood of Occurrence
MAMMALS				
Florida Panther	<i>Puma concolor coryi</i>	E	FE	Low
Florida Bonneted Bat	<i>Eumops floridanus</i>	E	FE	Medium
Florida Black Bear	<i>Ursus americanus floridanus</i>	NL*	NL*	Low
Southern Fox Squirrel	<i>Sciurus niger niger</i>	NL**	NL**	High
BIRDS				
Audubon's Crested Caracara	<i>Polyborus plancus audubonii</i>	T	FT	Low
Florida Scrub-Jay	<i>Aphelocoma coerulescens</i>	T	FT	Low
Red-cockaded Woodpecker	<i>Picoides borealis</i>	E	FE	Low

Common Name	Scientific Name	Federal Status	State Status	Likelihood of Occurrence
Everglade Snail Kite	<i>Rostrhamus sociabilis plumbeus</i>	E	FE	Low
Wood Stork	<i>Mycteria americana</i>	T	FT	High
Florida Burrowing Owl	<i>Athene cunicularia floridana</i>	NL	ST	Low
Florida Sandhill Crane	<i>Grus canadensis pratensis</i>	NL	ST	High
Southeastern American kestrel	<i>Falco sparverius paulus</i>	NL	ST	High
Tricolored Heron	<i>Egretta tricolor</i>	NL	ST	Medium
Little Blue Heron	<i>Egretta caerulea</i>	NL	ST	High
Roseate Spoonbill	<i>Platalea ajaja</i>	NL	ST	Medium
Bald Eagle	<i>Haliaeetus leucocephalus</i>	NL***	NL***	High
REPTILES				
Eastern Indigo Snake	<i>Drymarchon corais couperi</i>	T	FT	Low
Florida Pine Snake	<i>Pituophis melanoleucus mugitus</i>	NL	ST	Low
Gopher Tortoise	<i>Gopherus polyphemus</i>	C	ST	Low
PLANTS				
Beautiful Pawpaw	<i>Deeringothamnus pulchellus</i>	E	SE	Low
Britton's Beargrass	<i>Nolina brittoniana</i>	E	SE	Low
Florida Blazing Star	<i>Liatrix ohlingerae</i>	E	SE	Low
Florida Bonamia	<i>Bonamia grandiflora</i>	T	SE	Low
Lewton's Polygala	<i>Polygala lewtonii</i>	E	SE	Low
Paper-like Nailwort	<i>Paronychia chartacea ssp. chartacea</i>	T	SE	Low
Pygmy Fringe Tree	<i>Chionanthus pygmaeus</i>	E	SE	Low
Scrub Buckwheat	<i>Eriogonum longifolium var. gnaphalifolium</i>	T	SE	Low
Scrub Lupine	<i>Lupinus aridorum</i>	E	SE	Low
Short-leaved Rosemary	<i>Conradina brevifolia</i>	E	SE	Low
Sandlace	<i>Polygonella myriophylla</i>	E	SE	Low
Carter's Mustard	<i>Warea carteri</i>	E	SE	Low
Wide-leaf Warea	<i>Warea amplexifolia</i>	E	FE	Low
Ashe's Savory	<i>Calamintha ashei</i>	NL	ST	Low
Celestial Lily	<i>Nemastylis floridana</i>	NL	SE	Low
Cutthroat Grass	<i>Panicum abscissum</i>	NL	SE	Low
Florida Beargrass	<i>Nolina atopocarpa</i>	NL	ST	Low
Florida Spiny-pod	<i>Matelea floridana</i>	NL	SE	Low
Giant Orchid	<i>Pteroglossaspis ecristata</i>	NL	ST	Low
Hartwrightia	<i>Hartwrightia floridana</i>	NL	ST	Low
Many-flowered Grass-pink	<i>Calopogon multiflorus</i>	NL	ST	Low
Nodding Pinweed	<i>Lechea cernua</i>	NL	ST	Low
Pinewoods Bluestem	<i>Andropogon arctatus</i>	NL	ST	Low

Common Name	Scientific Name	Federal Status	State Status	Likelihood of Occurrence
Sand Butterfly Pea	<i>Centrosema arenicola</i>	NL	SE	Low
Scrub Bluestem	<i>Schizachyrium niveum</i>	NL	SE	Low
Star Anise	<i>Illicium parviflorum</i>	NL	SE	Low
Yellow Fringeless Orchid	<i>Platanthera integra</i>	NL	SE	Low

Based on Florida's Endangered and Threatened Species updated December 2018 available on <http://myfwc.com/wildlifehabitats/imperiled/> and 5B-40.0055 Florida Administrative Code (FAC) Regulated Plant Index.

Federal Status: E = Endangered; T = Threatened; C = Candidate Species; NL = Not Listed

State Status: FE = Federally Endangered; FT = Federally Threatened; FT(S/A) = Federally Threatened due to Similarity of Appearance. ST= State Threatened; SE = State Endangered; SSC = Species of Special Concern. Note: Coordination is not required with FWC for federally listed species.

Bold = observed during field reconnaissance

* The Florida black bear is still protected under Florida Black Bear Conservation Rule 68A-4.009 (F.A.C.) and the FWC Florida Black Bear Management Plan.

**The fox squirrel is still protected under Regulations Relating to the Taking of Mammals 68A-29.002 (F.A.C.).

*** The Bald eagle is still protected under the Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act and FWC Management Plan regulations.

Table ES-4: Federally Listed Species Effects Determinations

Species	Effect Determination
Florida Panther	No effect
Florida Bonneted Bat	No effect
Audubon's Crested Caracara	Not likely to adversely affect
Florida Scrub-Jay	No effect
Red-cockaded Woodpecker	No effect
Everglade Snail Kite	No effect
Wood Stork	Not likely to adversely affect
Eastern Indigo Snake	No effect
Beautiful Pawpaw	No effect
Britton's Beargrass	No effect
Scrub Blazing Star	No effect
Florida Bonamia	No effect
Lewton's Polygala	No effect
Paper-like Nailwort	No effect
Pygmy Fringe Tree	No effect
Scrub Buckwheat	No effect
Scrub Lupine	No effect
Short-leaved Rosemary	No effect
Sandlace	No effect
Carter's Mustard	No effect
Wide-leaf Warea	No effect

Nineteen Florida Fish and Wildlife Conservation Commission (FWC) state-listed species were evaluated in this study. Effect determinations made for the state listed species evaluated are shown in **Table ES-5**. A 100% gopher tortoise survey will be conducted during design and permitting, and any gopher tortoises observed within 25 feet from construction will be relocated. The following additional surveys will be conducted during design and permitting for state listed species: southeastern American kestrel, Florida sandhill crane, and Florida burrowing owl. Osceola County commits to conducting the above-mentioned surveys to minimize impacts to protected species. No adverse effects are anticipated to state listed species.

Table ES-5: State Listed Species Effects Determinations

Species	Effect Determination
Florida Burrowing Owl	No adverse effect anticipated
Florida Sandhill Crane	No adverse effect anticipated
Southeastern American Kestrel	No adverse effect anticipated
Tricolored Heron	No adverse effect anticipated
Little Blue Heron	No adverse effect anticipated
Roseate Spoonbill	No adverse effect anticipated
Florida Pine Snake	No effect anticipated
Gopher Tortoise	No adverse effect anticipated
Ashe’s Savory	No adverse effect anticipated
Celestial Lily	No adverse effect anticipated
Cutthroat Grass	No adverse effect anticipated
Florida Beargrass	No effect anticipated
Florida Spiny-pod	No adverse effect anticipated
Giant Orchid	No effect anticipated
Hartwrightia	No effect anticipated
Many-flowered Grass-pink	No effect anticipated
Nodding Pinweed	No effect anticipated
Pinewoods Bluestem	No effect anticipated
Sand Butterfly Pea	No effect anticipated
Scrub Bluestem	No effect anticipated
Star Anise	No adverse effect anticipated
Yellow Fringeless Orchid	No adverse effect anticipated

MITIGATION

Mitigation credits will be purchased from a mitigation bank that is permitted by South Florida Water Management District (SFWMD) and US Army Corps of Engineers (USACE) to service the Lake Tohopekaliga Drainage Basin. The following banks are within the same drainage basin and service the project study area: Reedy Creek Mitigation Bank, Southport Ranch Mitigation Bank, and Florida Mitigation Bank. These three banks have both forested and herbaceous credits available for sale.

EFH ASSESSMENT

National Marine Fisheries Service (NMFS) indicated that Essential Fish Habitat (EFH) would not be impacted and an EFH assessment is not required. Therefore, this NRE does not include an EFH Assessment.

1.0 INTRODUCTION

In accordance with Presidential Executive Order 11990, Federal Highway Administration (FHWA) Technical Advisory T6640.8A, Section 7(c) of the Endangered Species Act (ESA) of 1973 (ESA, P.L. 93-205) and the Florida Department of Transportation (FDOT) Project Development and Environment (PD&E) Manual, Part 2, Chapters 9 and 16 (January 14, 2019), a Natural Resources Evaluation was conducted for the proposed widening of Neptune Road. The improvements being evaluated include alternatives for the widening from Partin Settlement Road to US 192. The project is in Osceola County, Florida (see **Project Location Map - Figure 1**). The following Natural Resource Evaluation (NRE) summarizes the results of these assessments.

An Advance Notification (AN) package was distributed to the agencies on August 31, 2018. Comments were received from several agencies but the only comments pertaining to the natural resources were from the National Marine Fisheries Service (NMFS) and the US Environmental Protection Agency (USEPA). The AN comments from the NMFS and the USEPA are included in **Appendix A**. NMFS indicated that Essential Fish Habitat (EFH) would not be impacted and an EFH assessment is not required. Further, NMFS is unaware of any threatened or endangered species or critical habitat under NMFS' jurisdiction but indicated the project should be coordinated with the US Fish and Wildlife Service (USFWS). NMFS did provide comments regarding the benefits of freshwater wetlands and if wetland impacts are unavoidable, sequential minimization and mitigation should take place pursuant to the Fish and Wildlife Coordination Act. Because there are no EFH resources within the study area, this NRE does not include an EFH Assessment.

The purpose of this report is to identify wetlands and other surface waters within the project area, evaluate potential wetland and surface water impacts, identify measures to avoid and minimize impacts, and identify conceptual mitigation options. The purpose of this report is also to determine if the proposed project is likely to adversely affect, will jeopardize the continued existence of, or will result in the destruction or adverse modification of any critical habitat of any endangered or threatened species (listed species).

The proposed "action" under consideration is the widening of Neptune Road from Partin Settlement Road to US 192 including pedestrian and bicyclist facilities and construction of stormwater management facilities. Four alternatives were evaluated and are discussed in Section 2.4.

2.0 PROJECT DESCRIPTION

This project involves a 3.9-mile segment of Neptune Road extending from Partin Settlement Road to US 192 in Osceola County. The section east of the St. Cloud canal (approximately 1.1 miles in length) is within the City of St. Cloud. From Partin Settlement Road to Old Canoe Creek Road, the proposed project improves the existing 2-lane roadway to a 4-lane, divided roadway with a curbed median, with premium bicycle and pedestrian facilities (i.e., bike lanes, multiuse path(s), and/or sidewalks). From Old Canoe Creek Road to US 192, the project widens the existing 2-lane roadway to 4-lanes with sidewalks. Bridge structures are to be replaced and stormwater management facilities will be evaluated. **Figure 1** illustrates the project location and **Figure 2** illustrates the project limits.

Figure 1: Project Location

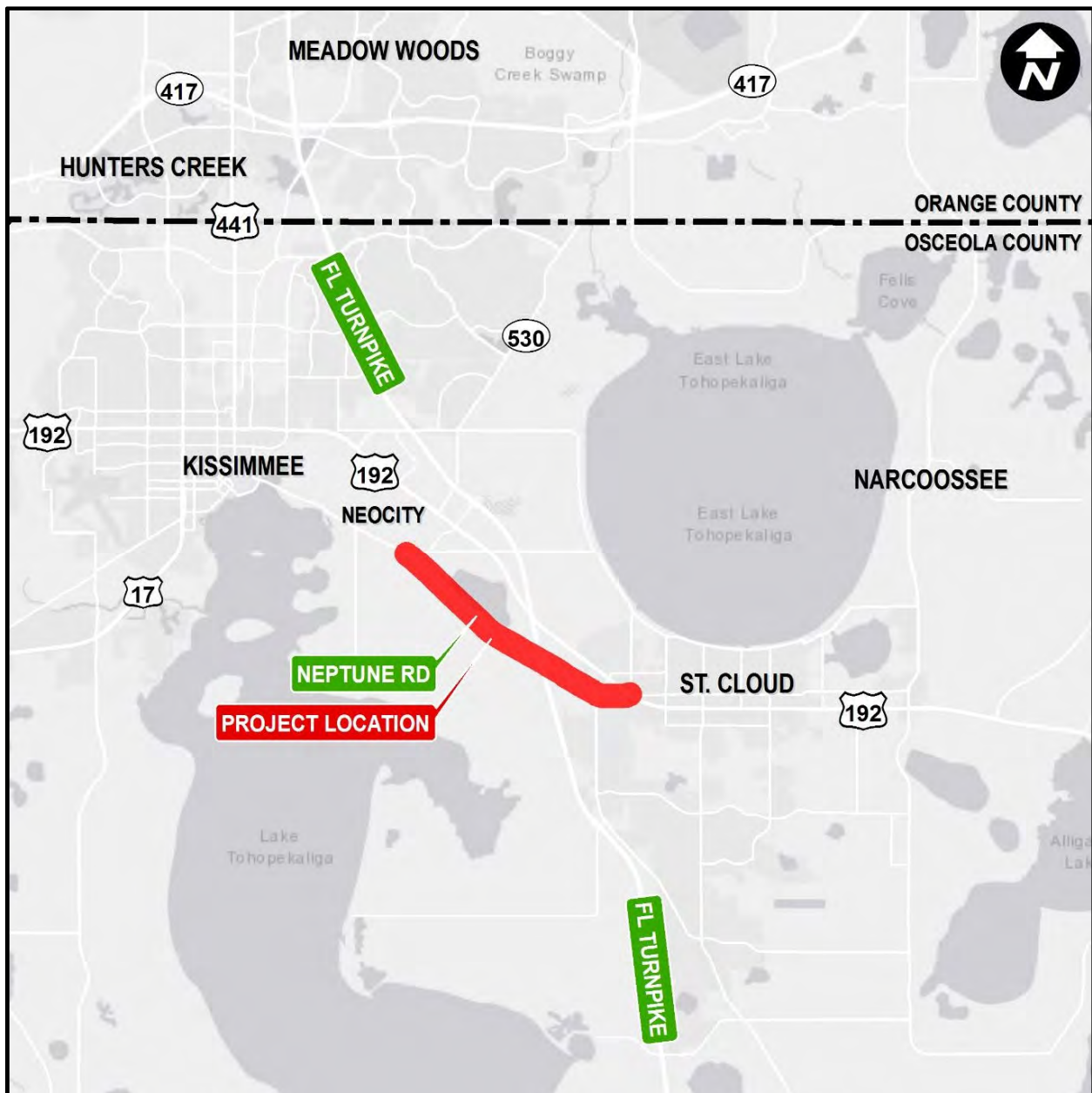
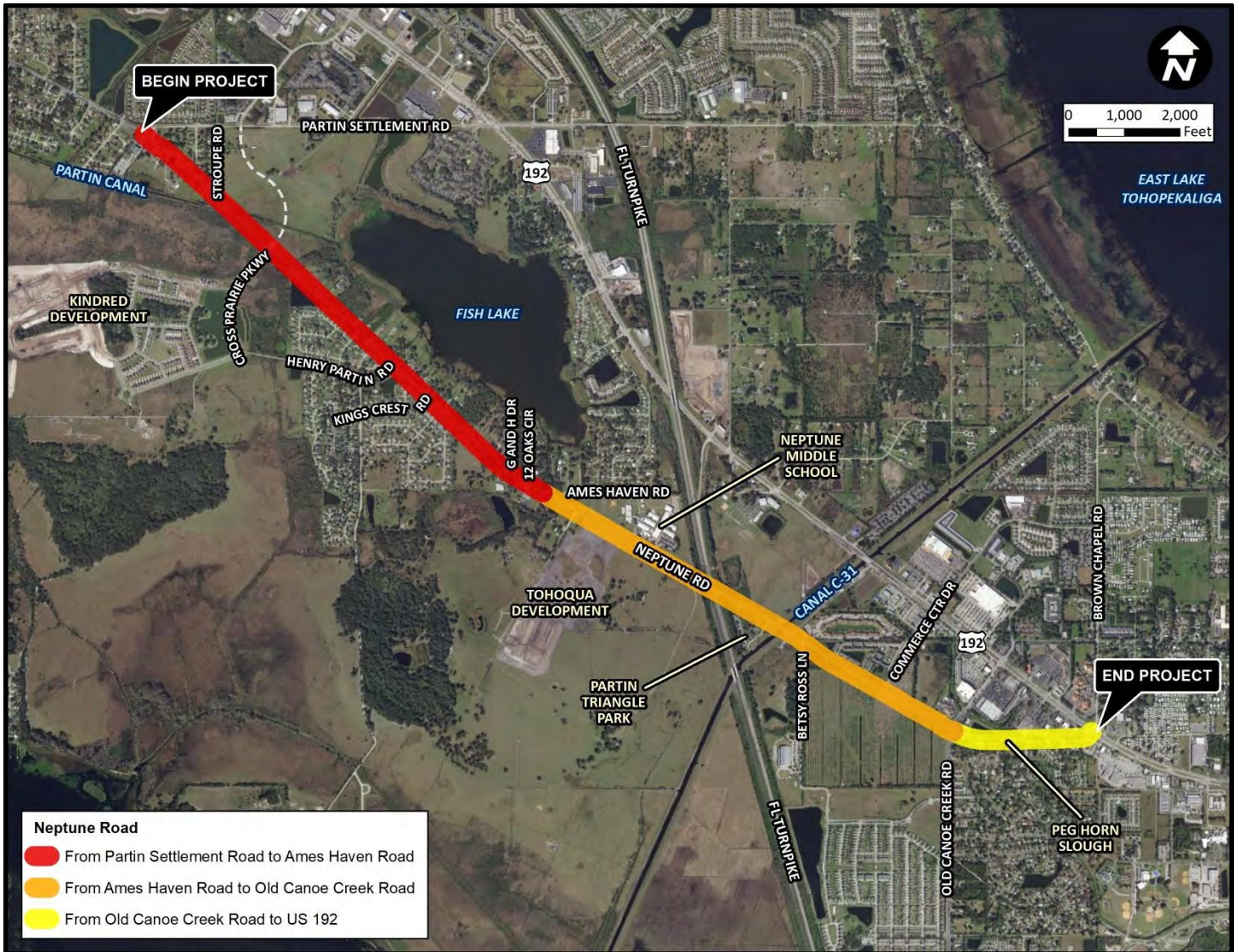


Figure 2: Project Limits



3.0 PURPOSE AND NEED

Purpose

The purpose of the project is to address capacity and safety issues along the 3.9-mile segment of Neptune Road.

Need

The need for the project is based on capacity and safety.

Capacity

The 2017 annual average daily traffic (AADT) volume on Neptune Road, between Partin Settlement and Old Canoe Creek Road was 18,100 resulting in a volume to capacity (V/C) ratio of 1.02, which indicates level of service (LOS) F operating conditions. The 2040 traffic volumes on Neptune Road between Partin Settlement Road to US 192 are projected to range between 27,000 and 55,000 AADT, resulting in LOS F for the entire corridor with V/C ratios ranging from 1.94 to 2.15.

Safety

A total of 195 crashes were reported for the five-year period (January 1st, 2013 through December 31st, 2017), including three fatal crashes and 109 injury crashes, which resulted in three fatalities and 187 injuries. The number of reported crashes per year nearly doubled over the five-year period:

- 28 crashes in 2013
- 22 crashes in 2014
- 33 crashes in 2015
- 57 crashes in 2016
- 55 crashes in 2017

A crash type analysis was conducted and the predominant crash type along the corridor was the rear-end crash (47.7 percent). Approximately 49 percent of the rear-end collisions occurred at-fault in the westbound direction and 30 percent occurred at-fault in the eastbound direction. Rear-end crashes occurred along the entire length of the corridor but were most concentrated along the sections in the vicinity of Ames Haven Road, as well as at the Commerce Center Drive and Stroupe Road intersections. The next most common crash types were left-turn crashes (14.4 percent) and run-off-the-road (ROTR) crashes (13.3 percent). Left-turn crashes were most concentrated at the intersection of Neptune Road at Stroupe Road, and ROTR crashes were most concentrated along the section of Neptune Road near Ames Haven Road.

4.0 ALTERNATIVES ANALYSIS

4.1 NO-BUILD ALTERNATIVE

The No-Build Alternative is an option where the proposed project activity (i.e., widening Neptune Road) would not take place. The No-Build Alternative provides the baseline for establishing environmental impacts of the build alternatives.

4.2 TRANSPORTATION SYSTEM MANAGEMENT AND OPERATIONS ALTERNATIVE

A Transportation System Management and Operations (TSM&O) Alternative generally provides short-term improvements that extend the service life of the facility. TSM&O Alternatives include activities and strategies designed to optimize the performance and utilization of the existing infrastructure through implementation of systems, services, and projects to preserve the capacity and improve the security, safety, and reliability of the transportation system. Example TSM&O strategies include upgrades or additions to the existing facility, such as arterial traffic management systems, traffic incident management, work zone traffic management, road weather management, traveler information services, congestion pricing, parking management, traffic control, commercial vehicle operations, transit priority signals systems, and freight management.

The No-Build Alternative already includes providing the maximum number of lanes (through and turn lanes) at the signalized intersections; therefore, the existing intersections have already been optimized and the analysis of No-Build conditions is representative of a TSM&O Alternative. Additional through lanes will need to be added to provide the needed capacity and transportation demand identified in the purpose and need for the project. Therefore, no TSM&O Alternative was considered.

4.3 MULTIMODAL ALTERNATIVES

All build alternatives include provisions for bicycles, pedestrians and automobiles. Transit is not currently provided along Neptune Road and it is not planned to be provided. Transit (bus) is provided along US 192 which runs parallel to Neptune Road.

4.4 BUILD ALTERNATIVES

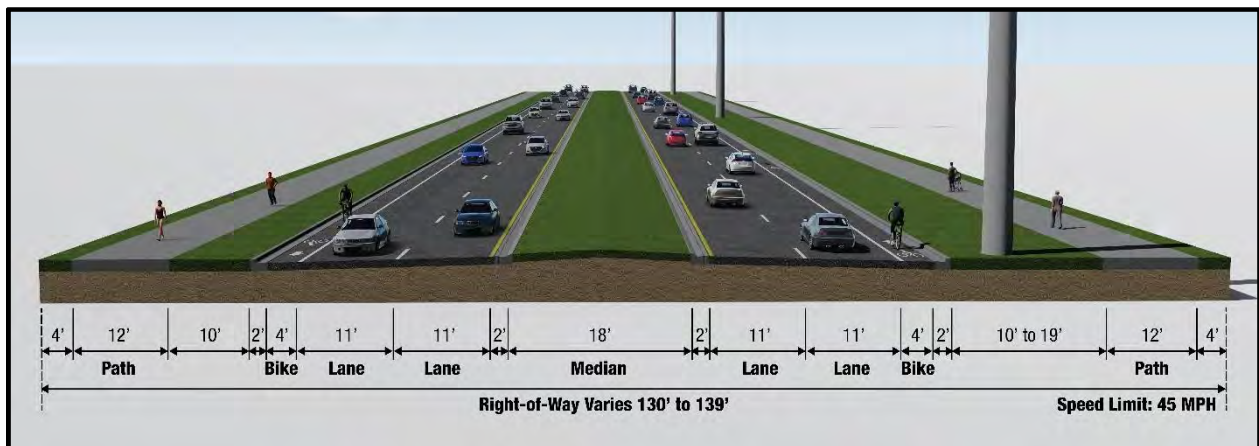
4.4.1 PARTIN SETTLEMENT ROAD TO OLD CANOE CREEK ROAD

4.4.1.1 ALTERNATIVE 1

From Partin Settlement Road to Old Canoe Creek Road, Alternative 1 includes a 4-lane divided roadway (with 11-foot lanes), a 22-foot raised median, 4-foot bicycle lanes in each direction, curb and gutter, a 10-foot planting strip (varies due to existing power transmission pole locations) on both sides, 12-foot multiuse path on both sides, and a 4-foot clear area adjacent to each multiuse path. This typical section will require between 130 and 139 feet of ROW (depending on the location of the existing power transmission poles). **Figure 3** illustrates this typical section between Partin Settlement Road and Old Canoe Creek Road. The posted speed limit for this section will be 45 MPH.

From Partin Settlement Road to west of G and H Drive, the additional ROW for Alternative 1 will be acquired primarily on the north side of the existing roadway. From G and H Drive to Canal C-31, additional ROW will be acquired from both the north and south sides of the road to avoid relocating Kissimmee Utility Authority (KUA) power transmission poles. From Canal C-31 to Old Canoe Creek Road, the additional ROW will be acquired primarily on the south side of the existing roadway.

Figure 3: Alternative 1 – Typical Section from Partin Settlement Road to Old Canoe Creek Road



4.4.1.2 ALTERNATIVE 2

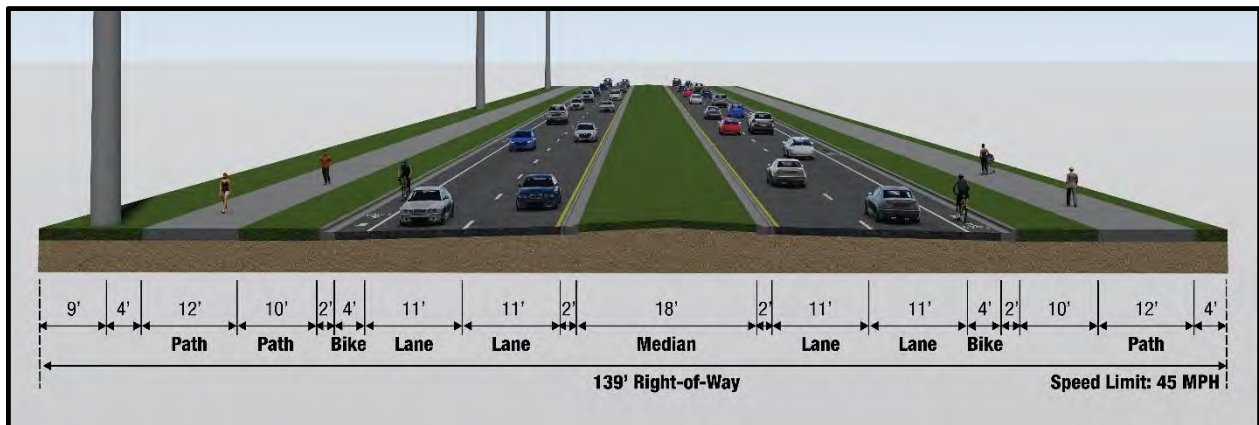
The typical section for Alternative 2 is basically the same as for Alternative 1, with the difference being that Alternative 2 includes relocating power transmission poles from the south side of Neptune Road to the north side of Neptune Road, from Partin Settlement Road to just east of Betsey Ross Lane.

From Partin Settlement Road to Old Canoe Creek Road, Alternative 2 includes a 4-lane divided roadway (with 11-foot lanes), a 22-foot raised median, 4-foot bicycle lanes in each direction, curb and gutter, a 10-foot planting strip on both sides, 12-foot multiuse path on both sides, and a 4-foot clear area adjacent to each multiuse path. The existing power transmission poles will be relocated to the north side of the shared use path within a 9-foot envelope. This typical section will require 139 feet of ROW.

Figure 4 illustrates this typical section between Partin Settlement Road and Old Canoe Creek Road. The posted speed limit for this alternative will be 45 MPH.

From Partin Settlement Road to west of G and H Drive, the additional ROW for Alternative 2 will be acquired primarily on the south side of the existing roadway. From G and H Drive to Canal C-31, additional ROW will be acquired from both the north and south sides of the road to avoid relocating power transmission poles. From Canal C-31 to Old Canoe Creek Road, the additional ROW will be acquired primarily on the south side of the existing roadway.

Figure 4: Alternative 2 – Typical Section from Partin Settlement Road to Ames Haven Road



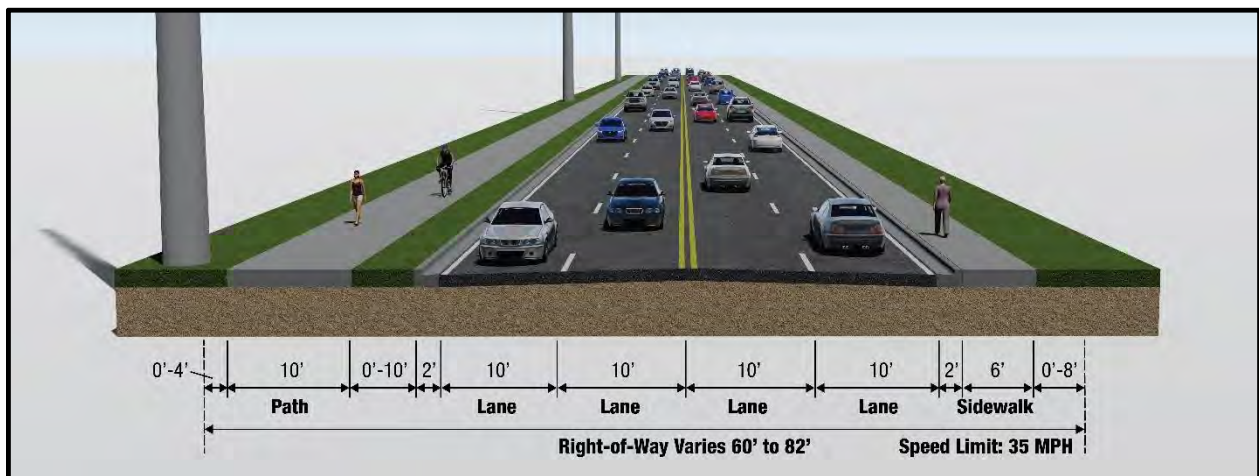
4.4.2 OLD CANOE CREEK ROAD TO US 192

4.4.2.1 ALTERNATIVE A

From Old Canoe Creek Road to US 192, Alternative A includes a 4-lane undivided roadway (with 10-foot lanes), curb and gutter, a 10-foot planting strip on both sides (where possible within the existing ROW), a nine to 10-foot multiuse path with a 4-foot clear area (where possible within the existing ROW) on the north side, and a 6-foot sidewalk on the south side. This typical section will require between 60 and 82 feet of ROW, and is anticipated to be constructed within the existing ROW. **Figure 5** illustrates this typical section between Old Canoe Creek Road and US 192. The posted speed limit for this alternative will be 35 MPH.

From Old Canoe Creek Road to US 192, no additional ROW is anticipated to be acquired for Alternative 1.

Figure 5: Alternative A – Typical Section from Old Canoe Creek Road to US 192



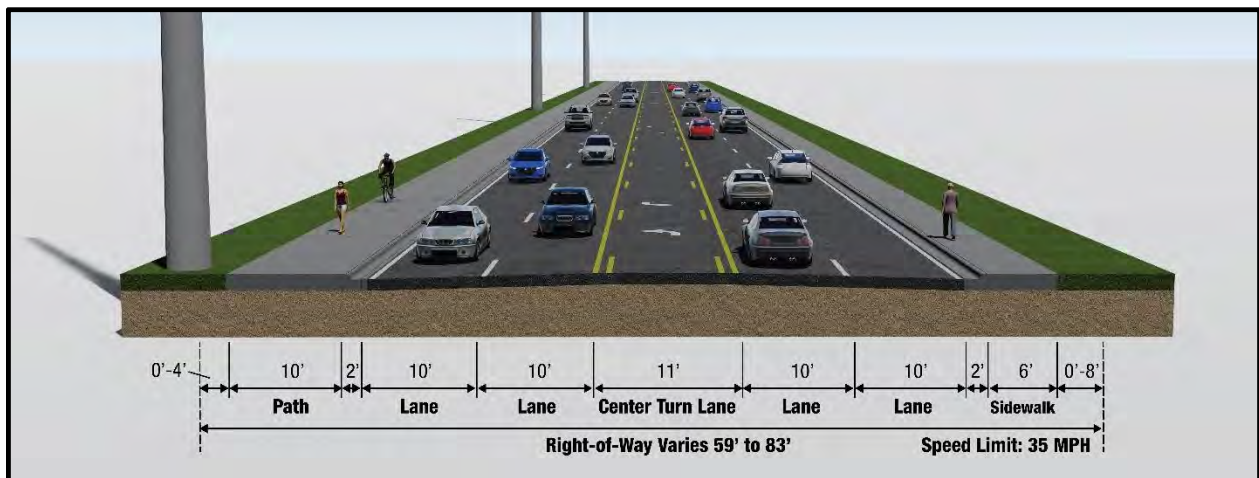
4.4.2.2 ALTERNATIVE B

Whereas Alternative A includes improving this segment without acquiring additional ROW; Alternative B includes providing a two-way center turn lane which will require additional ROW.

From Old Canoe Creek Road to US 192, Alternative B includes a 5-lane roadway (with 10-foot travel lanes and an 11-foot two-way left turn lane), curb and gutter, a 10-foot planting strip on both sides (where possible within existing ROW), a nine to 10-foot multiuse path with a 4-foot clear area (where possible within existing ROW) on the north side, and a 6-foot sidewalk on the south side. This typical section will require between 59 and 83 feet of ROW. **Figure 6** illustrates this typical section between Old Canoe Creek Road and US 192. The posted speed limit for this alternative will be 35 MPH.

From Old Canoe Creek Road to US 192, the additional ROW for Alternative A will be acquired primarily on the north side of the existing roadway.

Figure 6: Alternative B – Typical Section from Old Canoe Creek Road to US 192



5.0 EXISTING ENVIRONMENTAL CONDITIONS

5.1 METHODOLOGY FOR ACCESSING NATURAL AND BIOLOGICAL FEATURES

The assessment of natural and biological features, wetlands, and threatened and endangered species within the study area included a review of the following data and documents within a 500-foot buffer¹ of the existing road:

- United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS), *Soil Survey of Osceola County, Florida*
- Historical aerial photography from the FDOT Aerial Photo Look-up System (APLUS) and Publication of Archival Library and Museum Materials (PALMM)
- Habitat and species-specific information obtained from the USFWS, the Florida Fish and Wildlife Conservation Commission (FWC), Florida Fish and Wildlife Research Institute (FWRI), Florida Geographic Data Library (FGDL), and the Florida Natural Areas Inventory (FNAI)
- The Hydric Soils of Florida Handbook (2007)
- The US Geological Survey (USGS) 7.5-Minute Quadrangle maps
- The USFWS National Wetland Inventory (NWI) maps
- The USGS Groundwater Atlas of the United States
- The Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM)
- FNAI Standard Data Report for the study area included in **Appendix B**
- USFWS Information for Planning and Consultation (IPaC) Trust Resources Report for the study area included in **Appendix C**
- United States Environmental Protection Agency (USEPA) Sole Source Aquifer Program maps
- Review of books and other technical reports for each of the listed species evaluated in this biological assessment
- Review of agency comments on the Advance Notification Package (Distributed on August 31, 2018) and the ETDM screening conducted on August 27, 2019 (ETDM #14402)

In addition to the review of databases, reports and other resources, field reconnaissance was conducted on November 30, 2018 and February 19, 2019. Caracara surveys were conducted from January 2019 through April 2019.

5.2 EXISTING AND FUTURE LAND USE

5.2.1 EXISTING LAND USE

Existing land use within the study area was determined through the interpretation of 1" = 100' scale aerial photography, review of land cover GIS data from SFWMD and field reconnaissance. Existing land use was mapped based on the Florida Land Use, Cover and Forms Classification System (FLUCFCS) (FDOT, 1999) for the study area and is depicted in **Figures 7A-7D**.

5.2.2 FUTURE LAND USE

Future land use (FLU) was determined based on a review of GIS data from Osceola County. FLU for the study area is depicted on **Figures 8A-8D**. The study area is partially developed with residential and commercial land uses. However, there is some agriculture land uses remaining within the study area. The FLU shows these agriculture areas as either mixed use or low density residential. As described in the

¹Habitat was reviewed within a 1500-meter buffer to determine suitable habitat for crested caracara surveys.

purpose and need (Section 3.0 – Transportation Demand), much of the study area is located within the County’s East of Lake Toho Conceptual Master Plan and there are two Development of Regional Impacts (DRIs) under construction adjacent to Neptune Road. The population in Osceola County, specifically in Kissimmee and surrounding communities, is growing which is indicative on the FLU maps.

5.2.3 HABITAT AND VEGETATIVE COVER

Land covers within the study area have been assigned habitat classifications per the FLUCFCS. The study area contains twenty-one land cover classes. A FLUCFCS map is included (see **Figures 7A-7D**), and a description by FLUCFCS type, and calculated total acreages are provided in **Table 1**.

Table 1: Summary of Land Cover/Land Use within the Study Area

FLUCFCS Code	FLUCFCS Type	Description	Acres
111	Fixed single family units, low density	This land use consists of low density, rural single-family residences found in the central portion of the study area, south of Neptune Road.	5.2
121	Fixed single family units, medium density	This land use type consists of medium density, single family residences. This category encompasses most of the residential land use found throughout the study area.	111.4
132	Mobile home units	This land use consists of G & H Mobile Home Park, located between Neptune Road and Fish Lake within the study area.	2.6
133	Multiple dwelling units, low rise	This land use consists of apartment buildings and duplexes scattered between Florida's Turnpike and US 192.	21.4
139	High density under construction	This land use consists of Tohoqua, a residential community which is currently under construction. This site is located on the south side of Neptune Road, facing Neptune Middle School.	14.7
141	Retail sales and services	This land use consists of several shopping centers within the study area, with most being located between Old Canoe Creek Road and US 192.	29.2
171	Educational facilities	This land use designation is for Neptune Middle School, located north of Neptune Road and adjacent to and west of Florida's Turnpike	15.5
172	Religious	This land use encompasses various churches and associated facilities. Religious facilities are found scattered throughout the study area.	12.1
175	Governmental	This land use consists of a St. Cloud Police Department station at the corner of Old Canoe Creek Road and Neptune Road.	4.4
185	Parks and zoos	This category includes two Osceola County parks located within the study area, Partin Triangle Neighborhood Park and Boat Ramp and Neptune Middle School Sports Fields.	15.3
190	Open land	This land use consists of undeveloped, inactive areas within the study area with no structures or indication of intended use. This parcel is located on the eastern end of Neptune Road.	3.9
211	Improved pastures	This land use consists of open prairie utilized by cattle. Vegetation observed was predominated by bahia grass (<i>Paspalum notatum</i>), with scattered cogon grass (<i>Imperata cylindrica</i>) and cabbage palms (<i>Sabal palmetto</i>). This land use occurs throughout the study area.	53.9
245	Floriculture	This land use consists of areas dedicated to the cultivation of decorative flowering plants. Within the study area, this consists of the Tom Ritter Orchids nursery, found adjacent to and south of Neptune Road.	2.2
261	Fallow crop land	This land use type consists of harvested, inactive agricultural fields within the study area.	30.4

FLUCFCS Code	FLUCFCS Type	Description	Acres
434	Hardwood-conifer mixed	This land use consists of various upland forested areas scattered along Florida's Turnpike and Neptune Road. Canopy vegetation included live oak (<i>Quercus virginiana</i>) and slash pine (<i>Pinus elliotti</i>). Other vegetation observed included Brazilian pepper (<i>Schinus terebinthifolius</i>), cabbage palms, and beggarticks (<i>Bidens spp.</i>).	17.8
510	Streams and waterways	This category includes various drainage features that run through the study area, such as roadside ditches and SFWMD canals. Vegetation observed along the banks of these ditches included cattail (<i>Typha spp.</i>), pickerelweed (<i>Pontederia cordata</i>), and torpedograss (<i>Panicum repens</i>).	10.1
534	Reservoirs less than 10 acres	This category includes man-made stormwater pond areas serving various developments along Neptune Road. Vegetation observed included cattail and St. Augustine grass (<i>Stenotaphrum secundatum</i>) along the edges of the ponds.	8.1
617	Mixed wetland hardwoods	This forested wetland community occurs in several areas throughout the study area. The canopy observed included bald cypress (<i>Taxodium distichum</i>) and red maple (<i>Acer rubrum</i>), with a scattered shrub layer consisting of Brazilian pepper, Carolina willow (<i>Salix caroliniana</i>) and elderberry (<i>Sambucus canadensis</i>). The herb stratum includes Virginia chainfern (<i>Woodwardia virginica</i>) and marsh fern (<i>Thelypteris palustris</i>).	18.5
641	Freshwater marshes	This herbaceous wetland community occurs throughout the study area. Vegetation observed included softrush (<i>Juncus spp.</i>), maidencane (<i>Panicum hemitomon</i>), primrose willow (<i>Ludwigia peruviana</i>), elderberry, saltbush (<i>Baccharis hamifolia</i>), and scattered red maple.	26.8
643	Wet prairies	This herbaceous wetland community is located between the Partin canal and Neptune Road. These areas were historically used as cattle pasture. Vegetation observed included maidencane, softrush, torpedograss, and arrowhead (<i>Sagittaria lancifolia</i>).	10.8
814	Roads and highways	This land use consists of roads and associated ROW that are located throughout the study area.	80.1
Grand Total			494.4
Land cover and land uses based on the Florida Land Use, Cover and Forms Classification System (FLUCFCS). Acreage is based on the 500-foot study area boundary.			

Data compiled by Kimley-Horn and Associates, Inc. 2019

Figure 7A: FLUCFCS Map (1 of 4)

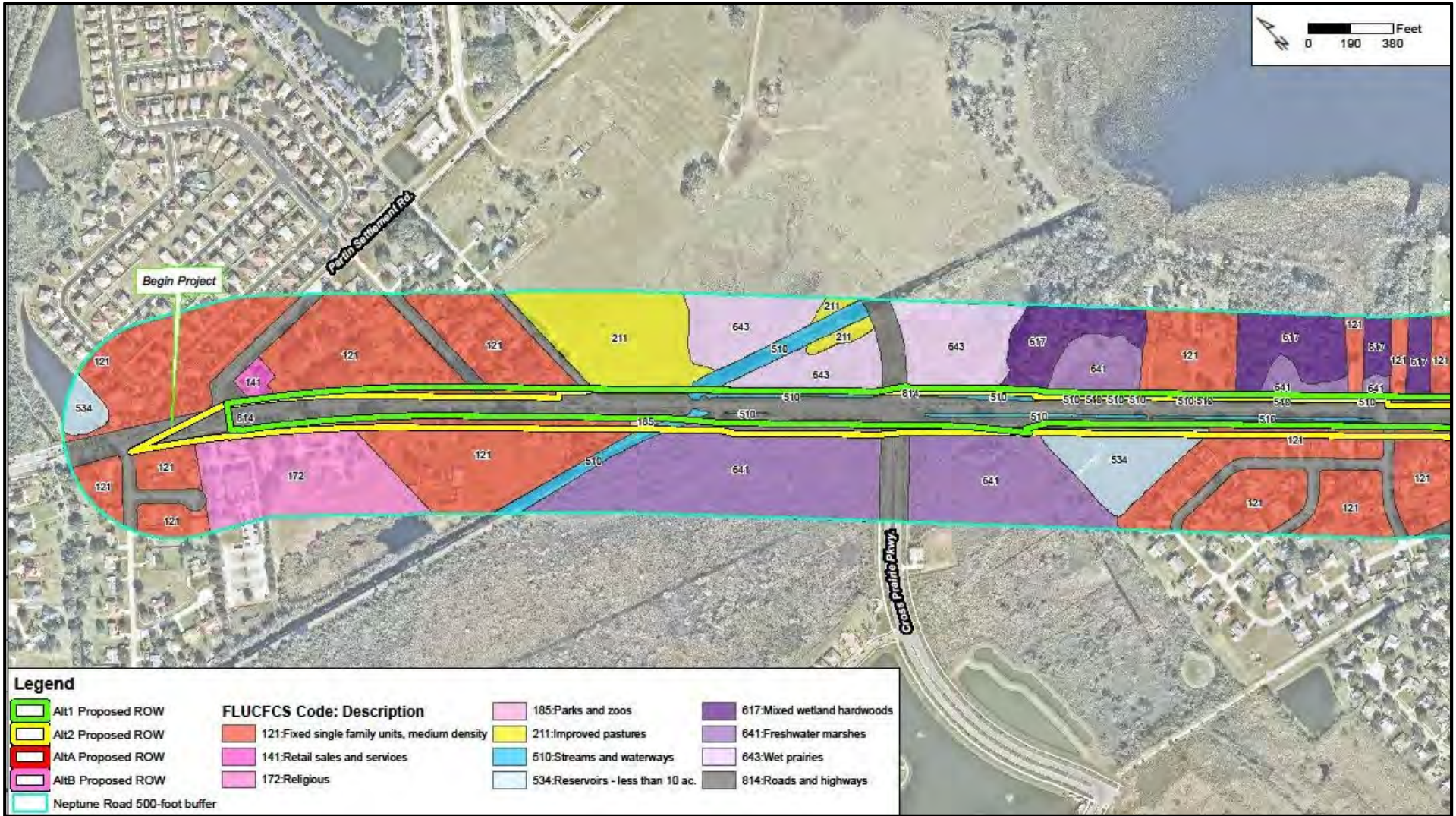


Figure 7B: FLUCFCS Map (2 of 4)

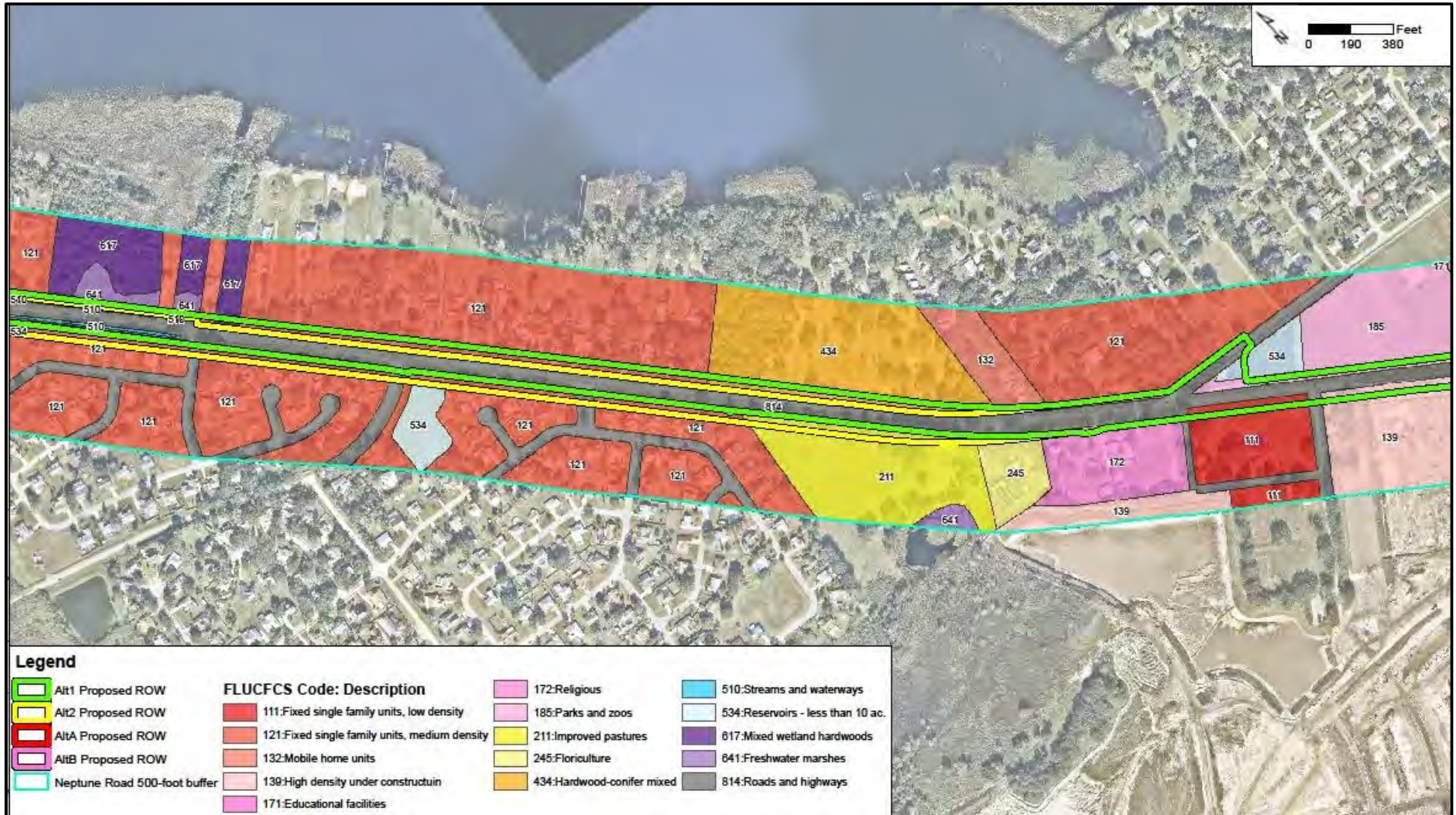


Figure 7C: FLUCFCS Map (3 of 4)

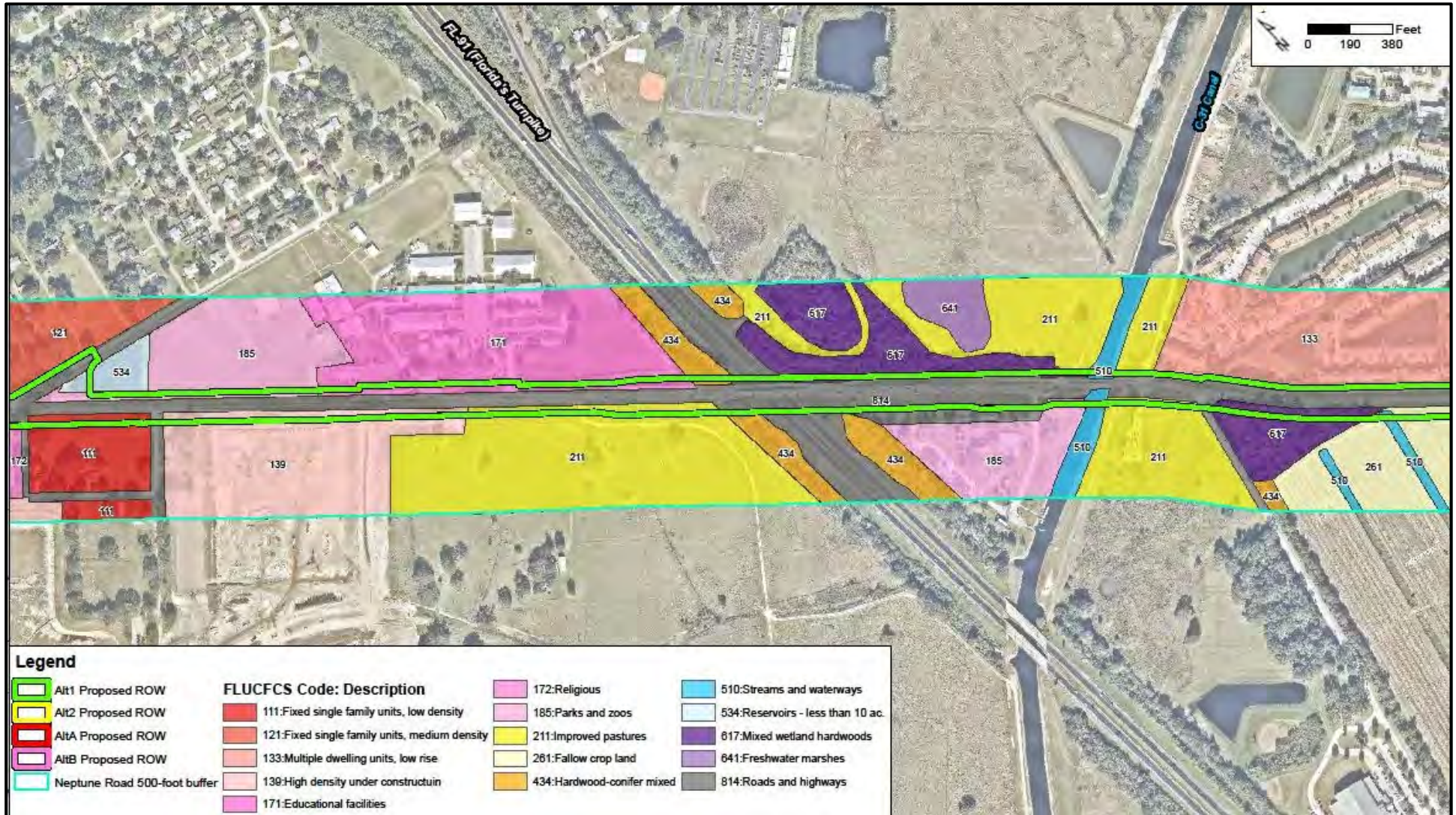


Figure 7D: FLUCFCS Map (4 of 4)

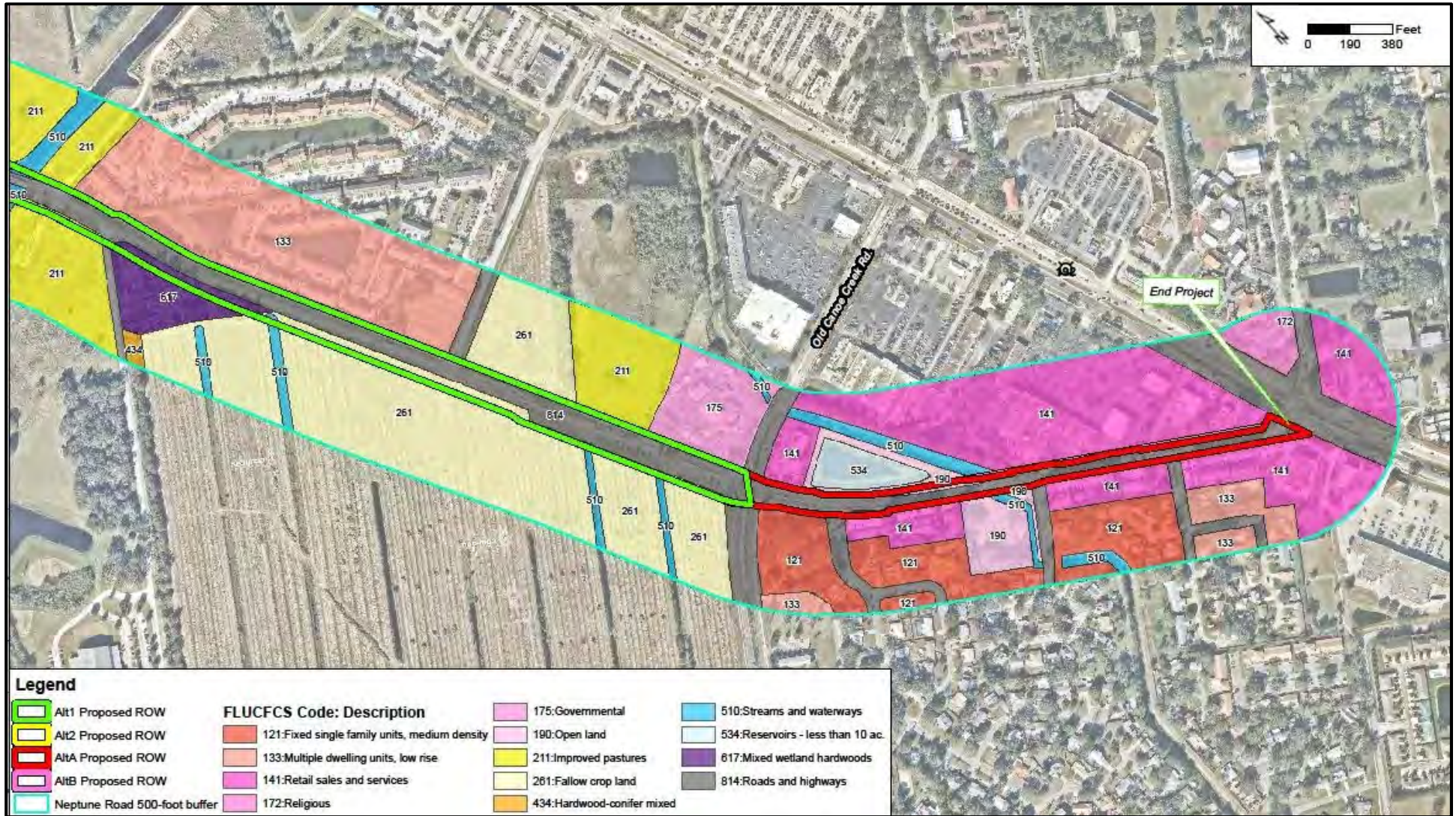


Figure 8A: Osceola County FLU Map (1 of 4)

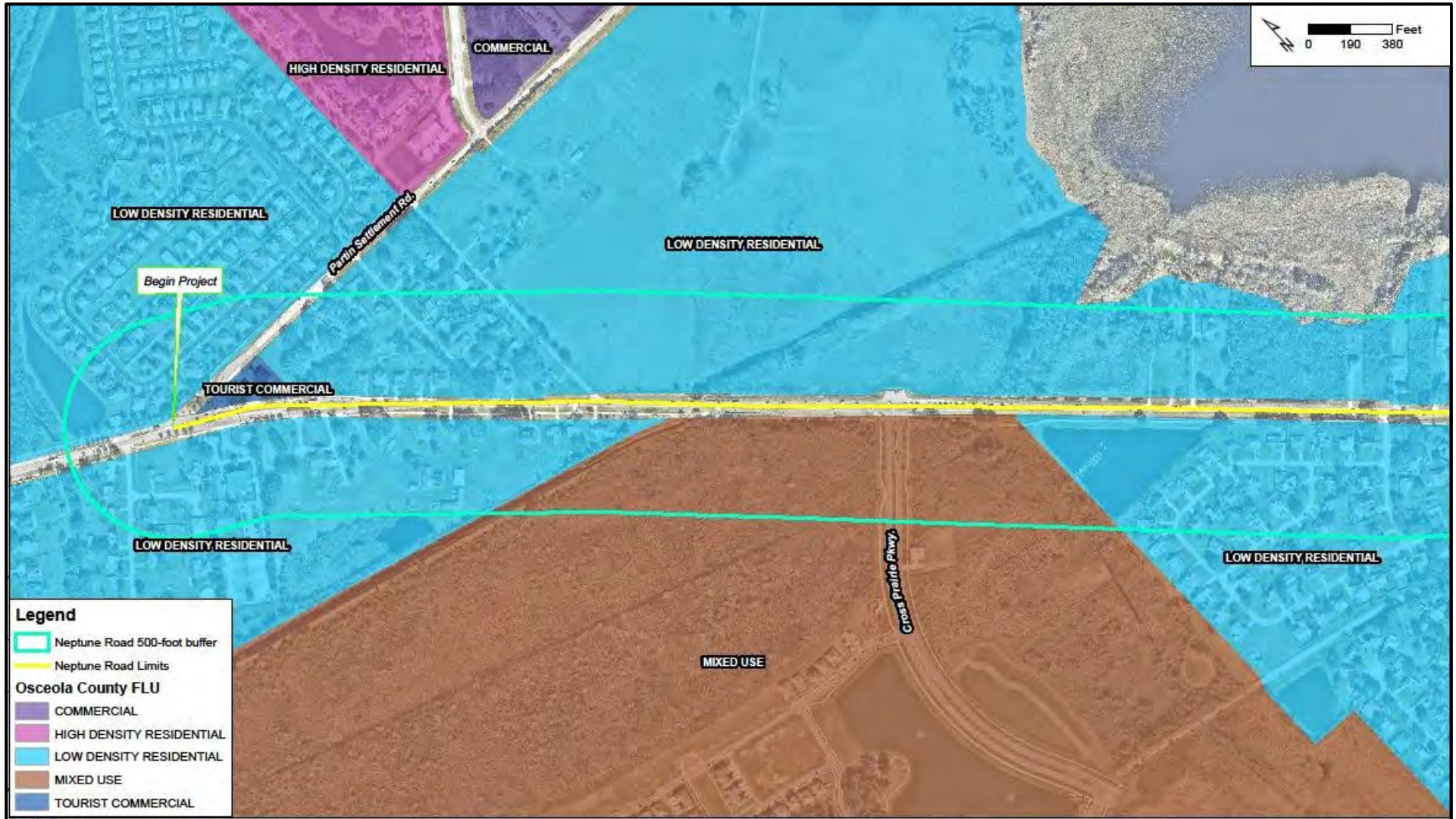


Figure 8B: Osceola County FLU Map (2 of 4)

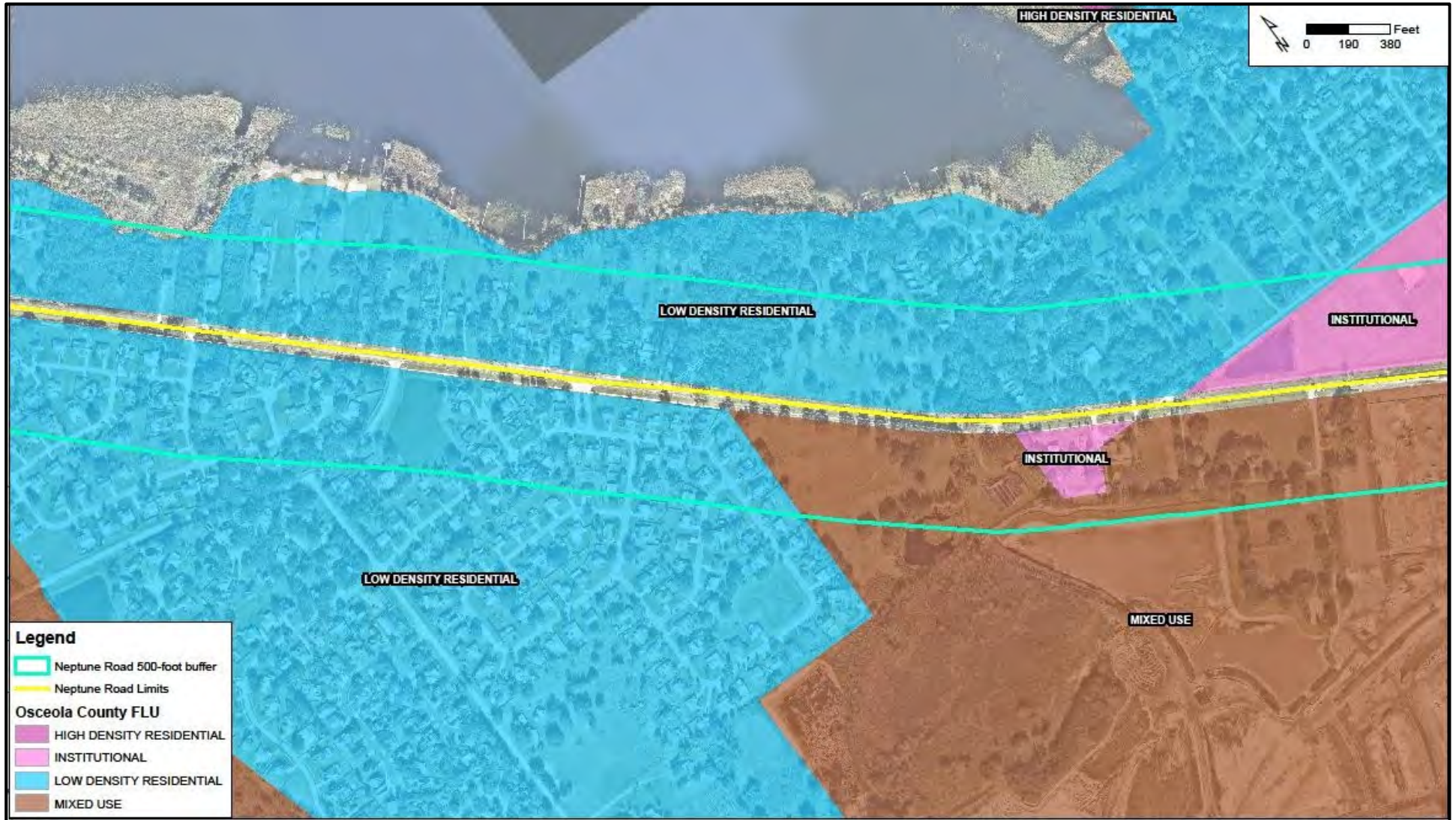


Figure 8C: Osceola County FLU Map (3 of 4)

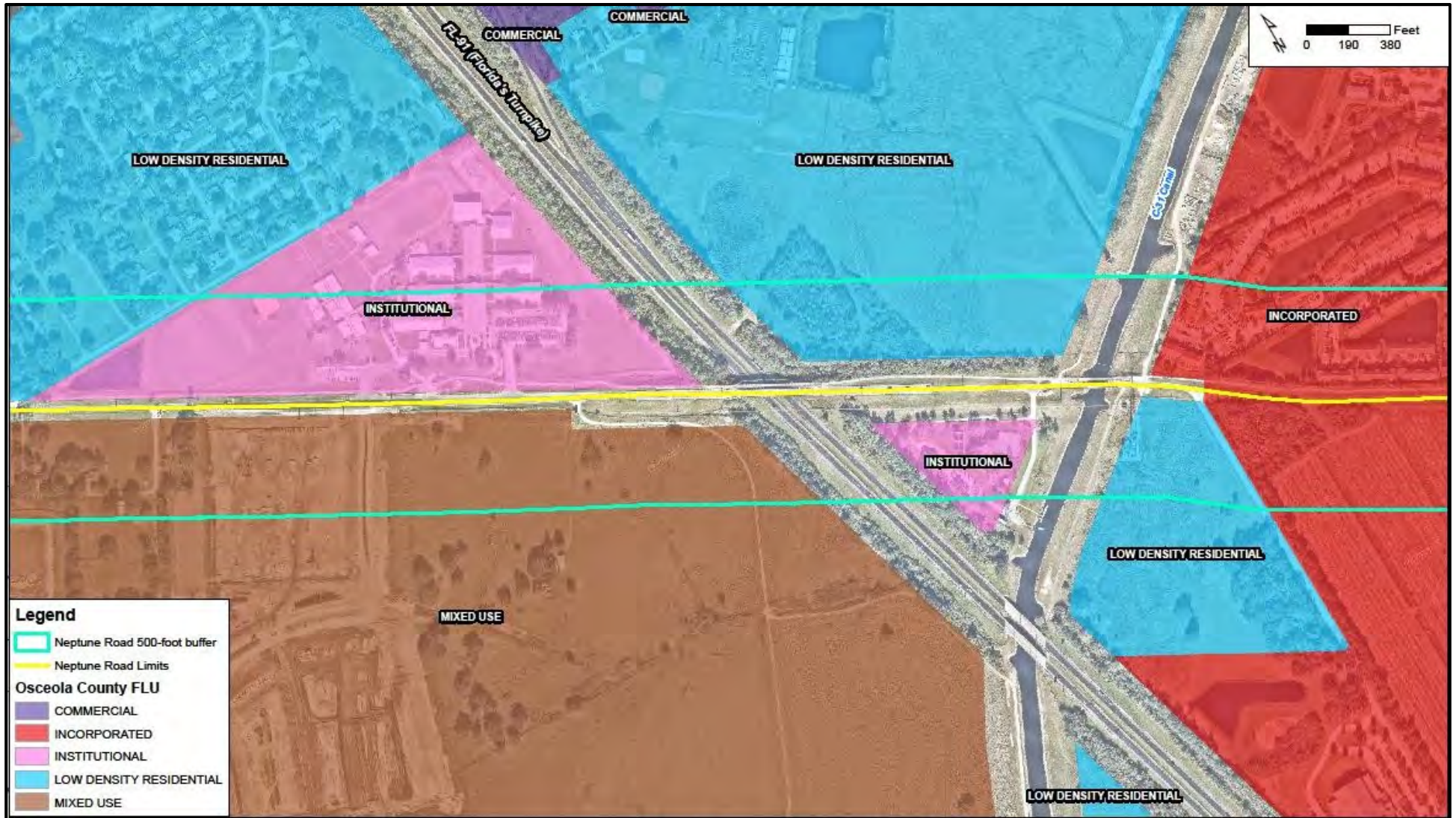
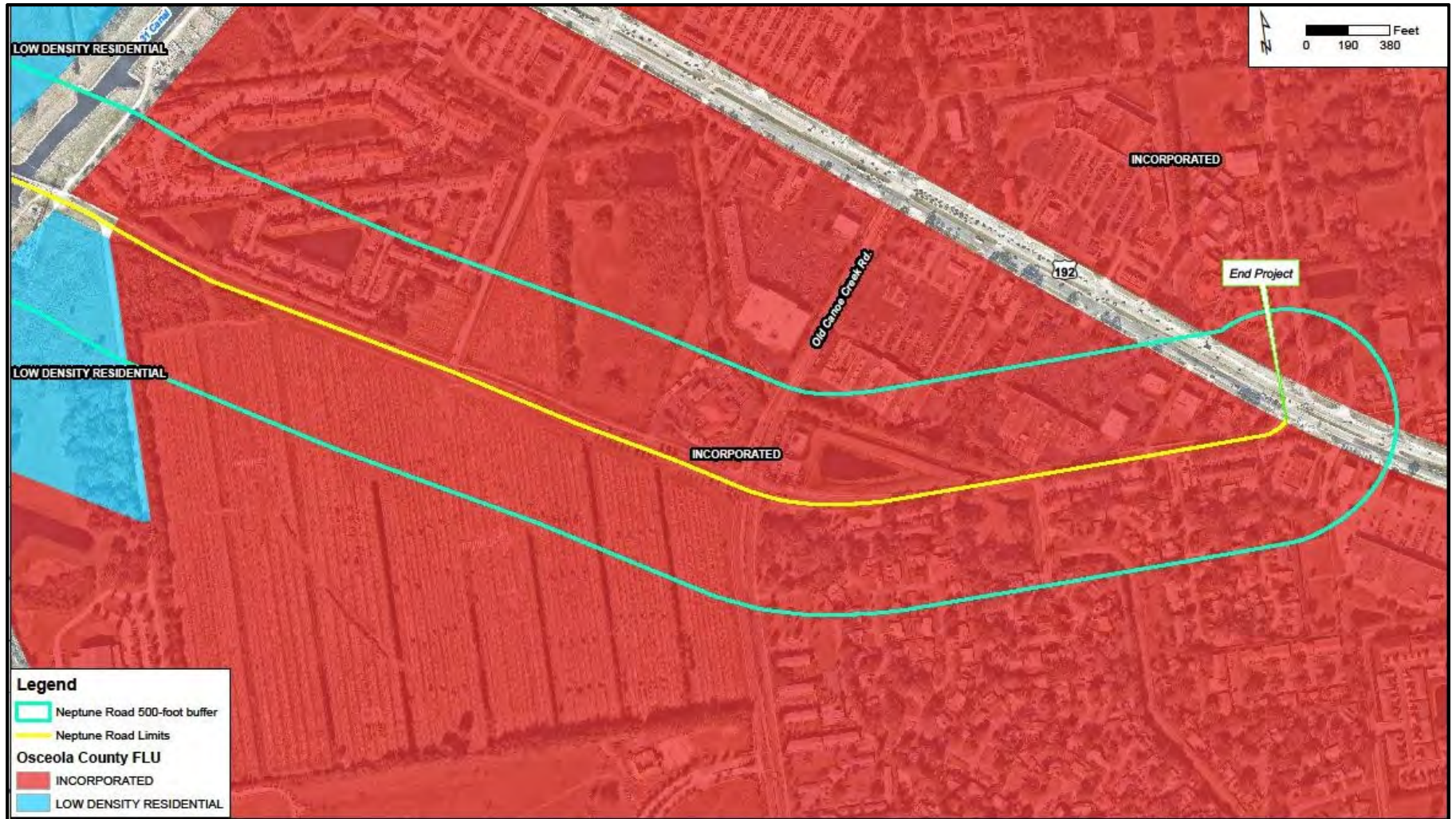


Figure 8D: Osceola County FLU Map (4 of 4)



5.2.4 SOILS

Based on a review of the USDA/NRCS Soil Survey for Osceola County, there are twenty (20) major soil types within the study area. **Table 2** includes a summary of the soil types found in the study area (see **NRCS Soils Map - Figures 9A-9D**).

Table 2: NRCS Soils Identified in the Study Area in Osceola County

Soil ID Number	Soil Name	% of soil within study area	Parent Material	Drainage Class	Water Capacity	Hydraulic Conductivity	Depth to Restrictive Feature	Groundwater Depth
1	Adamsville sand	1.24	Sandy marine deposits	Somewhat poorly drained	Low	rapid	>80 inches	18 to 42 inches
5	Basinger fine sand	3.32	Sandy marine deposits	Poorly drained	Low	Very rapid	>80 inches	6 inches
9	Cassia Fine Sand	0.57	Sandy marine deposits	Somewhat poorly drained	Low	Moderately rapid	>80 inches	18 to 42 inches
10	Delray Loamy Fine Sand, Depressional	5.01	Sandy and loamy marine deposits	Very poorly drained	Low	Moderately rapid	>80 inches	0 inches
15	Hontoon Muck	0.01	Herbaceous organic material	Very poorly drained	Very high	Very rapid	>80 inches	0 inches
16	Immokalee Fine Sand	26.13	Sandy marine deposits	Poorly drained	Low	Moderately rapid	>80 inches	6-18 inches
17	Kaliga Muck	0.38	Herbaceous organic material over stratified loamy marine deposits	Very poorly drained	Very high	Moderately slow to moderately high	>80 inches	0-6 inches
22	Myakka Fine Sand	21.03	Sandy marine deposits	Poorly drained	Very low	Moderately rapid	>80 inches	6-18 inches
23	Myakka-Urban Land Complex	<0.01	Sandy marine deposits	Poorly drained	Very low	Moderately rapid	>80 inches	6-18 inches
24	Narcoossee Fine Sand	0.06	Sandy marine deposits	Moderately well drained	Very low	Rapid	>80 inches	24-42 inches
32	Placid Fine Sand, Depressional	9.99	Sandy marine deposits	Very poorly drained	Low	Rapid	>80 inches	0-6 inches

Soil ID Number	Soil Name	% of soil within study area	Parent Material	Drainage Class	Water Capacity	Hydraulic Conductivity	Depth to Restrictive Feature	Groundwater Depth
33	Placid Variant Fine Sand	0.50	Sandy marine deposits	Somewhat poorly drained	Low	Rapid	>80 inches	18-42 inches
34	Pomello Fine Sand, 0-5% Slopes	0.13	Sandy marine deposits	Moderately well drained	Low	Moderately rapid	>80 inches	24-42 inches
36	Pompano Fine Sand	0.08	Sandy marine deposits	Poorly drained	Low	Rapid	>80 inches	3-18 inches
38	Riviera Fine Sand	0.01	Sandy and loamy marine deposits	Poorly drained	Moderate	Moderately rapid	>80 inches	3-18 inches
39	Riviera Fine Sand, Depressional	0.02	Sandy and loamy marine deposits	Very poorly drained	Low	Moderately rapid	>80 inches	0-6 inches
40	Samsula Muck	10.21	Herbaceous organic material over sandy marine deposits	Very poorly drained	Very high	Rapid	>80 inches	0-6 inches
42	Smyrna Fine Sand	6.38	Sandy marine deposits	Poorly drained	Low	Moderately rapid	>80 inches	6-18 inches
45	Vero Fine Sand	3.41	Sandy and loamy marine deposits	Poorly drained	Moderate	Rapid	>80 inches	6-18 inches
46	Wauchula Fine Sand	11.06	Sandy and loamy marine deposits	Poorly drained	Moderate	Moderately low to moderately rapid	>80 inches	6-18 inches

Bold denotes hydric soils.

There is 0.45% of the project area within water, which was not included in the table.

Data Compiled by Kimley-Horn and Associates, Inc. 2019

Figure 9A: NRCS Soils Map (1 of 4)

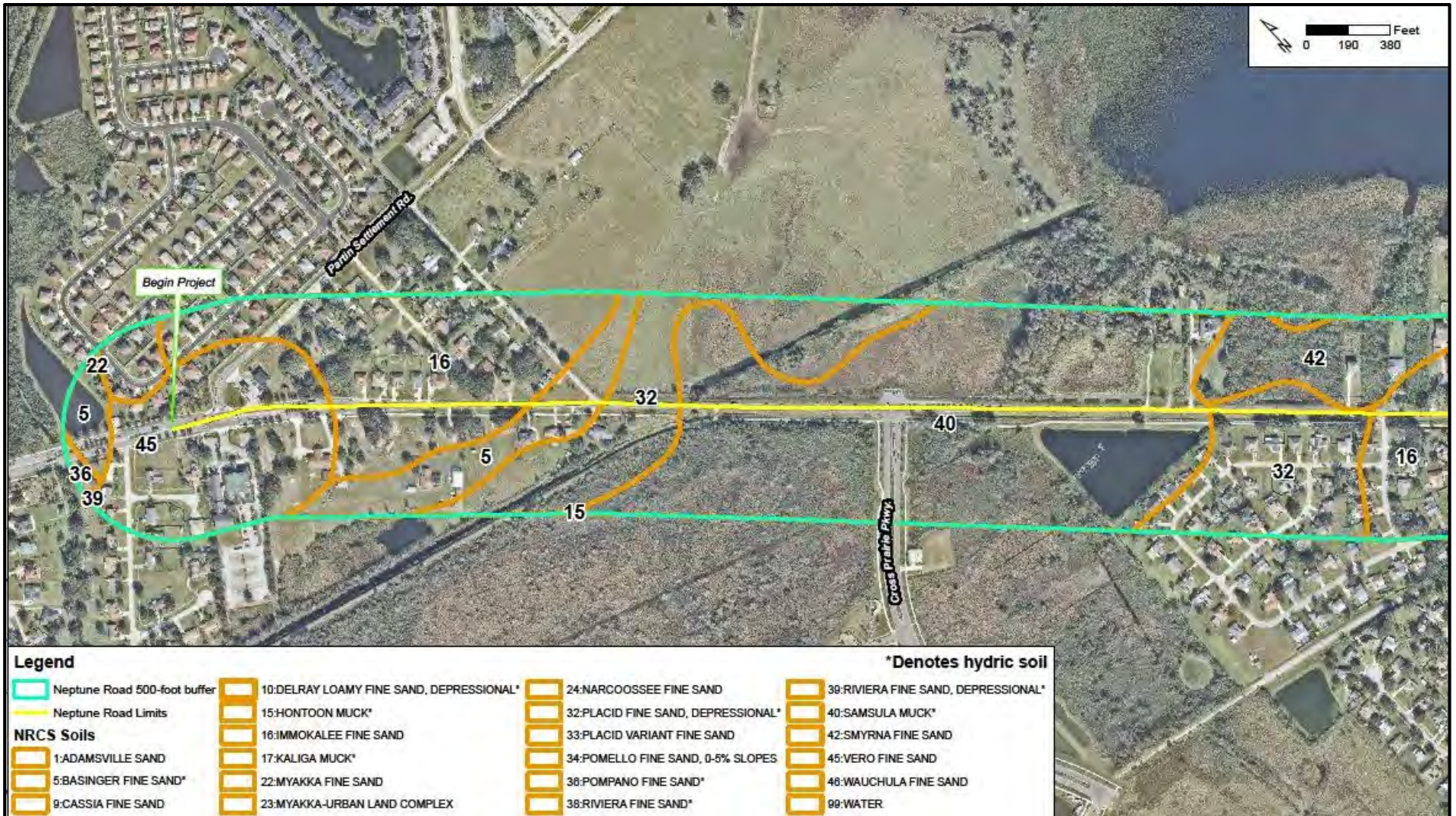


Figure 9B: NRCS Soils Map (2 of 4)

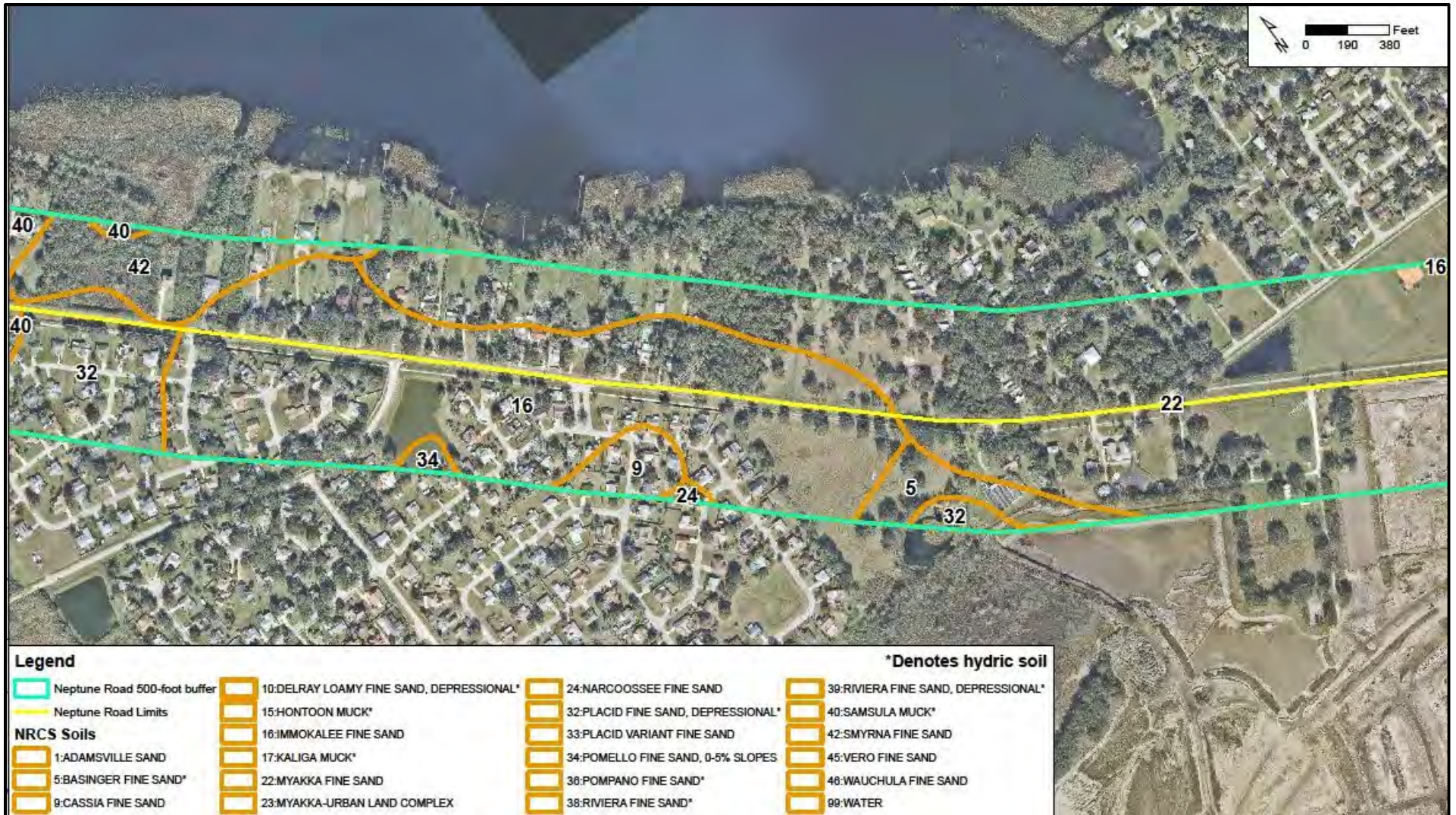


Figure 9C: NRCS Soils Map (3 of 4)

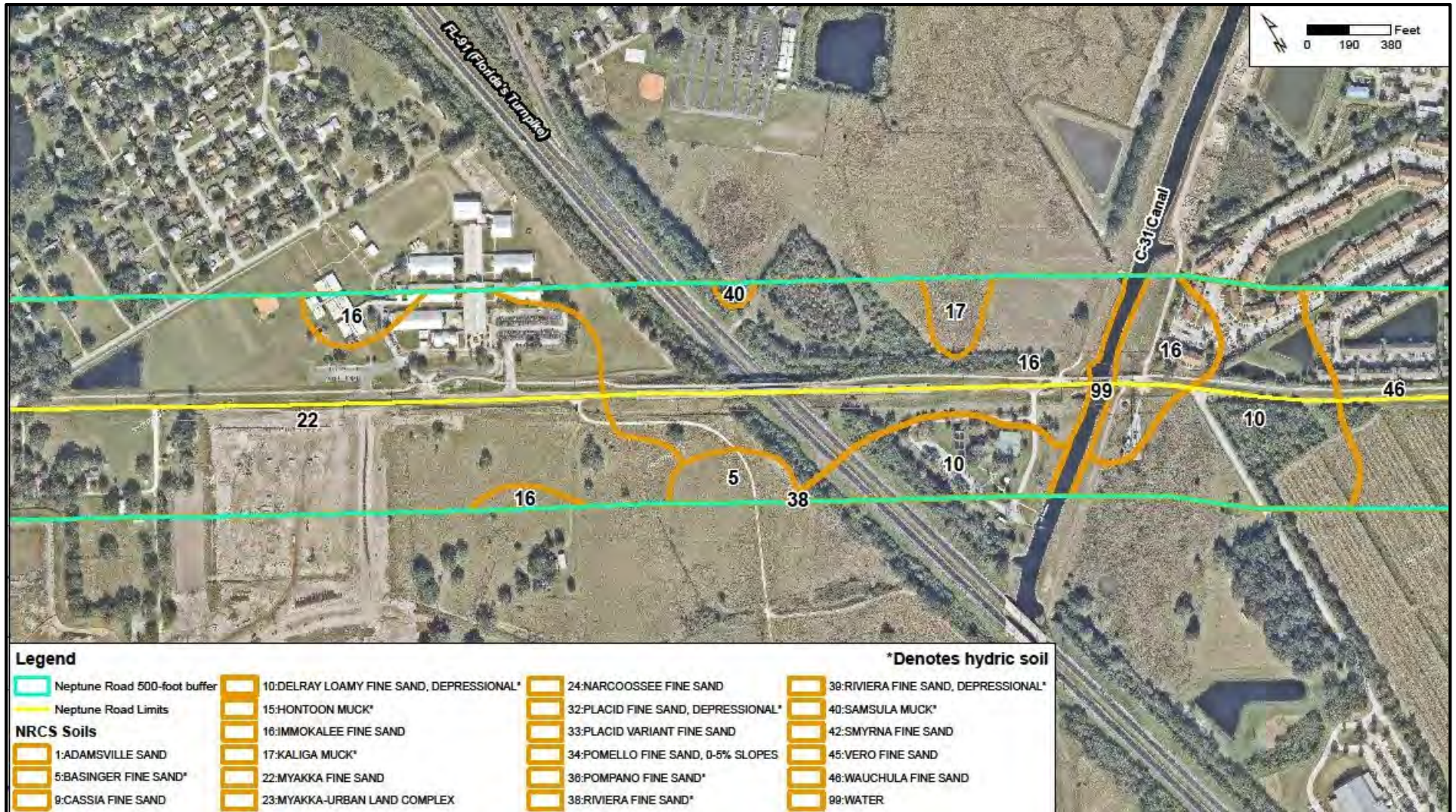
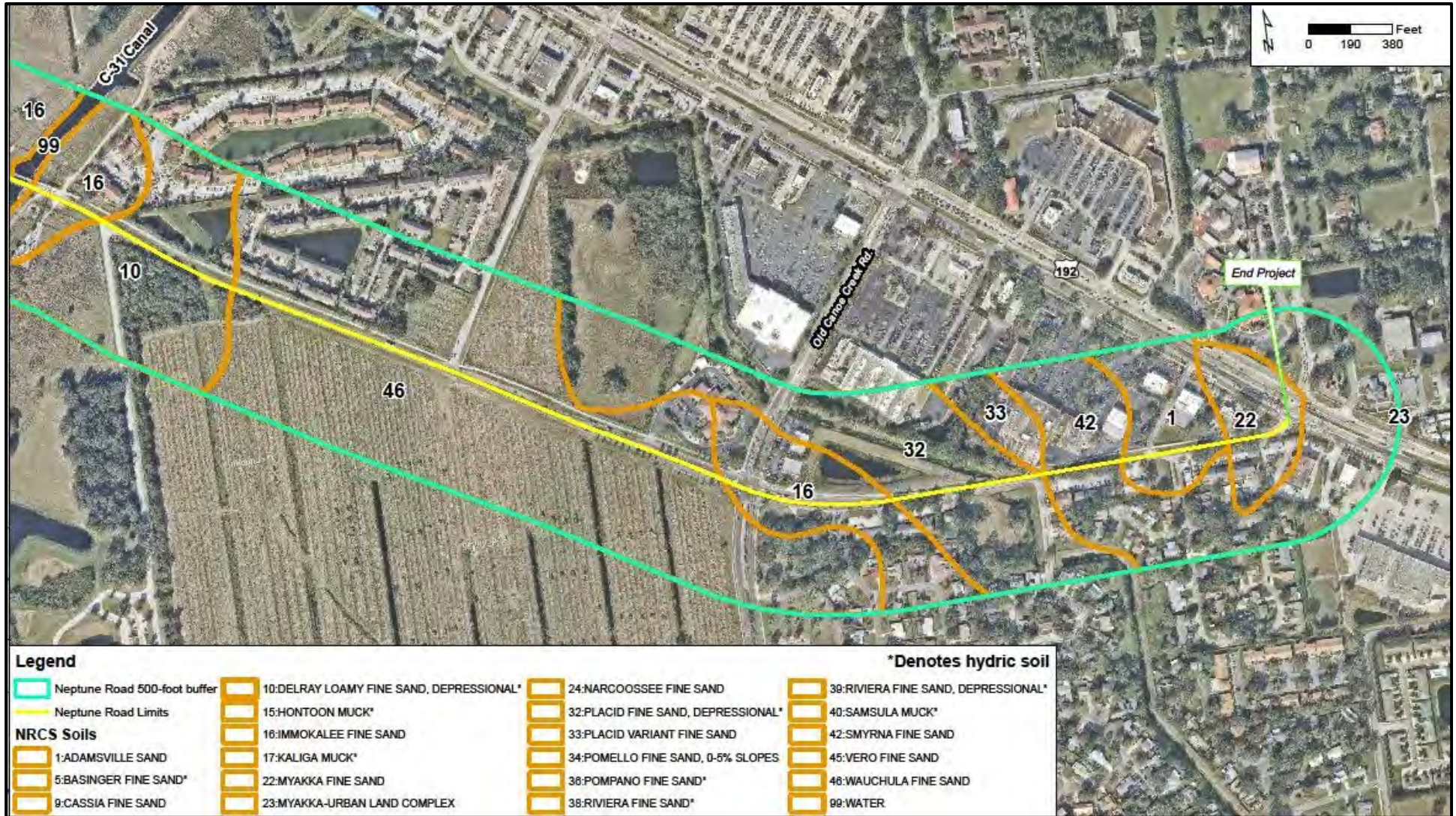


Figure 9D: NRCS Soils Map (4 of 4)



Of the twenty (20) soil types mapped within the study area, nine (9) are designated hydric soils (*Hydric Soils of Florida Handbook, Fourth Edition, 2007*). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. In addition, five (5) of the non-hydric soil types within the study area may contain hydric inclusions within the lower elevation areas. These soils include: Adamsville Sand, Immokalee Fine Sand, Placid Variant Fine Sand, Smyrna Fine Sand, and Vero Fine Sand.

6.0 WETLANDS EVALUATION

6.1 DATA COLLECTION

In accordance with Executive Order 11990, Protection of Wetlands, and FHWA Technical Advisory T6640 8A, the extent and types of wetlands in the study area were documented. Each wetland site was identified in the field using the delineation methods described in the *Federal Manual for Identification and Delineation of Wetlands* (USACE 1987) and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0) (November 2010)*, and in accordance with Chapter 62-340, of Florida Administrative Code (FAC), *Delineation of the Landward Extent of Wetlands and Surface Waters*. Wetland classifications occurring within the study area were determined based on FLUCFCS, as well as the USFWS publication *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). These methods consider prevalence of wetland vegetation, hydric soil indicators, and wetland hydrology.

All wetlands and surface waters identified in the field were compiled onto digital aerial imagery of the study area. Acreage calculations of the existing area and area of impact were then calculated using ArcGIS Software. It was not practical to obtain total acreage calculations for some of the wetlands and surface waters that extended outside the study area. Formal wetland delineations including field flagging and approval by the SFWMD or USACE have not been conducted but will occur during the design and permitting phase of the project.

ETDM Comments

The NMFS commented that although no essential fish habitat will be impacted by this project, the freshwater marshes within the study area provide water quality functions. If these wetlands cannot be avoided, sequential minimization and mitigation should take place. In addition, construction could cause secondary impacts to adjacent wetlands through sedimentation and runoff.

FDEP commented that every effort should be made to treat stormwater runoff from the proposed road widening to prevent ground and surface water contamination. FDEP also stated that retrofitting of stormwater conveyance systems would help reduce impacts to water quality.

SFWMD also stated that stormwater runoff should be treated, and a Water Quality Impact Analysis should be completed.

The USACE commented that there are several palustrine and riverine wetlands within the project study area. Wetland avoidance and minimization opportunities should continue to be emphasized throughout the planning process. There are three federally approved wetland mitigation banks that service the project study area.

The USEPA commented that the “selected site should avoid and minimize, to the maximum extent practicable, placement of fill into jurisdictional waters of the U.S., which include wetlands and streams. Additionally, consider that the potential increase in impervious surface may increase storm water runoff and may increase pollutants into nearby water bodies and wetlands because of the project”. The USEPA recommended that the PD&E include a discussion of the stormwater collection and treatment mechanisms that would be designed to protect nearby wetlands, best management practices during

construction and compensatory mitigation for unavoidable wetland impacts. It was suggested to prevent further fragmentation, degradation, and loss of wildlife habitat, preservation of the remaining habitat in the project area be considered. USEPA requested a copy of the NRE.

6.2 WETLAND CHARACTERIZATION

Baseline information characterizing the wetlands involved within the study area including contiguity, vegetative structural diversity, edge relationships, wildlife habitat value, hydrologic functions, public use, and integrity is found in **Table 3**. The wetland polygons were individually characterized based on their FLUCFCS type and are depicted in **Figures 10A-10D - Wetlands and Surface Waters Map**. A representative photographic log of wetlands and surface waters is included in **Appendix D**. Due to the large size of the study area, the number of wetland and surface water features that occur and the similarity among the various wetlands observed, the wetlands and surface waters described in **Table 3** are grouped based on FLUCFCS type and each individual wetland is not described.

Table 3: Wetland and Surface Water Characteristics within the Study Area

Wetland ID	FLUCFCS Code	FLUCFCS Description	USFWS Code	Contiguity	Vegetative Structural Diversity	Edge Relationships	Wildlife Habitat Value	Hydrologic Function	Public Use	Integrity	Size (Acres)*
SW-1, SW-4, SW-5, SW-6, SW-12	534	Reservoirs less than 10 acres	PUBHx	Each reservoir is isolated.	Not applicable – open water with little to no vegetation along edges.	These stormwater ponds are adjacent to residential or commercial development.	Provides some foraging opportunities for birds, fish, reptiles, amphibians, invertebrates, and some mammals.	Man-made stormwater pond areas. Hydrologic function is consistent with design and maintenance of each pond.	Not applicable.	Man-made.	4.25
SW-2 (Partin Canal), SW-7 (Canal C-31)	510	Streams and Waterways	PUBHx	Each canal is connected to a large lake (SW-2 is connected to Fish Lake and Lake Tohopekaliga and SW-7 is connected to East Lake Tohopekaliga and Lake Tohopekaliga).	Not applicable – open water with little to no vegetation along edges.	SW-2 is adjacent to herbaceous wetlands and residential development. SW-7 is adjacent to pastures and recreational facilities.	Provides some foraging opportunities for birds, fish, reptiles, amphibians, invertebrates, and some mammals.	Storage, water quality effects on downstream areas.	C-31 canal provides boat access to nearby lakes.	Canals were excavated and are regularly maintained.	4.97
SW-3	510	Streams and Waterways	PUBHx	SW-3 consists of several roadside ditches that were connected to each other via culverts. Some ditches were hydrologically connected to large wetlands.	Mostly open water, however some vegetation was present along edges such as <i>Typha</i> spp.	Surrounding landscape included roadways and other large wetlands.	Provides some foraging opportunities for birds, fish, reptiles, amphibians, invertebrates, and some mammals.	Ditches collect runoff from adjacent roadways.	Provides no recreational use for the public.	Man-made.	1.57
SW-8, SW-9, SW-10, SW-11	510	Streams and Waterways	PUBHx	Agricultural ditches appear to be isolated from each other.	Mostly open water however some <i>Salix caroliniana</i> and <i>Ludwigia</i> spp. were present.	Ditches are surrounded by fallow crop lands.	Provides some foraging opportunities for birds, fish, reptiles, amphibians, invertebrates, and some mammals.	Ditches historically provided drainage for the crop lands.	Not applicable.	Man-made.	1.56
SW-13	510	Streams and Waterways	PUBHx	A culvert under Neptune Road connects these ditches to one another.	Mostly open water, however some vegetation was present along edges such as <i>Typha</i> spp.	Ditches are surrounded by residential and commercial development.	Provides some foraging opportunities for birds, fish, reptiles, amphibians, invertebrates, and some mammals.	Ditches collect runoff from adjacent roadways and development.	Not applicable.	Man-made.	2.07
WL-1, WL-2	641	Freshwater Marshes	PEM1F	Historically one large wetland; however, recent roadway construction of Cross Prairie Parkway has	Vegetation observed included <i>Juncus</i> spp., <i>Panicum hemitomon</i> , <i>Ludwigia peruviana</i> , <i>Baccharis hamifolia</i> .	Adjacent land uses include roadways, however both wetlands extend offsite.	Provides foraging habitat, life cycle support, and refuge opportunities for fish, reptiles, amphibians, invertebrates, wading birds, and aquatic and terrestrial mammals.	Provides nutrient uptake and sediment settling. Also provides water storage capacity.	Not applicable – privately owned.	Due to fragmentation from the construction of Cross Prairie Parkway these wetlands have been bisected resulting in moderate impact.	20.57

Wetland ID	FLUCFCS Code	FLUCFCS Description	USFWS Code	Contiguity	Vegetative Structural Diversity	Edge Relationships	Wildlife Habitat Value	Hydrologic Function	Public Use	Integrity	Size (Acres)*
				bisected these wetlands.							
WL-3, WL-4	643	Wet Prairie	PEM1F	Historically one large wetland system, however recent roadway construction of Cross Prairie Parkway has bisected these wetlands. Additionally, the Partin Canal has also bisected WL-3 and WL-4	These areas were historically used as cattle pasture. Vegetation observed included <i>Juncus</i> spp., <i>Panicum repens</i> , <i>Rhynchospora colorata</i> , and <i>Sagittaria lancifolia</i> .	Adjacent land uses include roadways and improved pastures; however, wetlands extend beyond the study area.	Provides foraging habitat, life cycle support, and refuge opportunities for fish, reptiles, amphibians, invertebrates, wading birds, and aquatic and terrestrial mammals.	Provides nutrient uptake and sediment settling. Also provides water storage capacity.	Not applicable – privately owned.	Due to fragmentation from the construction of Partin Canal and Cross Prairie Parkway these wetlands have been bisected resulting in moderate impact.	6.26
WL-5	643	Wet Prairie	PEM1F	Historically, this wetland was connected to WL-3 and 4.	These areas were historically used as cattle pasture. Vegetation observed is like WL-3 and 4	Adjacent land uses include pastures, Partin Canal, and forested wetlands which connect to Fish Lake.	Provides foraging habitat, life cycle support, and refuge opportunities for fish, reptiles, amphibians, invertebrates, wading birds, and aquatic and terrestrial mammals.	Provides nutrient uptake and sediment settling. Also provides water storage capacity.	Not applicable – privately owned.	Medium due to fragmentation from the construction of Cross Prairie Parkway.	4.62
WL-6, WL-8, WL-10, WL-12	617	Mixed Wetland Hardwoods	PFO1/3 C	Historically, these wetlands were contiguous with each other and with Fish Lake. Residential development has fragmented these wetlands.	Vegetation includes <i>Taxodium distichum</i> , <i>Acer rubrum</i> , <i>Schinus terebinthifolius</i> , <i>Salix caroliniana</i> , <i>Sambucus canadensis</i> , <i>Woodwardia virginica</i> , and <i>Thelypteris palustris</i> .	Adjacent land uses include residential development; however most of the wetlands extend offsite and eventually connect to Fish Lake.	Provides foraging habitat, life cycle support, and refuge opportunities for fish, reptiles, amphibians, invertebrates, wading birds, and aquatic and terrestrial mammals.	Provides nutrient uptake and sediment settling. Also provides water storage capacity.	Some of the wetlands are privately owned, however some fishing opportunities could be available in the wetlands adjacent to Fish Lake.	Due to fragmentation for development, moderate impacts have occurred.	8.25
WL-7, WL-9, WL-11	641	Freshwater Marshes	PEM1F	These wetlands have been fragmented by residential development.	Vegetation observed included <i>Juncus</i> spp., <i>Panicum hemitomon</i> , <i>Ludwigia peruviana</i> , <i>Baccharis hamifolia</i> .	Adjacent land uses include roadways, residential land uses, and wetlands, which connect to Fish Lake.	Provides foraging habitat, life cycle support, and refuge opportunities for fish, reptiles, amphibians, invertebrates, wading birds, and aquatic and terrestrial mammals.	Provides nutrient uptake and sediment settling. Also provides water storage capacity.	Some of the wetlands are privately owned, however some fishing opportunities could be available in the wetlands adjacent to Fish Lake.	Due to fragmentation for residential development, moderate impacts have occurred. However, adjacent wetlands are still connected to Fish Lake.	3.73
WL-13	641	Freshwater Marshes	PEM1F	Wetland appears to be connected to larger wetland to the south and has not been historically manipulated.	Vegetation observed included <i>Juncus</i> spp., <i>Panicum hemitomon</i> , <i>Ludwigia peruviana</i> , <i>Baccharis hamifolia</i> .	Adjacent land uses include pastures, wetlands, and some commercial development (nursery).	Provides foraging habitat, life cycle support, and refuge opportunities for fish, reptiles, amphibians, invertebrates, wading birds, and aquatic and terrestrial mammals.	Provides nutrient uptake and sediment settling. Also provides water storage capacity.	Not applicable – privately owned.	This wetland appears relatively intact and still connects to a larger wetland to the south.	0.52

Wetland ID	FLUCFCS Code	FLUCFCS Description	USFWS Code	Contiguity	Vegetative Structural Diversity	Edge Relationships	Wildlife Habitat Value	Hydrologic Function	Public Use	Integrity	Size (Acres)*
WL-14, WL-15 WL-17	617	Mixed Wetland Hardwoods	PFO1/3 C	These wetlands have been historically manipulated for agricultural purposes and also roadway construction (Florida's Turnpike and Neptune Road).	Vegetation includes <i>Taxodium distichum</i> , <i>Acer rubrum</i> , <i>Schinus terebinthifolius</i> , <i>Salix caroliniana</i> , <i>Sambucus canadensis</i> , <i>Woodwardia virginica</i> , and <i>Thelypteris palustris</i> .	Adjacent land uses include pastures/agricultural uses and roadways. There are some wetlands and/or surface waters nearby, but none appear to be connected to WL-14, 15 and/or 17.	Provides foraging habitat, life cycle support, and refuge opportunities for fish, reptiles, amphibians, invertebrates, wading birds, and aquatic and terrestrial mammals.	Provides nutrient uptake and sediment settling. Also provides water storage capacity.	Not applicable – privately owned.	These wetlands may have been historically manipulated for agricultural purposes and/or roadway construction.	10.25
WL-16	641	Freshwater Marshes	PEM1F	Wetland appears to be isolated.	Vegetation observed included <i>Juncus spp.</i> , <i>Panicum hemitomon</i> , <i>Ludwigia peruviana</i> , <i>Baccharis hamifolia</i> .	Adjacent land use includes pastures. There are some wetlands to the south and the west, however there does not appear to be a connection.	Provides foraging habitat, life cycle support, and refuge opportunities for fish, reptiles, amphibians, invertebrates, wading birds, and aquatic and terrestrial mammals.	Provides nutrient uptake and sediment settling. Also provides water storage capacity.	Not applicable – privately owned.	This wetland may have been manipulated historically for agricultural purposes, however, this wetland has not been impacted by roadway construction or residential development.	2.05

*Size (acreage) is only the area included within the study area. Many of the wetlands and surface waters extend offsite, outside the limits of the study area.

Figure 10A: Wetlands and Surface Water Maps (1 of 4)

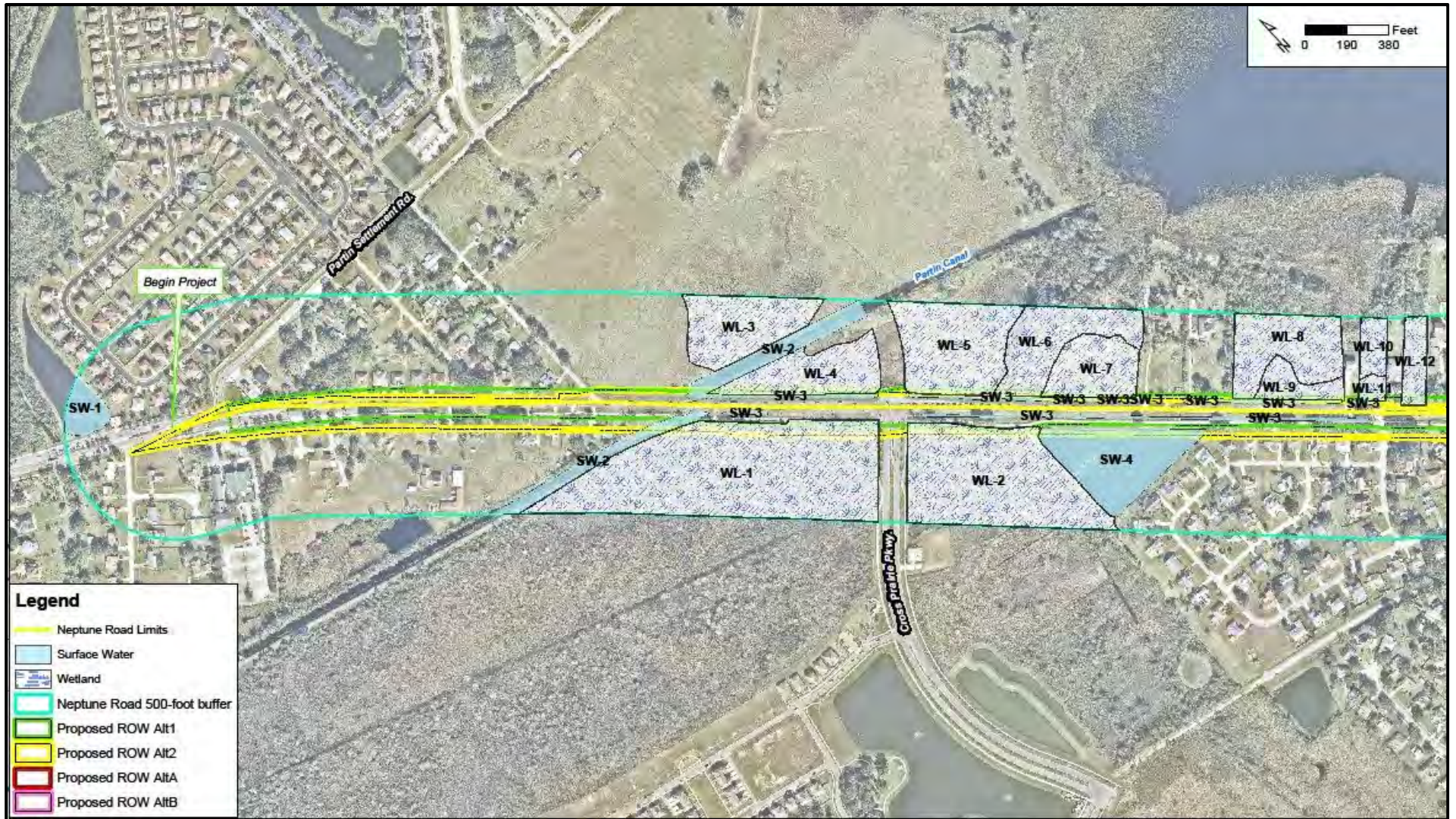


Figure 10B: Wetlands and Surface Water Maps (2 of 4)

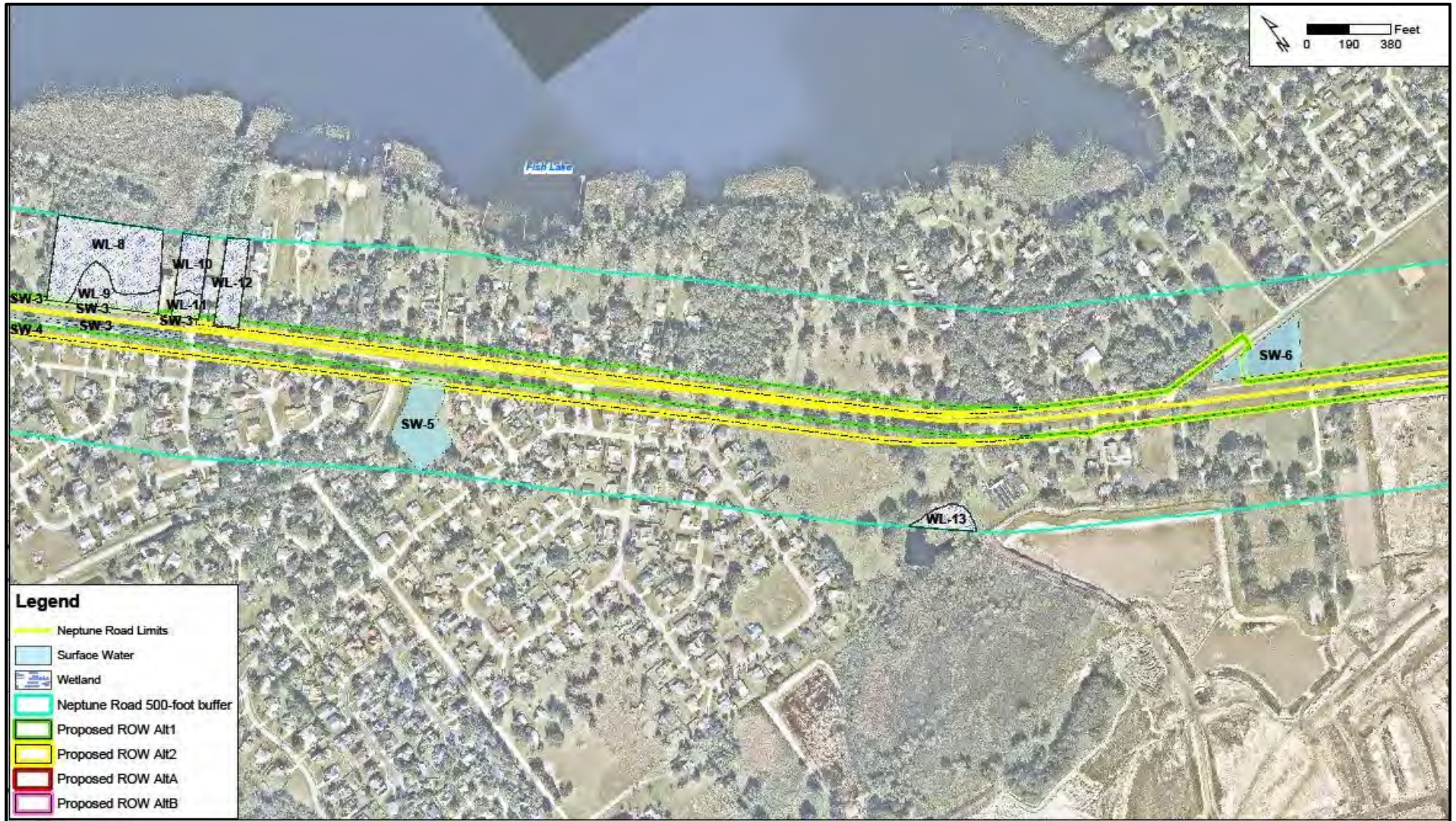


Figure 10C: Wetlands and Surface Water Maps (3 of 4)

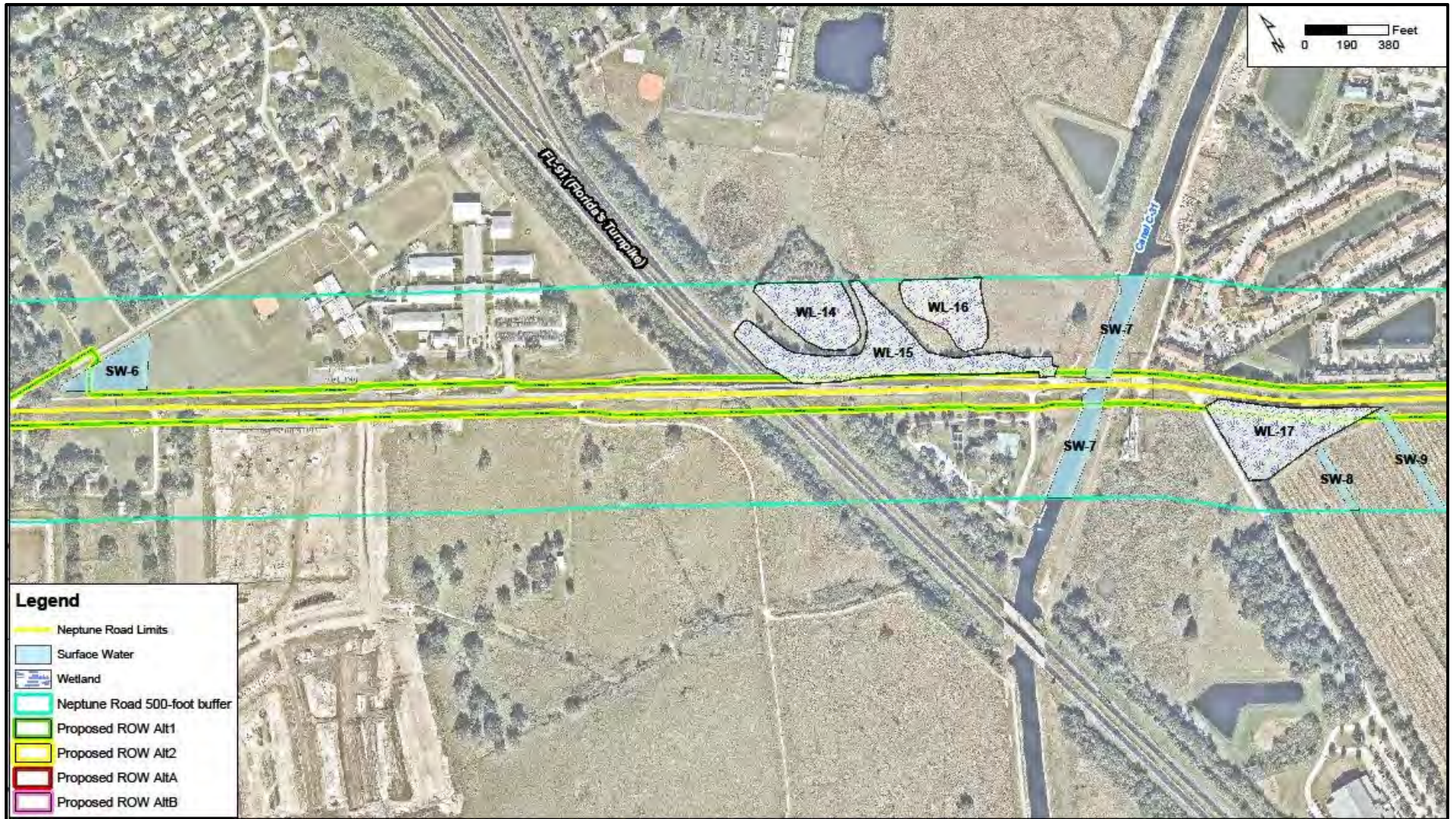


Figure 10D: Wetlands and Surface Water Maps (4 of 4)



6.3 WETLAND AND SURFACE WATER IMPACTS ANALYSIS

Within the study area, impacts to wetlands and surface waters are anticipated to occur for all proposed build alternatives because the wetland and surface water systems in most cases extend to the existing road ROW. Impacts are discussed in the following sections.

6.3.1 DIRECT IMPACTS

The approximate wetland and surface water direct impacts were calculated based on the total footprint of the proposed build alternative alignments.

The proposed direct impacts (fill) are shown in **Table 4**. Based upon the proposed typical sections described and shown in Section 2.4, Alternatives 1 and 2 from Partin Settlement Road to Old Canoe Creek Road have ROW varying from 130' to 139'. Alternative A from Old Canoe Creek Road to US 192 has ROW varying from 60' to 82', while Alternative B has ROW varying from 59' to 83'. The maximum footprint was utilized for all alternatives when calculating wetland and surface water impacts. The No Build Alternative results in no impacts to wetlands or surface waters.

Table 4: Direct Wetland and Surface Water Impacts by Alternative (Acres)

SW/WL Number	Alt 1	Alt 2	Alt A	Alt B
SW 2	0.18	0.33		-
SW 3	1.57	1.54		-
SW 5	-	0.06		-
SW 6	0.20	0.20		-
SW 7	0.22	0.22		-
SW 9	0.04	0.04		-
SW 10	0.01	0.01		-
SW 11	0.01	0.01		-
SW 13	-	-	0.03	0.05
Total Surface Water Impacts	2.23	2.41	0.03	0.05
WL1	0.30	1.20	-	-
WL2	0.19	0.52	-	-
WL4	0.22	0.22	-	-
WL5	0.21	0.06	-	-
WL6	0.13	0.04	-	-
WL7	0.15	-	-	-
WL8	0.04	-	-	-
WL9	0.16	-	-	-
WL11	0.05	-	-	-
WL12	0.09	-	-	-
WL15	0.20	0.20	-	-
WL17	0.83	0.83	-	-
Total Wetland Impacts	2.57	3.07	-	-
Grand Total Surface Water and Wetland Impacts	4.80	5.48	0.03	0.05

6.3.2 SECONDARY IMPACTS

The approximate secondary impacts to wetlands and surface waters were calculated for the proposed build alternatives. Impact values were calculated based on a 25-foot construction impact zone that was established around the alignment. This would include grading for harmonization. **Table 5** provide a summary of the potential secondary impacts from construction to wetlands for each alternative. Alternative A and B did not have any direct wetland impact and there are no wetlands within 25 feet of the alternatives; thus, assessment of secondary impacts to wetlands was not required.

Table 5: Secondary Wetland Impacts by Alternative (Acres)

WL Number	Alt 1	Alt 2
WL1	0.49	0.56
WL2	0.36	0.34
WL4	0.42	0.42
WL5	0.24	0.23
WL6	0.12	0.12
WL7	0.24	0.22
WL8	0.06	0.06
WL9	0.23	0.23
WL11	0.07	0.07
WL12	0.06	0.05
WL15	0.69	0.69
WL17	0.39	0.39
Total Secondary Wetland Impacts	3.37	3.38

6.3.3 STORMWATER POND SCREENING

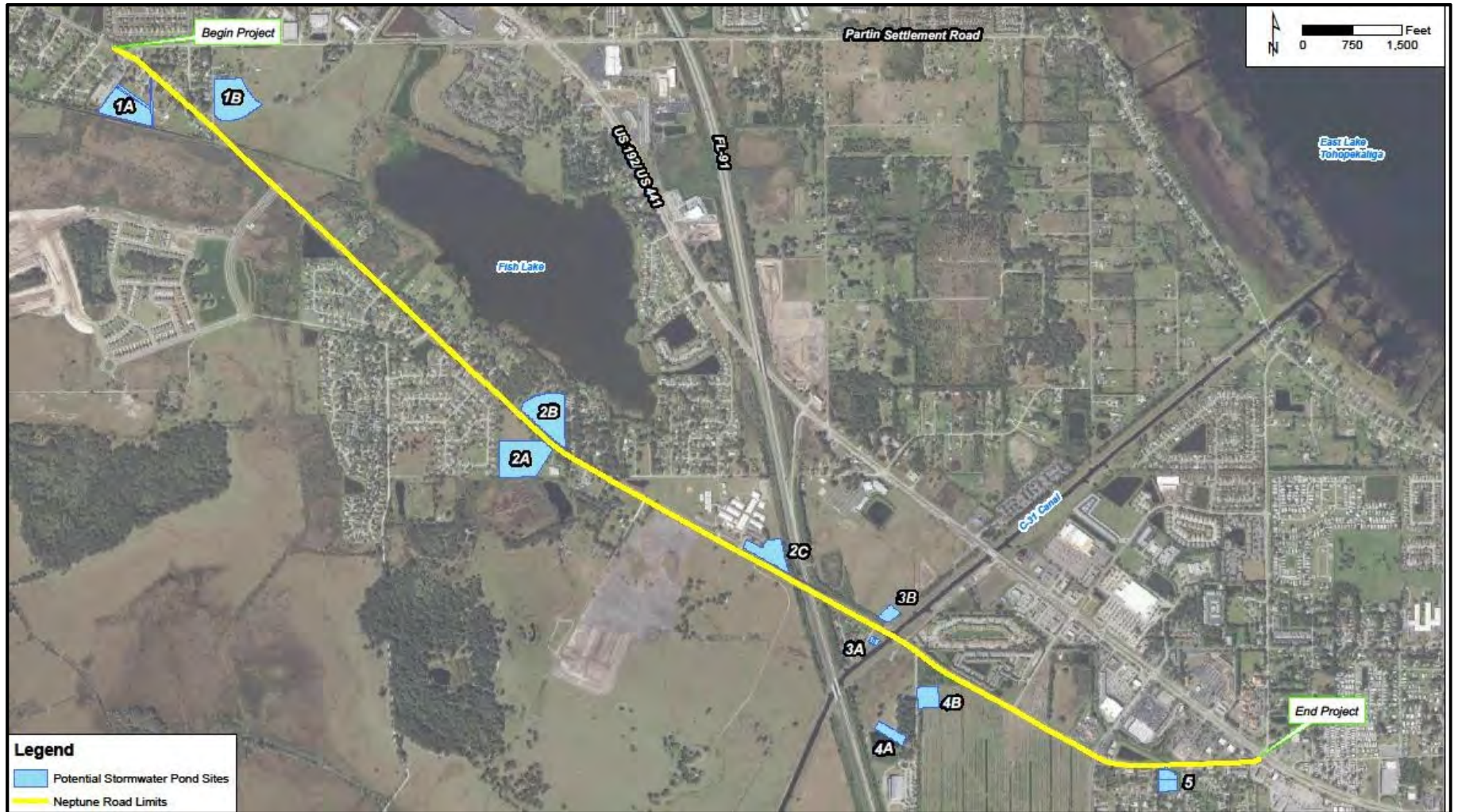
A stormwater pond screening analysis was conducted, and the results are included in **Table 6**. Multiple potential pond site alternatives were evaluated per basin. Additional detail regarding the pond sites is included in the *Pond Siting Report* (June 2019). The stormwater pond site alternatives are included on **Figure 11**. Wetland impacts would occur if pond number 1A or 2A were selected as the preferred alternative.

Table 6: Summary of Stormwater Pond Screening

Pond Number	Acreage ¹	FLUCFCS Description	Vegetative Description	Wetland or Surface Water (SW) Impacts
1A	6.57	190/641	Open land and freshwater marsh	3.84 acres of impacts to freshwater marsh
1B	7.67	211	Improved pasture	N/A
2A	8.61	211/641	Improved pasture and freshwater marsh	1.51 acres of impacts to freshwater marsh
2B	7.69	434	Hardwood-conifer mixed	N/A
2C	3.70	171	Educational facilities; No impacts to school; pond would be in bahia grass/existing dry detention area	N/A
3A	0.32	185	Recreational; No impacts to park facilities; pond would be in bahia grass	N/A
3B	1.00	211	Improved pasture	N/A
4A	1.48	211/434	Improved pasture and hardwood-conifer mixed	N/A
4B	2.32	261/434	Fallow crop land and hardwood-conifer mixed	N/A
5	1.97	190	Open land	N/A

¹: Acreage listed includes the entire pond ROW acquisition requirement.

Figure 11: Potential Stormwater Pond Alternatives Map



6.4 FUNCTIONAL ASSESSMENT

6.4.1 METHODOLOGY

The Uniform Mitigation Assessment Methodology (UMAM), as established by the FAC, Chapter 62-345, was used to complete a functional assessment of the wetlands within the study area. The UMAM is a rating index that assists in evaluating the functions and values of a wetland system. It establishes a numerical ranking for a wetland based on various ecological or anthropogenic variables known to influence the functional value of a wetland. UMAM scores are based on the total of three categories, scored from zero (0) (lowest) to ten (10) (highest), divided by the total maximum score for the variables (30). The UMAM value is expressed as a number between zero (0) and one (1), with one being assigned to the highest valued/functioning wetlands. The three (3) categories are described as follows:

6.4.1.1 LOCATION AND LANDSCAPE SUPPORT

Location and landscape support evaluates the location of the assessment area in relation to the connectivity and landscape position for the utilization of fish and wildlife. The potential for use by wildlife (i.e. availability of cover, food, and nesting areas) is also evaluated in this category.

6.4.1.2 WATER ENVIRONMENT

The water environment evaluates the quantity of water in an assessment area, including timing, frequency, depth, duration and quality. These characteristics may compromise the ability of the area to support wildlife.

6.4.1.3 COMMUNITY STRUCTURE

Community structure evaluates the vegetation and benthic habitat present in an assessment area. This evaluation includes the presence, abundance, health, condition, appropriateness, and distribution of plant communities and benthic habitats.

6.4.2 UMAM RESULTS

The wetlands and surface waters identified within the study area were assessed based on the UMAM criteria and a summary of the scores are provided in **Table 7**. UMAM data forms and comments for each wetland type within the study area are included in **Appendix E**.

Table 7: Summary of UMAM Scores

FLUCFCS	Wetland Number	Location & Landscape Support	Water Environment	Community Structure	UMAM Composite Score
617	WL-6, WL-8, WL-12	5	6	6	0.57
617	WL-15, WL-17	4	5	6	0.50
641	WL-1, WL-2	5	5	5	0.50
641	WL-7, WL-9, WL-11	6	6	5	0.57
641	WL-13	5	5	5	0.50
641	WL-16	5	5	5	0.50
643	WL-4	2	3	3	0.27

FLUCFCS	Wetland Number	Location & Landscape Support	Water Environment	Community Structure	UMAM Composite Score
643	WL-5	3	4	4	0.37

Potential wetland functional loss based on the composite UMAM scores was calculated for each habitat type and is presented in **Table 8**.

Table 8: Potential Wetland Functional Loss

Alternative	FLUCFCS	Wetland Number	Direct Impacts (Acres)	UMAM Composite Score	Potential Functional Loss	Sum of Potential Functional Loss by Alternative by Habitat Type
Alt 1	617	WL-6, WL-8, WL-12	0.26	0.57	-0.15	Forested: -0.67
	617	WL-15, WL-17	1.03	0.50	-0.52	
	641	WL-1, WL-2	0.49	0.50	-0.25	Herbaceous: -0.60
	641	WL-7, WL-9, WL-11	0.36	0.57	-0.21	
	643	WL-4	0.22	0.27	-0.06	
	643	WL-5	0.21	0.37	-0.08	
Alt 2	617	WL-6	0.04	0.57	-0.02	Forested: -0.54
	617	WL-15, WL-17	1.03	0.50	-0.52	
	641	WL-1, WL-2	1.72	0.50	-0.86	Herbaceous: -0.94
	643	WL-4	0.22	0.27	-0.06	
	643	WL-5	0.06	0.37	-0.02	

Alternative 1 will have an approximate functional loss of 0.67 acres of forested wetlands and 0.60 acres of herbaceous wetlands. Alternative 2 will have an approximate functional loss of 0.54 acres of forested wetlands and 0.94 acres of herbaceous wetlands.

After review of the project’s potential impacts to wetlands, it has been determined that the proposed project will have no significant short-term or long-term adverse impacts to wetlands, there is no practical alternative to construction in wetlands as the project is the widening of an already existing roadway, and measures have been taken to minimize harm to wetlands along the project corridor.

6.5 CONCEPTUAL MITIGATION

Avoidance and minimization of potential wetland and surface water impacts were incorporated throughout the development of the proposed build alternative alignments, where possible. Most of the project has been designed to occur within existing ROW, which reduces impacts to adjacent wetlands and surface waters.

Avoidance and minimization of wetland and surface water impacts will continue to be evaluated during the final design, permitting and construction phases of this project and all possible and practicable measures to avoid or minimize these impacts during design, construction and operation will be incorporated. Appropriate mitigation options will be provided for unavoidable impacts. Mitigation is expected to consist of purchase of mitigation credits. The project occurs within the Lake Tohopekaliga Cumulative Impact Basin and several mitigation banks have service areas that include the project study area. The following mitigation banks will be considered for wetland mitigation: Reedy Creek Mitigation Bank, Southport Ranch Mitigation Bank, and Florida Mitigation Bank. These banks currently have both forested and herbaceous, state and federal credits available.

All UMAM scores, UMAM calculations, preliminary wetland lines and determinations discussed are subject to revision and approval by regulatory agencies during the permitting process. The exact type of mitigation used to offset wetland impacts from the proposed widening of Neptune Road will be coordinated with the USACE and the SFWMD during the permitting phase of this project.

As required by Executive Order 11990 and USDOT Order 5660.1A, the proposed project will have no significant short-term or long-term adverse impacts to wetlands, there is no practical alternative to construction in wetlands as the project includes the widening of an already existing roadway, and measures have been taken to minimize harm to wetlands along the project corridor. Wetland impacts which will result from the construction of this project will be mitigated pursuant to Section 373.4137, F.S. to satisfy all mitigation requirements of Part IV. Chapter 373, F.S. and 33 U.S.C. s. 1344.

6.6 CUMULATIVE EFFECTS

Cumulative effects of a project result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time (Council on Environmental Quality (CEQ) (40CFR Section 1508.7)). Cumulative effects are also largely dependent upon the size of the road/bridge corridor, the relative position of the project within the landscape, and the relative condition of the habitats being traversed (pristine vs. degraded).

Historical aeriels were obtained and reviewed from 1969 to the present (see **Appendix F – Historical Aeriels**). The 1969 aerial shows much of the study area consisting of pastures, some rural development, wetlands, and the adjacent lakes (Fish Lake, Lake Tohopekaliga, and East Lake Tohopekaliga). The Partin Canal, C-31 Canal, US 441, Neptune Road, and the Florida's Turnpike are all evident in this aerial. Thus, some conversion of land primarily for agriculture had already begun in the early 1960s with land clearing appearing to be mostly within uplands. By 1973, there was a slight increase in residential development. Development significantly increased in the 80s and 90s, which included the construction of Neptune Middle School. Additionally, more residential development was occurring especially around Fish Lake and near the intersection of Neptune Road and Partin Settlement Road. Construction within the wetland systems surrounding the lakes were avoided, much like present day. The preserved wetland systems were not connected even in the 1960s and today still remain unconnected, which prohibits movement of wildlife between wetland systems.

When evaluating cumulative impacts to wetlands, a watershed approach is often utilized. The study area is located within the Kissimmee River Watershed and more specifically within the Lake Tohopekaliga Drainage Basin. Using GIS, the total area of the watershed and drainage basin areas were calculated as well as the total protected wetlands. The protected wetlands were based on an analysis of data layers

showing Florida Managed Lands and SFWMD conservation easements. Due to the size of the watershed and drainage basin, this study did not include a review of every individual permit to determine if the wetlands are preserved or not, but from aerial review there are other areas of wetlands that are not in easement but appear to be protected wetlands that were not included in the overall numbers. Thus, the acreage of protected wetlands is a conservative number and may be greater than determined in this analysis.

The Kissimmee River Watershed is approximately 1,946,927 acres with approximately 609,785 acres of wetlands. Approximately 199,836 acres of wetlands are protected within conservation easements or a Florida managed lands program. The wetland impacts for the alternatives range from approximately 2.6 acres to 3.1 acres. These impacts are negligible within the context of the watershed.

The Lake Tohopekaliga Drainage Basin is approximately 84,360 acres. For this basin, there is approximately 29,132 acres of wetlands of which approximately 3,235 acres are protected. The wetland impacts of the project are negligible within the context of the overall drainage basin.

As discussed in the Section 6.5 Conceptual Mitigation, it is anticipated that mitigation will be conducted through purchase of credits within the same watershed. Therefore, cumulative wetland impacts are not expected to occur from this project.

7.0 PROTECTED SPECIES AND HABITAT ASSESSMENT

7.1 DATA COLLECTION

Information on the potential occurrence of federal and state listed species within the project study area was qualitatively assessed based on a review of available literature, database review, and based on field surveys that were conducted within the study area. The results of the database and GIS review are as follows:

FWC

FWC documents five bald eagle nests within a half mile from the study area buffer (OS083, OS084, OS130, OS169, and OS206). The 660-foot buffers for OS083, OS130, and OS206 lie outside of the study area buffer for this project, while the 660-foot buffer for OS084 and OS169 lie within the study area buffer for the project. OS084 and OS169 are discussed further in section 7.5.3 below.

There are several nuisance reports of the Florida black bear within 1 mile from the study area. Florida black bears are discussed further in section 7.5.3 below.

FNAI

FNAI reported only two bald eagle nests within one mile from the study area buffer (OS083 and OS130). OS130 is shown within an existing subdivision with last known active date of 2012. OS 083 is shown as last survey/last active 2015. OS169 is shown as active in 2015 and 2016. Additionally, the study area is outside of the 660-foot buffer for both nests. There were no other documented occurrences of listed wildlife.

USFWS

The project is located within the following consultation areas: Audubon's crested caracara, red-cockaded woodpecker, Everglade snail kite, Florida scrub-jay, Florida bonneted bat, and Lake Wales Ridge Plants. The project is not located within any USFWS-designated critical habitat.

The study area is located within four Core Foraging Areas (CFA) for wood stork nesting colonies (Lake Conlin, Lake Russell, Gatorland, and Lake Mary Jane). The center point for both Lake Conlin and Lake Russell nesting colonies are located within Osceola County, while the center point for Gatorland and Lake Mary Jane nesting colonies are located within Orange County. The CFA in south Florida counties (Osceola) is defined as 18.6 miles from an active nesting colony, while the CFA in central Florida counties (Orange) is 15 miles.

Several species were included in the IPaC Trust Resources Report because USFWS includes historic data. However, when comparing current conditions for the study area as well as current extent of the listed species, it was determined that many of these species would not occur in the study area (Florida grasshopper sparrow and ivory-billed woodpecker). Therefore, these species are not discussed further in the document.

AN Comments

No comments were received regarding listed species during the Advance Notification review process.

ETDM Comments

FWC commented that the following species could occur within the project area: Eastern indigo snake, American alligator, Audubon's crested caracara, wood stork, Florida pine snake, gopher tortoise, Southeastern American kestrel, Florida burrowing owl, Florida sandhill crane, little blue heron, tricolored heron, and roseate spoonbill. Two eagle nests (OS084 and OS169) are within the recommended buffer distance of 660 feet from the project site. New or irregular activities planned within 660 feet of a bald eagle nest should follow the USFWS Eagle Management Guidelines.

USFWS commented that the following species could occur within the project area: wood stork, eastern indigo snake, Everglade snail kite, Florida scrub-jay, red-cockaded woodpecker, and federally listed plants.

Maps of USFWS Consultation Areas and wood stork CFAs are included in **Appendix G**.

7.2 LISTED SPECIES

Pursuant to Section 7(c) of the Endangered Species Act of 1973, the study area was evaluated for the potential occurrence of federal listed threatened and endangered species, and species classified by federal agencies as candidates for listing. In addition, the study area was evaluated for potential occurrence of state listed threatened, endangered and species of special concern. The likelihood of species occurrences considered for the study area were determined based on several factors including whether the species were positively identified by project biologists during field surveys, suitable habitat was observed or is known to occur, species life history, and local knowledge. Species were given a 'Low' likelihood of occurrence if they were not observed during field surveys and/or have no or limited suitable habitat within the study area. Species were given a 'Medium' likelihood of occurrence if they were not observed during field surveys, but suitable habitat exists within the study area. Species were given a 'High' likelihood of occurrence if they were observed during field surveys and/or if there is suitable habitat throughout the study area. Based on the data and literature review and subsequent field surveys, state and federally listed species that may occur in the study area are identified in **Table 9**.

Table 9: Potential Federal and State Protected Fauna and Flora

Common Name	Scientific Name	Federal Status	State Status	Likelihood of Occurrence
MAMMALS				
Florida Panther	<i>Puma concolor coryi</i>	E	FE	Low
Florida Bonneted Bat	<i>Eumops floridanus</i>	E	FE	Medium
Florida Black Bear	<i>Ursus americanus floridanus</i>	NL*	NL*	Low
Southern Fox Squirrel	<i>Sciurus niger niger</i>	NL**	NL**	High
BIRDS				
Audubon's Crested Caracara	<i>Polyborus plancus audubonii</i>	T	FT	Low
Florida Scrub-Jay	<i>Aphelocoma coerulescens</i>	T	FT	Low
Red-cockaded Woodpecker	<i>Picoides borealis</i>	E	FE	Low
Everglade Snail Kite	<i>Rostrhamus sociabilis plumbeus</i>	E	FE	Low

Common Name	Scientific Name	Federal Status	State Status	Likelihood of Occurrence
Wood Stork	<i>Mycteria americana</i>	T	FT	High
Florida Burrowing Owl	<i>Athene cunicularia floridana</i>	NL	ST	Low
Florida Sandhill Crane	<i>Grus canadensis pratensis</i>	NL	ST	High
Southeastern American kestrel	<i>Falco sparverius paulus</i>	NL	ST	High
Tricolored Heron	<i>Egretta tricolor</i>	NL	ST	Medium
Little Blue Heron	<i>Egretta caerulea</i>	NL	ST	High
Roseate Spoonbill	<i>Platalea ajaja</i>	NL	ST	Medium
Bald Eagle	<i>Haliaeetus leucocephalus</i>	NL***	NL***	High
REPTILES				
Eastern Indigo Snake	<i>Drymarchon corais couperi</i>	T	FT	Low
Florida Pine Snake	<i>Pituophis melanoleucus mugitus</i>	NL	ST	Low
Gopher Tortoise	<i>Gopherus polyphemus</i>	C	ST	Low
PLANTS				
Beautiful Pawpaw	<i>Deeringothamnus pulchellus</i>	E	SE	Low
Britton's Beargrass	<i>Nolina brittoniana</i>	E	SE	Low
Florida Blazing Star	<i>Liatris ohlingerae</i>	E	SE	Low
Florida Bonamia	<i>Bonamia grandiflora</i>	T	SE	Low
Lewton's Polygala	<i>Polygala lewtonii</i>	E	SE	Low
Paper-like Nailwort	<i>Paronychia chartacea ssp. chartacea</i>	T	SE	Low
Pygmy Fringe Tree	<i>Chionanthus pygmaeus</i>	E	SE	Low
Scrub Buckwheat	<i>Eriogonum longifolium var. gnaphalifolium</i>	T	SE	Low
Scrub Lupine	<i>Lupinus aridorum</i>	E	SE	Low
Short-leaved Rosemary	<i>Conradina brevifolia</i>	E	SE	Low
Sandlace	<i>Polygonella myriophylla</i>	E	SE	Low
Carter's Mustard	<i>Warea carteri</i>	E	SE	Low
Wide-leaf Warea	<i>Warea amplexifolia</i>	E	FE	Low
Ashe's Savory	<i>Calamintha ashei</i>	NL	ST	Low
Celestial Lily	<i>Nemastylis floridana</i>	NL	SE	Low
Cutthroat Grass	<i>Panicum abscissum</i>	NL	SE	Low
Florida Beargrass	<i>Nolina atopocarpa</i>	NL	ST	Low
Florida Spiny-pod	<i>Matelea floridana</i>	NL	SE	Low
Giant Orchid	<i>Pteroglossaspis ecristata</i>	NL	ST	Low
Hartwrightia	<i>Hartwrightia floridana</i>	NL	ST	Low
Many-flowered Grass-pink	<i>Calopogon multiflorus</i>	NL	ST	Low
Nodding Pinweed	<i>Lechea cernua</i>	NL	ST	Low
Pinewoods Bluestem	<i>Andropogon arctatus</i>	NL	ST	Low

Common Name	Scientific Name	Federal Status	State Status	Likelihood of Occurrence
Sand Butterfly Pea	<i>Centrosema arenicola</i>	NL	SE	Low
Scrub Bluestem	<i>Schizachyrium niveum</i>	NL	SE	Low
Star Anise	<i>Illicium parviflorum</i>	NL	SE	Low
Yellow Fringeless Orchid	<i>Platanthera integra</i>	NL	SE	Low

Based on Florida's Endangered and Threatened Species updated December 2018 available on <http://myfwc.com/wildlifehabitats/imperiled/> and 5B-40.0055 Florida Administrative Code (FAC) Regulated Plant Index.

Federal Status: E = Endangered; T = Threatened; C = Candidate Species; NL = Not Listed

State Status: FE = Federally Endangered; FT = Federally Threatened; FT(S/A) = Federally Threatened due to Similarity of Appearance. ST= State Threatened; SE = State Endangered; SSC = Species of Special Concern. Note: Coordination is not required with FWC for federally listed species.

Bold = observed during field reconnaissance

* The Florida black bear is still protected under Florida Black Bear Conservation Rule 68A-4.009 (F.A.C.) and the FWC Florida Black Bear Management Plan.

**The fox squirrel is still protected under Regulations Relating to the Taking of Mammals 68A-29.002 (F.A.C.).

*** The Bald eagle is still protected under the Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act and FWC Management Plan regulations.

7.3 FIELD SURVEYS

Habitat mapping, gopher tortoise surveys, and plant surveys were conducted on November 30, 2019 and February 19, 2019. A Florida bonneted acoustic and roost survey was conducted May 2020 through June 2020 and the results are summarized in the *Florida Bonneted Bat Acoustic Survey Report* dated July 2020 and is included in **Appendix H**. Crested caracara surveys were conducted January 2019 through April 2019. The results of the crested caracara surveys are summarized in the *Crested Caracara Report* dated May 2019 and is included in **Appendix I**

Additionally, observations of flora and fauna or indicators of wildlife within the corridor were noted such as tracks, burrows, scat, calls (avian), and evidence of foraging activities, in addition to actual observations of plants and animals. The results of plant and animal surveys are summarized in the following sections. **Table 10** lists wildlife species/signs that were observed within the study area during field reconnaissance.

Table 10: Wildlife Species/Signs Observed Within the Study Area

Scientific Name	Common Name
<i>Corvus brachyrhynchos</i>	American Crow
<i>Falco sparverius</i>	American Kestrel
<i>Turdus migratorius</i>	American Robin
<i>Pelecanus erythrorhynchos</i>	American White Pelican
<i>Anhinga anhinga</i>	Anhinga
<i>Megaceryle alcyon</i>	Belted Kingfisher
<i>Dendrocygna autumnalis</i>	Black-bellied Whistling Duck
<i>Coragyps atratus</i>	Black Vulture
<i>Poliophtila caerulea</i>	Blue-gray Gnatcatcher
<i>Cyanocitta cristata</i>	Blue Jay
<i>Spatula discors</i>	Blue-winged Teal
<i>Quiscalus major</i>	Boat-tailed Grackle

Scientific Name	Common Name
<i>Molothrus ater</i>	Brown-headed Cowbird
<i>Bubulcus ibis</i>	Cattle Egret
<i>Quiscalus quiscula</i>	Common Grackle
<i>Phalacrocorax auritus</i>	Double-crested Cormorant
<i>Dryobates pubescens</i>	Downy Woodpecker
<i>Sialia sialis</i>	Eastern Bluebird
<i>Sturnella magna</i>	Eastern Meadowlark
<i>Sayornis phoebe</i>	Eastern Phoebe
<i>Streptopelia decaocto</i>	Eurasian Collared Dove
<i>Sturnus vulgaris</i>	European Starling
<i>Corvus ossifragus</i>	Fish Crow
<i>Plegadis falcinellus</i>	Glossy Ibis
<i>Ardea herodias</i>	Great Blue Heron
<i>Ardea alba</i>	Great Egret
<i>Larus argentatus</i>	Herring Gull
<i>Passer domesticus</i>	House Sparrow
<i>Charadrius vociferus</i>	Killdeer
<i>Aramus guarauna</i>	Limpkin
<i>Egretta caerulea</i>	Little Blue Heron
<i>Lanius ludovicianus</i>	Loggerhead Shrike
<i>Zenaida macroura</i>	Mourning Dove
<i>Anas fulvigula</i>	Mottled Duck
<i>Cairina moschata</i>	Muscovy Duck
<i>Cardinalis cardinalis</i>	Northern Cardinal
<i>Mimus polyglottos</i>	Northern Mockingbird
<i>Pandion haliaetus</i>	Osprey
<i>Setophaga palmarum</i>	Palm Warbler
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker
<i>Buteo lineatus</i>	Red-shouldered Hawk
<i>Agelaius phoeniceus</i>	Red-winged Blackbird
<i>Buteo jamaicensis</i>	Redtail Hawk
<i>Larus delawarensis</i>	Ring-billed Gull
<i>Columba livia</i>	Rock Pigeon
<i>Antigone canadensis</i>	Sandhill Crane
<i>Passerculus sandwichensis</i>	Savannah Sparrow
<i>Haliaeetus leucocephalus</i>	Southern Bald Eagle
<i>Tachycineta bicolor</i>	Tree Swallow
<i>Cathartes aura</i>	Turkey Vulture
<i>Eudocimus albus</i>	White Ibis
<i>Mycteria americana</i>	Wood Stork
<i>Setophaga coronata</i>	Yellow-rumped Warbler

Scientific Name	Common Name
<i>Sciurus carolinensis</i>	Eastern Gray Squirrel
<i>Didelphis virginiana</i>	Opossum
<i>Sciurus niger niger</i>	Southern Fox Squirrel

7.4 HABITAT IMPACTS

7.4.1 POTENTIAL PROJECT IMPACTS

Uplands and wetlands were mapped based on the FLUCFCS (FDOT, 1999) and FLUCFCS Maps are included as **Figure 7**. Wetland habitat descriptions and upland habitat descriptions were discussed in Section 5.4.2.

A summary of the proposed impacts to upland habitat within the project study area are presented in **Table 11**. There are no native uplands remaining in the area of Alternatives A and B.

Table 11: Habitat Impacts by Alternatives (Acres)

FLUCFCS CODE	Description	Alt 1	Alt 2	Alt A	Alt B
211	Improved Pastures	1.64	2.72	0	0
261	Fallow Crop Land	1.89	1.89	0	0
434	Hardwood-Conifer Mixed	1.40	0.14	0	0

Avoidance and minimization of potential upland habitat impacts were incorporated throughout the development of the proposed build alternative alignments, where possible. Most of the project has been designed to occur within existing ROW, which reduces impacts to adjacent upland habitats.

Avoidance and minimization of upland habitats will continue to be evaluated during the final design, permitting and construction phases of this project and all possible and practicable measures to avoid or minimize these impacts during design, construction and operation will be incorporated.

7.5 LISTED SPECIES SURVEY RESULTS AND IMPACTS

Provided below is a discussion of the listed species that may occur within the study area and the potential impacts to each species resulting from project implementation. The descriptions of the species and their habitat requirements were excerpted from multiple resources. Listings of the resources used in these descriptions are provided in Section 12.0 – References.

7.5.1 FEDERAL LISTED FAUNA

Florida Panther

The main threats to the Florida panther populations include habitat loss and degradation and human conflict, including road kills. Preservation of large natural landscapes and increased public awareness are included in the Florida Panther Recovery Plan (2008) to help maintain and increase the survival of the

Florida panther. This species is a large feline with a long tail. Fur is dark buff to tawny above and light buff to white below. This species requires large tracts of forested habitats with dense understory vegetation and large wetlands to be used for diurnal refuge. Panthers select habitat based on prey availability. In Florida, the panther is found year-round predominately in Collier, Glades, Lee, Monroe, and Miami-Dade counties. However, dispersing individuals can be found well north in the peninsula of Florida searching for new territories.

The study area does not fall within the USFWS consultation area for this species. There have been no known records of Florida panthers occurring within the study area. Additionally, the project is not within a Panther Focus Area (Primary, Secondary or Dispersal Zones or Primary Dispersal/Expansion Area). Based on the USFWS Panther Key (February 19, 2007), a project is considered to have an effect on panthers if there has been documented physical evidence of panthers within a two-mile radius of a project within the past two years. Documented evidence includes telemetry locations, photographs, tracks, prey kills or other verifiable evidence. Currently, the study area does not meet these criteria; thus, the project is considered to have **no effect** on the Florida panther.

Florida Bonneted Bat

The Florida bonneted bat is the largest bat species endemic to Florida. This species has a wide ranging USFWS consultation area but has only been recorded to occur in south Florida (Miami-Dade, Broward, Collier, Hendry, Lee, Charlotte, Glades, Highlands, Desoto, and Polk counties). This species is known to roost in natural tree cavities and tree cavities created by woodpeckers and other species as well as in man-made structures. The project study area is within the USFWS consultation area for the Florida bonneted bat and based on coordination with USFWS suitable foraging and roosting habitat for this species were surveyed. An acoustic and roost survey was conducted from May to June 2020 and the results of the surveys are summarized in **Appendix H – Florida Bonneted Bat Acoustic Survey Report (July 2020)**. No Florida bonneted bats were detected during the acoustic and roost survey; therefore, a determination of **no effect** has been made for the Florida bonneted bat.

Birds

Audubon's Crested Caracara

Audubon's crested caracara (caracara) are year-round residents in Florida. The species has been reported from the Kissimmee, Caloosahatchee and Upper St. Johns River basins, and the Kissimmee prairie. The crested caracara is strongly associated with open habitats, preferring large expanses of pastures, grasslands, or prairies with numerous shallow ponds and sloughs and single or small clumps of cabbage palms, live oaks, and cypress. Notable changes in land use patterns have occurred throughout central Florida. As a result, the caracara's range in Florida is now smaller than historically documented. Caracara now occurs almost exclusively on privately owned cattle ranches in the south-central part of the state.

The caracara is an opportunistic feeder with a broad diet consisting of carrion and live prey, including invertebrates associated with carrion and dung in pastures. They forage in a wide variety of habitats including pastures, along roads, wetlands and agricultural lands including citrus groves.

Following a desktop review of crested caracara related resources, field reconnaissance was conducted to verify existing conditions and identify areas of potential habitat. Suitable habitat was documented within the study area during the November 30, 2018 site visit. Based on this site visit, three survey stations were established within the study area. Crested caracara surveys were conducted January

through April 2019. The results of the surveys are summarized in **Appendix I – Audubon’s Crested Caracara Survey Report (May 2019)** and is incorporated here by reference. Suitable habitats for the crested caracara within the project study area were surveyed in accordance with the USFWS Crested Caracara Survey Protocol (USFWS, 2016). No caracaras were observed during the survey. However, due to the presence of suitable habitat, a determination of ***may affect, not likely to adversely affect*** has been made for the crested caracara.

Florida Scrub-Jay

The Florida scrub-jay (scrub-jay) prefers low growing oak scrub habitats, including sand pine and scrubby flatwoods. Optimal habitat includes scrub oak with most of the oaks and other shrubs limited to 1-4 meters in height, interspersed with numerous small patches of bare sand. Fire is a frequent natural event in scrub habitats and serves to maintain the habitat. Fire suppression and development of the habitat has made this species vulnerable to extinction.

Scrub-jays are similar in size and shape to their relative, the blue jay, but they differ strikingly in color pattern and exhibit subtle markings as opposed to the blue jay. They have a pale blue head, nape, wings and tail and are pale gray on the back and belly. A white eyebrow blends with a frosted white forehead. The throat and upper breast are faintly striped and bordered by pale blue, forming a distinct bib. The scrub-jay is relatively sedentary and rarely sustains a flight of more than a kilometer. The Florida scrub-jay is a non-migratory species.

Although the project is within the USFWS consultation area for the scrub-jay, there is no suitable habitat for this species within the study area. Additionally, no scrub-jays were observed within the study area. Therefore, a determination of ***no effect*** has been made for the scrub-jay.

Red-Cockaded Woodpecker

Red-cockaded woodpeckers inhabit open, mature pine woodlands that have a diversity of grass and shrub species. Preferred habitat includes old growth longleaf pine flatwoods in north and central Florida and mixed longleaf pine and slash pine in south-central Florida. The red-cockaded woodpecker creates cavities in within the longleaf pine tree and rely on the trees production of resin to protect them from predators. Development of longleaf pine habitat as well as fire exclusion in this fire-dependent ecosystem has led to a large decrease in populations of red-cockaded woodpeckers.

The study area is located within the USFWS consultation area for the red-cockaded woodpecker; however, habitat for the red-cockaded woodpecker does not occur within the study area. Additionally, no red-cockaded woodpeckers or evidence of red-cockaded woodpeckers have been observed within the study area. Thus, the project will have ***no effect*** on the red-cockaded woodpecker.

Everglade Snail Kite

The Everglade snail kite has experienced degradation of its foraging habitat. This species has a highly specific diet, which is made up almost exclusively of apple snails (*Pomacea paludosa*). Snail kites typically prefer large, open, freshwater marshes and shallow lakes (< 4 ft. deep) with a low density of emergent vegetation and typically nest in low trees or shrubs over water (commonly willow, wax myrtle, pond apple, or buttonbush, but also in non-woody vegetation like cattail or sawgrass).

The study area does fall within the USFWS Consultation Area for the snail kite; however, there is no USFWS critical habitat within the study area. No apple snails, apple snail eggs, or snail kites were

observed during field reconnaissance. Although there are several lakes within 3 miles from the study area (Fish Lake, Lake Tohopekaliga and East Lake Tohopekaliga) and snail kites have been documented in Lake Tohopekaliga, these lakes and the marsh edges, will not be impacted by this project. Thus, the project will have *no effect* on the Everglade snail kite.

Wood Stork

Wood storks are typically found in marshes, cypress swamps, and mangrove swamps, but their presence in artificial ponds, seasonally flooded roadside or agricultural ditches, and managed impoundments has become common. Wood stork breeding areas extend from South Florida through Georgia and along the coastal areas of South Carolina. Large, colonial nesting areas are typically established in swamps or islands surrounded by broad, open water areas. The same colony site may be used over many years, provided the site remains undisturbed and sufficient foraging habitat is available. Wood storks are known to nest with other wading bird species, including white ibis, tricolored herons, snowy egrets, and great blue herons. Foraging habitat consists of nearly any calm, shallow water area (between 10 and 25 centimeters) or wetland depression that concentrates fish and is not overgrown with dense, aquatic vegetation. Some examples of foraging sites include freshwater marshes, stocked ponds, shallow ditches, narrow tidal creeks, shallow tidal pools, and depressional areas of cypress heads and swamp sloughs provide foraging habitat.

The shallow surface waters within the study area are man-made swales and stormwater ponds that may provide some minimal opportunistic foraging habitat, but no nesting habitat was present, and no wood storks were observed. The following are surface water impact acreages for each alignment: Alternative 1 – 2.24 acres, Alternative 2 – 2.89 acres, Alternative A – 0.03 acres and Alternative B – 0.05 acres. The preferred alignment including stormwater management facilities is anticipated to include 4.86 acres of wetlands and surface waters. A wood stork suitable foraging analysis (SFH) was conducted to determine the amount of biomass lost from these impacts. **Table 12** shows the amount of biomass lost based on impacts to wetlands and surface waters that contain suitable foraging habitat within the preferred alignment. A total of 2.53 kg of biomass will be lost based on impacts to short hydroperiod wetlands/surface waters and a 5.44 kg of biomass lost for long hydroperiod wetlands. The total biomass loss for impacts from the preferred alignment to suitable foraging habitat in wetlands and surface waters is 7.97 kg.

Table 12: Wood Stork Suitable Foraging Biomass Analysis for the Preferred Alignment

Hydroperiods	Acres	% exotics	Biomass (kg)
Class 1 (0-60 days)	1.68	0-25	0.68
Class 1 (0-60 days)	0.44	50-75	0.07
Class 3 (120-180 days)	1.60	25-50	1.78
Class 7 (330-365 days)	1.14	0-25	5.44
Total Short Hydroperiod (Classes 1, 2, and 3)	3.72		2.53
Total Long Hydroperiod (Classes 4, 5, 6 and 7)	1.14		5.44
Total	4.86		7.97

Based upon the *South Florida Wood Stork Effect Determination Key* (May 2010), the project is not within 0.47 miles from an active colony site, the project will impact greater than 0.50 acres of SFH, SFH is within the CFA of a colony site, and mitigation will be provided for lost SFH by creation of stormwater ponds, therefore, a determination of **may affect, not likely to adversely affect** has been made for the wood stork. See **Appendix I** for the *South Florida Wood Stork Effect Determination Key* (May 2010) and the path to the appropriate effect determination highlighted.

Reptiles

Eastern Indigo Snake

The eastern indigo snake occurs in a range of habitats, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats. Eastern indigo snakes are often found in strong association with gopher tortoises, though this is more prevalent where temperatures drop to below 50 degrees regularly in the winter but are also known to use the burrows of armadillos, cotton rats, and land crabs (in coastal areas). These snakes require large tracts of land for survival and are typically restricted to xeric habitats on pine-oak sandhills. Indigo snakes forage in hydric habitats, often along wetland ecotones. Gopher tortoise burrows provide this species with shelter from cold winter temperatures and relief from desiccation. Habitat for this species is limited and no indigo snakes were observed during field reconnaissance. Much of the project is taking place within previously disturbed right-of-way and no alternative will have more than 25 acres of impact to eastern indigo snake habitat. Additionally, the *Standard Protection Measures for the Eastern Indigo Snake* (**Appendix J**) will be implemented during construction to minimize potential impacts to this snake. Based on agency coordination with John Wrublik, USFWS, there are no records indicating that the indigo snake occurs on or within several miles of the project site and that there is a lack of credible information that would show this species reasonably occurs on or near the project site (**Appendix L**). Therefore, a determination of **no effect** has been made for this species.

7.5.2 STATE LISTED FAUNA

Birds

Florida Burrowing Owl

The Florida burrowing owl is a small, ground-dwelling owl that is boldly spotted and barred with brown and white. They often dig their own burrow and line the entrance with decorative materials prior to laying eggs at the bottom of the burrow. They inhabit high, sparsely vegetated, sandy ground and can be found in ruderal areas such as pastures, airports, ball fields, and road ROW.

Although no burrowing owls were observed, marginal habitat exists within the study area. Therefore, a burrowing owl survey should be completed during design and permitting to determine if any burrows exist within the limits of construction. If burrowing owls are documented during pre-construction surveys, a permit will be required from the Florida Fish and Wildlife Conservation Commission to impact inactive burrows. Due to the limited habitat within the study area, no burrowing owls documented during field surveys and the commitment to conduct pre-construction surveys and any necessary permits from FWC, no adverse effect is anticipated for the burrowing owl.

Florida Sandhill Crane

The Florida sandhill crane is a tall grey bird with a red forehead, and long neck and legs. The Florida sandhill crane is non-migratory and inhabits open grasslands, freshwater marshes, swampy edges of lakes and ponds, river banks, prairies, pasture lands and occasionally pine savanna throughout the state. Florida sandhill cranes typically start nesting on the margins of marshes and wet grasslands in late

December and continue into June. The nests, which are built by both adults, generally consist of sticks, reeds, grasses and mosses. Sandhill cranes are omnivorous and have been known to feed on seeds, grains, berries, insects, earthworms, mice, small birds, snakes, lizards, frogs, and crayfish.

Potential nesting habitat occurs within the study area and sandhill cranes were observed foraging adjacent to a stormwater pond (**Figure 12 – Listed Species Map**); however, no nests were observed. A nest survey should be conducted during design and permitting to determine if any nests exist within the proposed limits of construction or within 400-feet from the limits of construction. If a nest exists within the construction limits, further coordination with FWC will be required. Based on the current surveys and the lack of sandhill crane nests within or in proximity to the study area, no adverse effect is anticipated for the sandhill crane.

Southeastern American Kestrel

The southeastern American kestrel is the smallest falcon in United States. The male kestrel has blue-gray wings, while the female is larger and has more uniformly rufous back and wings. Both sexes have a mustached black-and white facial pattern with strong perpendicular lines extending below the eye and ear, and a black band at the base of the rufous tail. The alarm call is highly distinguishable and given frequently in flight.

The Kestrel's range is limited by a combination of nest and perch site availability, food supply and suitable foraging habitat. Kestrels require all these elements near one another. Kestrels are secondary cavity nesters using abandoned woodpecker cavities. Kestrels nest in open pine habitats, woodland edges, prairies, and pastures throughout much of Florida. Nest sites are in tall dead trees or utility poles generally with an unobstructed view of surroundings. Sandhill habitats seem to be preferred, but kestrels have been observed in flatwoods settings. Open patches of grass or bare ground are necessary for kestrels to effectively utilize flatwoods settings, since thick palmettos may prevent detection of prey.

Habitat for the southeastern American kestrel is located scattered throughout the study area. Cavity trees were not observed during field reconnaissance; however, kestrels were observed perched along powerlines along Neptune Road. These observations were conducted during a period when the migratory populations of the American kestrel would be present in Florida. During the survey period for southeastern American kestrels (April through September), the migratory populations of American kestrels leave Florida. The remaining kestrels are assumed to be the southeastern subspecies. As this is a highly mobile species pre-construction surveys will be updated during design and permitting. No one alternative would result in more or less impact to this species. Mitigation may be required to replace lost nest sites. With the commitment to conduct updated surveys and permit and mitigate any impacts, no adverse effect is anticipated for this species.

Tricolored Heron

The tricolored heron is a medium-sized heron with a slender neck. The body color appears two-toned with dark slate coloration on the head, neck, and body that contrasts with a white rump, belly, and under tail. A reddish-brown and white streak extends along the front of the neck. During breeding season, adults have white head plumes and rufous to whitish shoulders. Young birds have more reddish-brown on head, neck, and mantle but otherwise similar to adults. This species' nesting season is from late February to August and nesting typically occurs in mangrove or willow trees in mixed or single species rookeries. The tricolored heron feeds on small fish, frogs, tadpoles, crustaceans, snails, worms, and aquatic insects. Suitable roosting, foraging, and nesting habitat can be found within the freshwater marshes and forested wetlands within the study area. This species was not observed during field reconnaissance. Temporary impacts from construction may occur and limit use of the area by tricolored

herons and other wading birds. However, due to availability of suitable habitat surrounding the study area (habitat surrounding Lake Tohopekaliga and East Lake Tohopekaliga), no adverse effect is anticipated for the tricolored heron.

Little Blue Heron

The little blue heron is a medium-sized heron, with a purplish to maroon-brown head and neck. There is a small white patch on the throat and the upper neck. The body is slate-blue. The bill is black towards the tip, especially during breeding season, with the other exposed areas on the head appearing dark gray to cobalt blue. The legs are grayish to green, becoming black in breeding season. Immature birds are mostly white with pale slate- gray tips on primary wing feathers. Legs of young birds are yellowish green. Suitable roosting, foraging, and nesting habitat can be found within the freshwater marshes and forested wetlands within the study area. This species was observed foraging during field reconnaissance. Temporary impacts from construction may occur and limit use of the area by little blue herons and other wading birds. However, due to availability of suitable habitat surrounding the study area (habitat surrounding Lake Tohopekaliga and East Lake Tohopekaliga), no adverse effect is anticipated for the little blue heron.

Roseate Spoonbill

These wading birds are characterized by their bright pink bodies, white necks, and spoon-like bills. Immature birds are whitish, acquiring the pink coloration as they mature. Roseate spoonbills are the only spoonbill native to the Western Hemisphere and the only pink bird that breeds in Florida. Their primary nesting sites include coastal mangrove islands or in Brazilian pepper on man-made dredge spoil islands near suitable foraging habitat. Roseate spoonbills typically forage in shallow water of variable salinity, including marine tidal flats and ponds, coastal marshes, mangrove-dominated inlets and pools, and freshwater sloughs and marshes.

Most of the known breeding sites occur within federally owned national parks and wildlife refuges and National Audubon Society sanctuaries. Nests are found in Florida from Tampa Bay on the Gulf coast and Brevard County on the Atlantic coast, south to northern Florida Bay. Suitable roosting, foraging, and nesting habitat can be found within the freshwater marshes and forested wetlands within the study area. This species was not observed during field reconnaissance. Temporary impacts from construction may occur and limit use of the area by roseate spoonbills and other wading birds. However, due to availability of suitable habitat surrounding the study area (habitat surrounding Lake Tohopekaliga and East Lake Tohopekaliga), no adverse effect is anticipated for the roseate spoonbill.

Reptiles

Florida Pine Snake

This snake is large, stocky, and tan or rusty colored with darker blotches. The Florida pine snake prefers relatively open canopies with dry soils in which it burrows. The Florida pine snake is a fossorial snake that typically utilizes pocket gopher burrows and occasionally gopher tortoise burrows. Habitat for this species is limited within the study area and there are no known occurrences of this species. This species was not observed within the study area. Therefore, no effect is anticipated for the Florida pine snake.

Gopher Tortoise

The gopher tortoise ranges throughout the southeastern U.S. and occurs in suitable habitat in all Florida counties. The gopher tortoise excavates extensive underground burrows and spends much of its life in these burrows. Gopher tortoise habitat typically includes well drained, sandy soils, abundant groundcover, relatively open canopy and sparse shrub cover.

These habitat characteristics occur in a variety of Florida's native upland communities, including scrub communities, coastal strand and pine flatwoods. Development pressures on many of the upland communities in Florida have been increasing resulting in suboptimal habitat such as fence rows, old fields, range lands, and canal banks providing a higher potential for gopher tortoise occupancy. Gopher tortoise burrows are important shelter for a variety of species including the eastern indigo snake, gopher frog and Florida mouse.

Surveys for this species were conducted whenever appropriate habitat was encountered. Preferred habitat for this species was observed within the study area; however, no gopher tortoises or their burrows were observed within the study area. Due to the presence of suitable gopher tortoise habitat, a 100% gopher tortoise survey should occur within 90 days from the start of construction. If a gopher tortoise burrows are observed and will be impacted by the proposed improvements, a gopher tortoise relocation permit from FWC will be required. A gopher tortoise relocation permit allows the permittee to relocate gopher tortoises to a protected certified recipient site by an authorized agent per the *FWC Gopher Tortoise Permitting Guidelines* (April 2008, revised January 2017). As no gopher tortoises or their burrows were observed and the commitment to complete pre-construction surveys, permit and relocate gopher tortoises, no adverse effect is anticipated for this species.

7.5.3 LISTED PLANT SPECIES

The following federally-listed plant descriptions are excerpted from the *Multi-Species Recovery Plan for South Florida* (USFWS 1999).

Federally-Listed Plants

Beautiful Pawpaw

The beautiful pawpaw is a low-lying shrub located in two disjunct locations in central and southwest Florida. Within the central Florida locations, this species is only documented with the xeric, mesic, and hydric pine flatwoods of eastern Orange County and generally considered outside the range of the proposed project site. However, the project site is located within the historical range of the species, and in proximity of recent documented locations of the species, therefore the potential for occurrence was considered. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Britton's Beargrass

This clump-forming perennial grows from a short, thick, fleshy, bulblike rootstock. The leaves are 1 to 2 m long and 6 to 13 mm wide, forming a rosette. When in bloom, these branches are covered with small white six-parted flowers. This species occurs in scrub, high pine, and even occasionally in hammocks and sandhills. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Scrub Blazing Star

FNAI refers to this plant as Florida blazing star. This plant is a long-lived perennial herb with erect stems, usually unbranched, which can grow up to 1 m tall. Flower heads are well separated on the stem with individual disc flowers up to 1 cm broad; the inflorescences are up to 3 cm across. The corollas are bright purplish-pink in color. This species is one of the endemic plants found in rosemary balds. It is also found along the ecotone between these balds and surrounding scrub habitats. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Florida Bonamia

This perennial vine has leathery leaves up to 4 cm in length and ovate in shape. The flowers are solitary and sessile in the leaf axils. The funnel-shaped corolla is 7 to 10 cm long and 7 to 8 cm across. It has a deep blue or bluish-purple color with a white throat. This species occurs within or near scrub in the central Florida ridge. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Lewton's Polygala

This perennial herb produces one to several annual stems, which are spreading, upward-curving or erect, and are often branched. The leaves are small, rather succulent, broader toward the tip, and are borne upright, tending to overlap along the stem, like shingles. The normally opening flowers are in erect, loosely flowered racemes about 1.5 cm or 3.3 cm long. The flowers are about 0.5 cm long and bright pink. This species is found in widely scattered populations that frequently occur in transitional habitats between high pine and turkey oak barrens. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Paper-like Whitlow-wort

The paper-like whitlow-wort is mat-forming with many bright yellowish-green branches radiating flatly from a strong taproot. The stems are 5 to 20 cm long and are wiry. The leaf blades are sessile, 1.5 to 3.0 mm long, ovate to triangular-ovate in shape, and strongly revolute. It has numerous small cream-colored to greenish flowers. This species is endemic to the scrub community on the Lake Wales Ridge in Highlands, Polk, Osceola, Orange, and Lake counties. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Pygmy Fringe Tree

This shrub or small tree, usually less than 10 feet tall, has somewhat leathery leaves 2 to 4 inches long. The flowers are less than 0.5 inches long, each with four narrow petals with white, fragrant, showy clusters. This species is found in scrub, sandhill, and xeric hammock, primarily on the Lake Wales Ridge. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Scrub buckwheat

Scrub buckwheat is a perennial herb with a taproot and one to three above-ground stems up to one meter tall. It has a basal rosette of leaves that are 15 to 20 centimeters (cm) long, narrow, and white-woolly on the underside. The flowers are green with pink anthers. This species is endemic to central Florida and found within sandhill, turkey oak barrens, oak-hickory scrub, and high pinelands. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Scrub Lupine

This species is a woody, perennial herb, with sprawling stems up to 1 m long. The leaves are obovate-elliptic, with the base and end of the leaves rounded with a sharp point at the leaf's end. A silvery pubescence covers the leaves and stems. The flowers are a pale flesh-colored pink and are 4 to 5

cm long. Habitat for this species includes sand pine and rosemary scrub. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Short-leaved Rosemary

Short-leaved rosemary is an erect, woody, perennial shrub that can grow to about 1 meter in height. This shrub has alternate leaves and contains large leaves (6.0 to 8.2 mm long) on the well-developed flowering branches. This shrubby mint is only found at 30 sites on the Lake Wales Ridge in the Polk and Highland Counties. This species prefers white sand scrub with evergreen scrub oaks and sand pine. Habitat is not located within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Sandlace

FNAI refers to this plant as Small's jointweed. This sprawling shrub forms low mats on the ground from its many zig zagging branches. The leaves are needle-like and are from 0.3 to 10.0 mm long. The small, white or cream-colored flowers have white petal-like sepals up to 3.4 mm long. This species thrives in bare white or yellow sands on the central Florida ridge. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Carter's Mustard

FNAI refers to this plant as Carter's warea. This annual herb contains several branching stems that are slender and up to 40 inches tall. The leaves are up to 2 inches long near the base of the stem and decrease in size upwards. The leaves are alternate, are pale yellow-green, and have rounded tips. The flowers are in clusters and contain up to 60 white flowers. Habitat for this species includes sandhill, scrubby flatwoods, and inland and coastal scrub. Habitat does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

Wide-leaf Warea

This annual herb has stems that are 12 to 40 inches tall with leaves that are 2 inches long. Flowers are usually 0.5 inches wide and are pink to purple in color. Flowers contain 4 paddle-shaped petals and 6 stamens. Preferred habitat is limited to sunny openings with exposed sand in longleaf pine/turkey oak/wiregrass sandhills. Habitat for this species does not exist with the study area and no individuals were observed during field reconnaissance. Therefore, a determination of **no effect** has been made for this species.

State Listed Plants

Ashe's Savory

This perennial shrub grows up to 5 m tall and has narrow grey-green leaves mostly 1 cm long or somewhat less. This plant produces inflorescence flowers that are a whitish to pale lavender-rose color. This species is most commonly found in openings in sand pine scrub but can also be found in disturbed areas such as fire lanes, road shoulders, and abandoned fields. Habitat for this species exists throughout the study area; however, no individuals were observed during field reconnaissance. Therefore, no adverse effect is anticipated for this species.

Celestial Lily

Celestial lily is a perennial herb forming from a bulb with a single, tall slender stem. The flower has six dark blue petals and it opens around 4:00 pm and closes by dusk. Preferred habitat includes wet flatwoods, prairies, marshes, and cabbage palm hammock edges. Burning of flatwoods and prairie habitat every two to three years helps for management of this species. This species is endemic to eastern and central counties in Florida, primarily in the St. Johns River drainage basin. Habitat for this species exists throughout the study area; however, no individuals were observed during field reconnaissance. Therefore, no adverse effect is anticipated for this species.

Cutthroat Grass

Cutthroat grass is a robust grass that grows 50-70 cm tall and has leaf blades which grow 15-25 cm long. This species is densely tufted and compressed. This species is found in herbaceous wetlands, scrub/shrub wetlands, and temporary pools; which are found throughout the study area. However, no individuals were observed during field reconnaissance. Therefore, no adverse effect is anticipated for this species.

Florida Beargrass

Florida beargrass is a perennial herb that is approximately 2.5 feet to 4.5 feet tall. Leaves are simple and alternate. Flowers are white and they bloom during the summer months. Preferred habitat includes pine flatwoods, which is not available within the study area. Additionally, no individuals were observed during field reconnaissance. Therefore, no effect is anticipated for this species.

Florida Spiny-pod

This perennial vine has slender stems that are variable in length. The leaves are opposite and pubescent, usually 2-6 cm in length. Clusters of flowers ranging in color from greenish-yellow to deep maroon bloom during spring and early summer. Habitat for this species includes upland hardwood forests and can tolerate fairly moist woods. Habitat does exist within the study area; however, no plants were documented during field surveys. Therefore, no adverse effect is anticipated for this species.

Giant Orchid

Giant orchid is a perennial herb with 2 to 4 basal leaves that are 6-28 inches long. The flower stalk can be as tall as 5.5 feet tall and contains 5-30 flowers on a terminal spike. The sepals of the flowers are yellow-green and are folded forward over the lip. Preferred habitat includes sandhill, scrub, pine flatwoods and pine rocklands. Habitat for this species does not exist within the study area and no individuals were observed during field reconnaissance. Therefore, no effect is anticipated for this species.

Hartwrightia

This aromatic, herbaceous perennial has solitary, erect stems that grow an average of 1 m high. The small flower heads are produced on a branched flat-topped inflorescence covered with club-shaped scales. These flower heads are white to pinkish-lavender and bloom in late September to November. Typical habitat for this species is slash and longleaf pine forests, flatwoods, and pineland swamps and bogs. Habitat does not exist within the study area and no plants were documented during field surveys. Therefore, no effect is anticipated for this species.

Many-flowered Grass-pink

Many-flowered grass-pink is an herb belonging to the orchid family and has 1 to 2 basal, grass-like leaves. Leaves are 0.1 m long and less than 0.5 cm wide. The flower stalk is leafless and up to 0.4 m long.

There can be up to 15 dark pink flowers at one time. The preferred habitat is dry to moist flatwoods with longleaf pine, wiregrass, and saw palmetto. Management for this species includes prescribed burning. Habitat for this species does exist within the study area, however, no many-flowered grass-pink was observed during field reconnaissance. Therefore, no effect is anticipated for this species.

Nodding Pinweed

Nodding pinweed is a perennial herb that has slender, erect, flowering stems, rising from a dense mat of spreading branches. Leaves are short (>0.4 inches), narrowly oval and alternating, with pointed tips, disappearing by flowering time. Nodding pinweed flowers in tight clusters at the ends of short branches with 3 tiny purple or green petals. The entire plant is covered with spreading, gray hairs and has a tiny, hard capsule fruit. Habitat includes scrub and scrubby flatwoods. No habitat exists within the study area and this species was not observed during field surveys. Therefore, no effect is anticipated for this species.

Pinewoods Bluestem

This perennial herb is native to both Florida and southern Alabama. This grass species grows up to 5 feet tall with long narrow leaves. Flowers are densely covered with tawny hairs and are light brown in color. Preferred habitat includes flatwoods and scrub and possibly flatwoods that have converted to unimproved pasture. No habitat exists within the study area and this species was not observed during field surveys. Therefore, no effect is anticipated for this species.

Sand Butterfly Pea

Sand butterfly pea is a perennial vine with stems up to 10 feet long and is commonly found intertwined with other species of bushes. Leaves are dark green and somewhat leathery. The flowers are 1.5 in wide and are purplish-blue. This species prefers sandhills, scrubby flatwoods, and dry upland woods. No habitat exists within the study area, and this species was not observed during field surveys. Therefore, no effect is anticipated for this species.

Scrub Bluestem

This small, strongly tufted perennial grass grows from slender fibrous roots, which is perennating by short lateral offshoot buds from the base. The leaves are 6-10 cm long and hairless except for a few hairs at their bases. It is very narrow, flat, and held horizontal to the stem. Flowering stalk are erect to 75 cm tall, then loosely branched at the top with only 1 inflorescence at the tip of each branch. Joints of the flowering stalk are covered with silvery-white hairs. This species is found in sandhills scrub communities, rosemary scrub, also sand pine scrub and oak scrub. No habitat exists within the study area, and this species was not observed during field surveys. Therefore, no effect is anticipated for this species.

Star Anise

This perennial evergreen shrub/small understory tree sometimes reaches 7 m tall. The smooth bark is grayish/brown and the leathery leaves have a dark, glossy green upper surface and a pale, dotted lower surface. This species is restricted to habitats with continually moist soils in forested wetlands. Habitat is limited for this species and no plants were documented during field surveys. Therefore, no adverse effect is anticipated for this species.

Yellow Fringeless Orchid

Yellow fringeless orchid is a perennial herb with 1 to 3 leaves on each stem. Leaves are alternate. The

plant is 10 to 30 inches tall. The flowers are yellow or orange and appear in late summer and early fall. Preferred habitat includes wet forested hardwoods and sandy soils. Habitat for this species is limited within the study area and no individuals were observed during field reconnaissance. Therefore, no adverse effect is anticipated for this species.

7.5.4 NON-LISTED SPECIES

Florida Black Bear

The Florida black bear was removed from the FWC list of state-threatened species in August 2012, however, the Florida black bear remains protected under other laws, primarily the Florida Black Bear Conservation Rule 68A-4.009 (F.A.C.) and the FWC Florida Black Bear Management Plan. Based on these regulations, pursuing, hunting, molesting, capturing, killing, or attempting those actions, whether or not such actions result in possession of the bear is unlawful. In addition, Rule 68A-4.009, F.A.C., generally prohibits anyone from possessing, injuring, shooting, wounding, trapping, collecting, or selling bears or their parts or attempting to engage in such actions without prior authorization from FWC. Black Bear Management Units (BMU) have also been established based on the seven geographically distinct bear subpopulations in Florida. The study area is located within the South Central BMU. Black bears are adaptable and inhabit a variety of forested habitats including seasonally inundated pine flatwoods, tropical hammocks, hardwood swamps and xeric sand pine-scrub oak communities. Based on a review of GIS databases, there are several reported nuisance bears in the vicinity of the project study area (see **Figure 12 – Listed Species Map**). Impacts to habitat that could potentially be utilized by the Florida black bear are not anticipated because of the proposed improvements. It is anticipated that Florida black bears could occur in the project study area; though none were observed, and no sign of bear activity was observed.

Although no black bear habitat will be impacted by the project, consistent with the June 2012 FWC Black Bear Management Plan, garbage and food debris will need to be properly removed during construction to eliminate possible sources of food that could encourage and attract bears. Nuisance bears should be reported to the FWC at the Wildlife Alert Hotline at 1-888-404-3922.

No adverse effect is anticipated for the Florida black bear.

Southern Fox Squirrel

The fox squirrel was removed from the FWC list of state-threatened species; however, the fox squirrel remains protected under the Regulations Relating to the Taking of Mammals Rule 68A-29.002 (F.A.C.). Based on these regulations, fox squirrels or their young, homes, dens or nests shall be taken, transported, stored, served, bought, sold or possessed in any matter unless specifically permitted by FWC.

Preferred habitat for the fox squirrel includes mature, open, fire-maintained longleaf pine and turkey oak sandhills and pine flatwoods. They also can be found in mixed hardwood pine, mature pine forests, cypress domes, pastures, the ecotone between bayheads and pine flatwood and other open lands with pines and oaks. Fox squirrels usually nest in turkey oak trees but also use longleaf pine, live oak, post oak, laurel oak and slash pine, though slash pine are used less frequently. Habitat for this species can be found in the pastures adjacent to Neptune Road. Additionally, this species was observed during field surveys.

There is no habitat within the existing ROW for this species. There is marginal habitat (improved pastures) adjacent to the corridor, but these areas are small and fragmented by development.

Furthermore, there is no management of these areas. Although fox squirrels were observed within the study area, no nests were observed. Thus, no adverse effect is anticipated for this species. The project is not expected to have adverse effects on this species.

Bald Eagle

As of 2008, the bald eagle is no longer listed by the USFWS or FWC as endangered or threatened. Bald eagles are still protected under the Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, and FWC's bald eagle rule (F.A.C. 68A-16.002). Potential habitat for bald eagles (e.g. tall pine trees) occurs throughout the project study area, and commonly includes areas in proximity to bays, rivers, lakes, or other bodies of water that provide concentrated prey availability. Eagles usually nest in tall trees (mostly live pines) that provide clear views of the surrounding area. Two bald eagle nests are located within the study area, Nest OS084 and OS169, as shown on **Figure 13 – Bald Eagle Nest Map**. An adult bald eagle was spotted inside Nest OS084 during a site visit conducted on November 30, 2018. Updated surveys are recommended during design to determine the current status of both nests. Coordination will be required with USFWS during design and permitting.

Based on the USFWS National Bald Eagle Management Guidelines and the FWC Bald Eagle Management Plan, construction activities proposed at least 660 feet from an eagle nest do not require an Eagle Permit from the USFWS. FWC also defines a 330-foot buffer and a 100-foot buffer for protection particularly in more urban environments. For OS169, neither Alternative 1 or Alternative 2 will encroach upon the 330 or the 100-foot buffers. Additionally, this nest's status or exact location was not confirmed during field reconnaissance because it is on a private residential property. During design and permitting, the status and location of this nest should be confirmed.

For OS084, both Alternative A and Alternative B will encroach slightly upon the 330-foot buffer, but not the 100-foot buffer. An adult bald eagle was observed within this nest during field reconnaissance. The nest is on the south edge of a group of live oaks and slash pines, which provide a vegetative buffer between the nest and Neptune Road. Outside of this vegetative buffer, the nest is surrounded by Neptune Road, Old Canoe Creek Road and a residential neighborhood. Therefore, it is reasonable to assume that the eagles have acclimated to the presence of existing roadway infrastructure and people. A bald eagle survey will be completed during design and permitting to determine current status of the nests. Further coordination would occur with USFWS. Technical assistance and possible permitting would occur following the updated survey, when the current condition of the nest is known.

USFWS has defined some potential minimization measures which should be implemented during construction:

- Restrictions on construction timing.
- Contractor education to avoid impacts.
- Nest monitoring during construction.
- Create a visual buffer between the construction activities and the nest by planting appropriate native pines or hardwoods.
- Shielding of lights so they do not shine directly on the nest.

7.6 INDIRECT EFFECTS

Indirect effects “are caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable” (Council on Environmental Quality (CEQ) 1986, 40 Code of Federal Regulations (CFR) 1508.8). encroachment/alteration effects could be an indirect effect for native upland habitats and listed species.

Habitat and Wildlife Effects

Encroachment/alteration effects could include habitat fragmentation, degradation of habitat from pollution, water quality degradation from stormwater runoff or roadway spills, changes in hydrology, and exotic/invasive species range expansion. This project includes the widening of an already existing roadway and will include construction of stormwater ponds to help reduce indirect effects of roadway runoff. The indirect effects resulting from fragmentation and edge effects are the same for all alternatives.

For the proposed alternatives, potential indirect effects to listed species are expected to be temporary in nature and can be avoided or minimized by incorporation of BMPs as described in *FDOT Standard Specifications for Road and Bridge Construction*. BMPs could include the use of turbidity curtains, silt fencing, hay bales. etc.

Figure 12: Listed Species Map

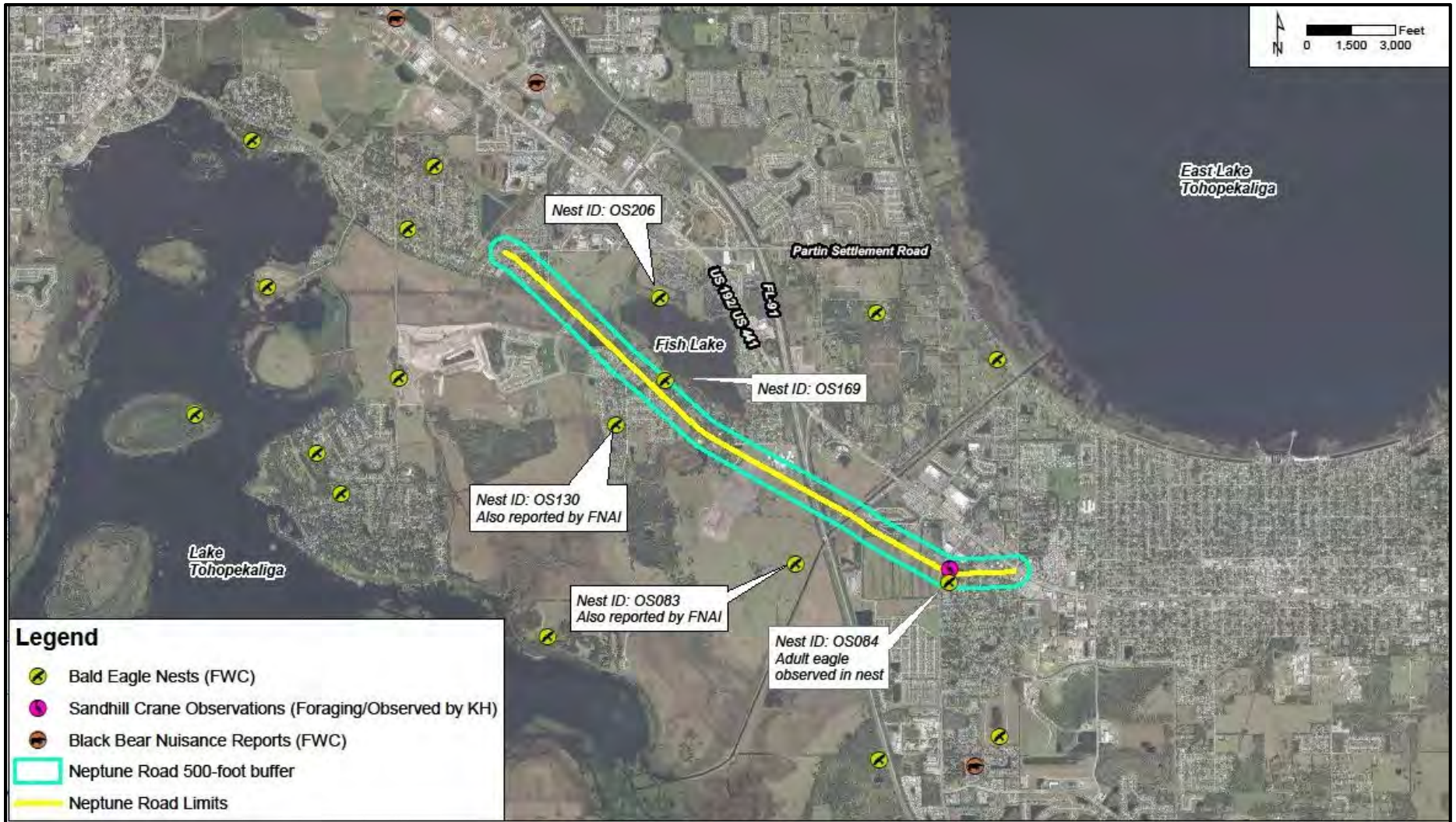


Figure 13: Bald Eagle Nest Map



8.0 IMPLEMENTATION MEASURES AND DESIGN CONSIDERATIONS

The following measures to avoid and minimize impacts to listed species potentially occurring within the study area have also been considered and are included as commitments in Section 11.0 – Commitments:

- The *Standard Protection Measures for the Eastern Indigo Snake* during construction will be implemented (**Appendix K**).
- Eagle nest monitoring will take place during design and permitting to determine the current location and status of the two nests documented along the corridor and to confirm no new nests are present. Coordination with USFWS Migratory Bird Division will occur following the updated survey, when the current condition of the nests is known. Minimization measures for the bald eagle should include restrictions on construction timing, contractor education to avoid impacts to nests, creating a visual buffer between construction activities and the nest, and shielding of lights so they do not shine directly on the nest.
- Pre-construction surveys for Florida sandhill crane, southeastern American kestrel, Florida burrowing owl, and gopher tortoises will be conducted and impacts, if any, coordinated with the FWC.
- Consistent with the June 2012 FWC Black Bear Management Plan, garbage and food debris will be properly removed during construction to eliminate possible sources of food that could encourage and attract bears. Nuisance bears will be reported to the FWC at the Wildlife Alert Hotline at 1-888-404-3922.

For the proposed alternatives, potential indirect effects to wetlands and managed species are expected to be temporary in nature and can be avoided or minimized by incorporation of BMPs as described in *FDOT Standard Specifications for Road and Bridge Construction*. BMPs could include the use of turbidity curtains, silt fencing, hay bales. etc.

9.0 PERMITTING REQUIREMENTS AND COORDINATION

Both the USACE and SFWMD regulate impacts to wetlands within the project area. Other agencies, including the USFWS, NMFS, U.S. Environmental Protection Agency (EPA), and the FWC, review and comment on wetland permit applications. The FWC permits gopher tortoise relocation activities and nest take for state protected avian species and the USFWS is the lead agency for eagle nest take permitting or coordination. In addition, the FDEP regulates stormwater discharges from construction sites. Additionally, coordination was conducted with the SFWMD Right-of-Way Permitting staff to obtain concurrence on required permits and design considerations for the proposed bridges over the C-31 canal. A copy of this correspondence is included in **Appendix L**. Based on this coordination and the ETDM comments, it is anticipated that the following permits will be required for this project:

<u>Permit</u>	<u>Issuing Agency</u>
Section 404 Dredge and Fill Permit – SAJ-92 or NW 14	USACE
Section 408 Review	USACE
Individual Environmental Resource Permit (ERP)	SFWMD
Right of Way Occupancy Permit	SFWMD
National Pollutant Discharge Elimination System (NPDES)	FDEP
Eagle Permit (if necessary)	USFWS
Species Permits (if necessary)	FWC

In addition to the permits listed above, USACE Section 408 review will be required for impacts associated with the bridge(s) over the C-31 canal. The US Coast Guard (USCG) assigned a degree of effect of “No Involvement” in the ETDM programming screening.

10.0 CONCLUSIONS AND RECOMMENDATIONS

Wetlands

Per the *Wetlands Evaluation*, two types of surface waters and three types of wetlands were identified within the study area. The following two tables summarize the direct and secondary impacts to surface waters and wetlands for the four alternatives. Alternative A and B had no direct or secondary impacts to wetlands. A summary of the approximate wetland impacts, and functional loss are shown in **Table 13**. Approximate secondary wetland impacts are shown in **Table 14**.

Table 13: Direct Wetland and Surface Water Impacts by Alternative (Acres)

SW/WL Number	Alt 1	Alt 2	Alt A	Alt B
SW 2	0.18	0.33		-
SW 3	1.57	1.54		-
SW 5	-	0.06		-
SW 6	0.20	0.20		-
SW 7	0.22	0.22		-
SW 9	0.04	0.04		-
SW 10	0.01	0.01		-
SW 11	0.01	0.01		-
SW 13	-	-	0.03	0.05
Total Surface Water Impacts	2.23	2.41	0.03	0.05
WL1	0.30	1.20	-	-
WL2	0.19	0.52	-	-
WL4	0.22	0.22	-	-
WL5	0.21	0.06	-	-
WL6	0.13	0.04	-	-
WL7	0.15	-	-	-
WL8	0.04	-	-	-
WL9	0.16	-	-	-
WL11	0.05	-	-	-
WL12	0.09	-	-	-
WL15	0.20	0.20	-	-
WL17	0.83	0.83	-	-
Total Wetland Impacts	2.57	3.07	-	-
Grand Total Surface Water and Wetland Impacts	4.80	5.48	0.03	0.05

Table 14: Secondary Wetland Impacts by Alternatives (Acres)

WL Number	Alt 1	Alt 2
WL1	0.49	0.56
WL2	0.36	0.34
WL4	0.42	0.42
WL5	0.24	0.23
WL6	0.12	0.12
WL7	0.24	0.22
WL8	0.06	0.06
WL9	0.23	0.23
WL11	0.07	0.07
WL12	0.06	0.05
WL15	0.69	0.69
WL17	0.39	0.39
Total Secondary Wetland Impacts	3.39	3.39

Protected Species and Habitat

Per the *Protected Species and Habitat Assessment*, 21 federally listed species and 22 state listed species may occur within the study area. The following effect determinations have been made for the federally listed species:

Species	Effect Determination
Florida Panther	No effect
Florida Bonneted Bat	No effect
Audubon's Crested Caracara	May affect, not likely to adversely affect
Florida Scrub-Jay	No effect
Red-cockaded Woodpecker	No effect
Everglade Snail Kite	No effect
Wood Stork	May affect, not likely to adversely affect
Eastern Indigo Snake	No effect
Beautiful Pawpaw	No effect
Britton's Beargrass	No effect
Scrub Blazing Star	No effect
Florida Bonamia	No effect
Lewton's Polygala	No effect
Paper-like Nailwort	No effect

Species	Effect Determination
Pygmy Fringe Tree	No effect
Scrub Buckwheat	No effect
Scrub Lupine	No effect
Short-leaved Rosemary	No effect
Sandlace	No effect
Carter’s Mustard	No effect
Wide-leaf Warea	No effect

Mitigation credits will be purchased from a mitigation bank within the Lake Tohopekaliga Drainage Basin that is permitted by SFWMD and USACE. The following banks are within the same drainage basin: Reedy Creek Mitigation Bank, Southport Ranch Mitigation Bank, and Florida Mitigation Bank. These three banks have both forested and herbaceous credits available for sale.

11.0 COMMITMENTS

Osceola County makes the following commitments to minimize impacts to wetlands and protected species:

- The *Standard Protection Measures for the Eastern Indigo Snake* during construction will be implemented (**Appendix K**).
- Eagle nest monitoring will take place during design and permitting to determine the current location and status of the two nests documented along the corridor and to confirm no new nests are present. Coordination with USFWS Migratory Bird Division will occur following the updated survey, when the current condition of the nests is known. Minimization measures for the bald eagle should include restrictions on construction timing, contractor education to avoid impacts to nests, creating a visual buffer between construction activities and the nest, and shielding of lights so they do not shine directly on the nest.
- Pre-construction surveys for Florida sandhill crane, southeastern American kestrel, Florida burrowing owl, and gopher tortoises will be conducted and impacts, if any, coordinated with the FWC.
- Consistent with the June 2012 FWC Black Bear Management Plan, garbage and food debris will be properly removed during construction to eliminate possible sources of food that could encourage and attract bears. Nuisance bears will be reported to the FWC at the Wildlife Alert Hotline at 1-888-404-3922.

12.0 REFERENCES

Cowardin *et. al.* U.S. Department of Interior - Fish and Wildlife Service. Classification of Wetlands and Deepwater Habitats of the United States. USFWS/OBS-79/31, December 1979.

South Florida Multi-Species Recovery Plan. 1999. U.S. Fish and Wildlife Service, Southeast Region.

USFWS Concurrence in U.S. Army Corps of Engineers use of Eastern Indigo Snake Programmatic Effect Determination Key (North Florida). 2013.

USFWS Standard Protection Measures for the Eastern Indigo Snake. 2013.

MetroPlan Orlando Cost Feasible 2040 Long Range Transportation Plan (LRTP). Technical Report 3: Plan Development & Cost Feasible Projects. August 2016.

APPENDIX A

AN Comments

Kiefer, Lynn

From: Jennifer Schull - NOAA Federal <jennifer.schull@noaa.gov>
Sent: Friday, October 12, 2018 11:44 AM
To: joshua.devries@osceola.org
Cc: Pace Wilber - NOAA Federal; Black, Amanda; Jennifer Schull
Subject: Re: Advance Notification Package - Neptune Road PD&E - Osceola County, FL

Dear Mr. DeVries,

NOAA's National Marine Fisheries Service (NMFS) reviewed the Advanced Notification Package for the road widening along a 3.9 mile stretch of Neptune Road from Partin Settlement Road to US 192 in Osceola County, Florida.

Based on the project location, information provided in the advanced notification package and GIS-based analysis of impacts, NMFS concludes that essential fish habitat (EFH) would not be impacted by the proposed project; accordingly, we offer no comments pursuant to the EFH provisions of the Magnuson-Stevens Act (P.L. 104-297); and this project will not require an EFH Assessment. However, the freshwater wetlands within the project corridor provide water quality functions, such as removal of sediments, excess nutrients, and contaminants, which benefit and support aquatic ecosystems. Through hydrological connections, these wetlands also contribute plant material and other usable nutrients (both dissolved and particulate organic matter) into aquatic food webs that include recreationally, commercially, and ecologically important species downstream. If wetland impacts are unavoidable, sequential minimization and mitigation should take place. In addition to the direct impacts from filling wetlands, construction activities may impact adjacent wetlands through sedimentation and runoff.

The NMFS is not aware of any threatened or endangered species or critical habitat under NMFS' jurisdiction within the project area. However, it should be noted that a "no effect" determination must be made by the action agency and the reasoning underlying the determination should be documented in a project file. Please coordinate closely with the U.S. Fish and Wildlife Service for other species listed under the Endangered Species Act that may require consultation.

We appreciate the opportunity to provide these comments. The comments regarding sequential mitigation are in accordance with the Fish and Wildlife Coordination Act. Further consultation on this matter is not necessary unless future modifications are proposed and you believe that the proposed action may result in adverse impacts to EFH. Please direct any future correspondence on this project to Ms. Jennifer Schull at our West Palm Beach field office ((561) 249-1652, jennifer.schull@noaa.gov, 400 N Congress Avenue, Suite 110, West Palm Beach, Florida 33401.)

On Fri, Sep 14, 2018 at 9:38 AM Black, Amanda <Amanda.Black@kimley-horn.com> wrote:

Good morning,

Attached is the Advance Notification (AN) package for the following project:

Neptune Road Widening

From Partin Settlement Road to US 192

Project Development and Environment Study (PD&E)

Osceola County, FL

Thank you,

Amanda Black

Kimley-Horn | 189 South Orange Avenue, Suite 1000, Orlando, FL 32801

Direct: 407 427 1663 | Main: 407 898 1511

--

Jennifer Schull

NOAA Fisheries Southeast Regional Office

Habitat Conservation Division

400 N. Congress Avenue STE 110

West Palm Beach, FL 33401

561 249-1652

Kiefer, Lynn

From: White, Roshanna <White.Roshanna@epa.gov>
Sent: Tuesday, October 16, 2018 3:08 PM
To: Black, Amanda
Cc: Militscher, Chris; Buskey, Traci P.
Subject: RE: UPDATED - Advance Notification Package - Poinciana Parkway Extension PD&E - Osceola and Polk Counties, FL
Attachments: PPE PD&E - Advance Notification Package_Updated.pdf

Dear Ms. Black,

The U.S. Environmental Protection Agency reviewed an Advance Notification (AN) Package for the Neptune Road Widening. According to the AN, the proposed project is a 3.9-mile segment of Neptune Road extending from Partin Settlement Road to US-192 in Osceola County. The existing two-way, two-lane roadway would be widened to a four-lane, divided roadway with a curbed median, buffered bicycle lanes, sidewalk on each side, and improvements to Bill Johnston Memorial Parkway on the other side. Additionally, bridge structures would be replaced and storm water management facilities would be evaluated.

Based on our preliminary review of the proposed project, the EPA offers the following environmental comments and technical recommendations for your consideration in preparation of the Project Development and Environmental Study (PD&E):

Wetlands and Other Surface Waters: Consistent with Section 404 of the Clean Water Act, the selected site should avoid and minimize, to the maximum extent practicable, placement of fill into jurisdictional waters of the U.S., which include wetlands and streams. Additionally, consider that the potential increase in impervious surface may increase storm water runoff and may increase pollutants into nearby water bodies and wetlands as a result of the project. The EPA recommends that the PD&E discuss storm water collection and treatment mechanisms that would be designed to protect the function of surrounding wetlands that will and have already experienced secondary impacts from roadway runoff, avoidance and minimization measures that would be included in the project design, compensatory mitigation (if needed), best management practices during project construction activities, and an evaluation of low-impact development storm water management practices.

Water Quality and Quantity: Human activities have the potential to degrade ground water, and it is important to maintain and protect the quality of water because it provides much of the drinking water in Florida. An increase in impervious or semi-impervious surfaces may contribute to surface drainage and non-point sources that may impact surface and groundwater quality. The EPA recommends that the PD&E discuss adequate sediment and erosion control measures that would be used to prevent the discharge of pollutants into water bodies, project measures that would reduce pollution runoff from construction activities; and best management practices that would control erosion, sediment release, and storm water runoff to minimize adverse impacts on water resources.

Hazardous Wastes: Contaminants have the potential to degrade water quality from activities on land, pollution of surface water bodies, or by infiltration through soils. Soils, groundwater and surface water have the potential to be negatively affected by contaminated site features such as underground petroleum storage tanks, industrial or commercial facilities with onsite storage of hazardous materials, solid waste facilities, and hazardous waste facilities. Also, project construction activities may produce the release of hazardous pollutants through spills and improper storage of materials. Hazardous pollutants can infiltrate the aquifers to an area of discharge. Contamination of ground water can result in poor drinking water quality and/or loss of water supply. The EPA

recommends corrective actions for any potential contamination be addressed to the extent practicable before the commencement of project activities.

The EPA appreciates the opportunity to provide comments on the proposed project. Please provide updates of future project revisions or submissions of the environmental documents for the proposed project. If you have any questions regarding these comments, please contact me at the information below.

Sincerely,

Roshanna White | Life Scientist | NEPA Program Office
U.S. Environmental Protection Agency | Region IV
61 Forsyth Street SW | Atlanta, GA 30303
Voice: 404-562-9035 | Email: white.roshanna@epa.gov

From: Black, Amanda [mailto:Amanda.Black@kimley-horn.com]
Sent: Tuesday, September 18, 2018 3:43 PM
Subject: UPDATED - Advance Notification Package - Poinciana Parkway Extension PD&E - Osceola and Polk Counties, FL

Good afternoon,

Attached is an updated Advance Notification (AN) package to clarify the review time extension request period for the following project:

- Poinciana Parkway Extension (SR 538)
- Poinciana Parkway to County Road (CR) 532
- Project Development and Environment Study (PD&E)
- CFX Project No.: 599-224
- Osceola and Polk Counties, FL

Thank you,

Amanda Black
Kimley-Horn | 189 South Orange Avenue, Suite 1000, Orlando, FL 32801
Direct: 407 427 1663 | Main: 407 898 1511

From: Black, Amanda
Sent: Monday, September 17, 2018 3:13 PM
Subject: Advance Notification Package - Poinciana Parkway Extension PD&E - Osceola and Polk Counties, FL

Good afternoon,

Attached is the Advance Notification (AN) package for the following project:

- Poinciana Parkway Extension (SR 538)
- Poinciana Parkway to County Road (CR) 532
- Project Development and Environment Study (PD&E)
- CFX Project No.: 599-224
- Osceola and Polk Counties, FL

Thank you,

Amanda Black

Kimley-Horn | 189 South Orange Avenue, Suite 1000, Orlando, FL 32801

Direct: 407 427 1663 | Main: 407 898 1511

APPENDIX B

FNAI Standard Data Report



1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
850-224-8207
fax 850-681-9364
www.fnai.org

Tori Bacheler
Kimley-Horn & Associates, Inc.
445 24th Street, Suite 200
Vero Beach, FL 32960

April 10, 2019

Dear Ms. Bacheler,

Thank you for requesting information from the Florida Natural Areas Inventory (FNAI). We have compiled the following information for your project area.

Project: Neptune Road PD&E
Date Received: 04/04/19
Location: Osceola County

Element Occurrences

A search of our maps and database indicates that we currently have several element occurrences mapped in the vicinity of the study area (see enclosed map and element occurrence table). Please be advised that a lack of element occurrences in the FNAI database is not a sufficient indication of the absence of rare or endangered species on a site.

The element occurrences data layer includes occurrences of rare species and natural communities. The map legend indicates that some element occurrences occur in the general vicinity of the label point. This may be due to lack of precision of the source data, or an element that occurs over an extended area (such as a wide ranging species or large natural community). For animals and plants, element occurrences generally refer to more than a casual sighting; they usually indicate a viable population of the species. Note that some element occurrences represent historically documented observations which may no longer be extant. Extirpated element occurrences will be marked with an 'X' following the occurrence label on the enclosed map.

Likely and Potential Rare Species

In addition to documented occurrences, other rare species and natural communities may be identified on or near the site based on habitat models and species range models (see enclosed Biodiversity Matrix Report). These species should be taken into consideration in field surveys, land management, and impact avoidance and mitigation.

FNAI habitat models indicate areas, which based on land cover type, offer suitable habitat for one or more rare species that is known to occur in the vicinity. Habitat models have been developed for approximately 300 of the rarest species tracked by the Inventory, including all federally listed species.

FNAI species range models indicate areas that are within the known or predicted range of a species, based on climate variables, soils, vegetation, and/or slope. Species range models have been developed for approximately 340 species, including all federally listed species.

The FNAI Biodiversity Matrix Geodatabase compiles Documented, Likely, and Potential species and natural communities for each square mile Matrix Unit statewide.



Florida Resources
and Environmental
Analysis Center

Institute of Science
and Public Affairs

The Florida State University

Tracking Florida's Biodiversity

The Inventory always recommends that professionals familiar with Florida's flora and fauna conduct a site-specific survey to determine the current presence or absence of rare, threatened, or endangered species.

Please visit www.fnai.org/trackinglist.cfm for county or statewide element occurrence distributions and links to more element information.

The database maintained by the Florida Natural Areas Inventory is the single most comprehensive source of information available on the locations of rare species and other significant ecological resources. However, the data are not always based on comprehensive or site-specific field surveys. Therefore this information should not be regarded as a final statement on the biological resources of the site being considered, nor should it be substituted for on-site surveys. Inventory data are designed for the purposes of conservation planning and scientific research, and are not intended for use as the primary criteria for regulatory decisions.

Information provided by this database may not be published without prior written notification to the Florida Natural Areas Inventory, and the Inventory must be credited as an information source in these publications. FNAI data may not be resold for profit.

Thank you for your use of FNAI services. An invoice will be mailed separately. If I can be of further assistance, please contact me at (850) 224-8207 or at kbrinegar@fnai.fsu.edu.

Sincerely,

Kerri Brinegar

Kerri Brinegar
GIS / Data Services

Encl

Neptune Road PD&E

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303

(850) 224-8207
(850) 681-9364 Fax

www.fnai.org



47006
Oak Street
Extension

Preserve LATR BISH*12

Site boundaries are approximate.

Osceola County

Element Occurrences

- Animals
- Plants
- Communities
- Other
- Data Sensitive
-  Point Indicates General Vicinity of Element
-  U.S. Fish & Wildlife Service Scrub Jay Survey 1992-96



Conservation Lands


- Federal
- State
- Local
- Private



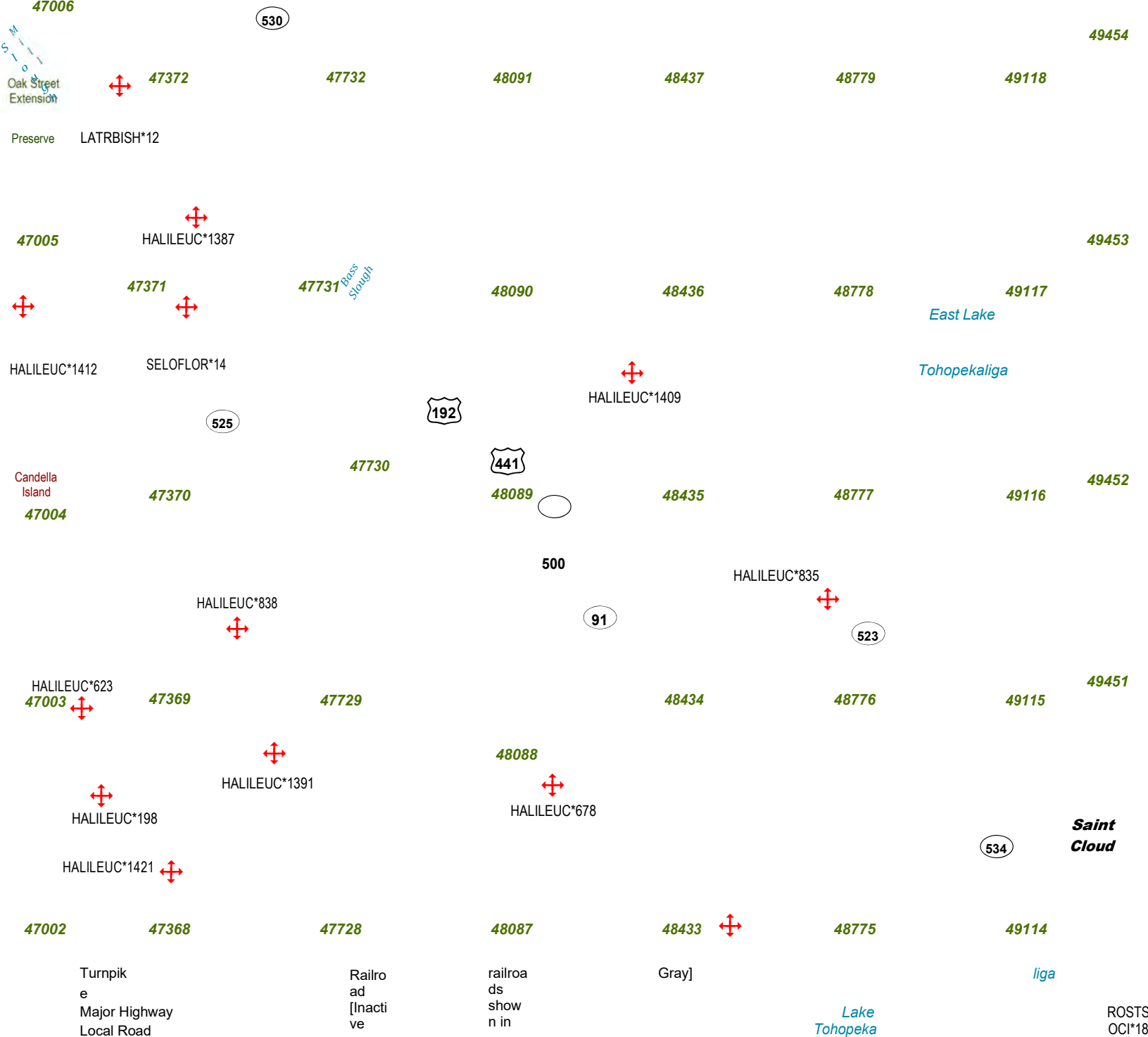
Land Acquisition Projects

- Florida Forever
- Board of Trustees Projects

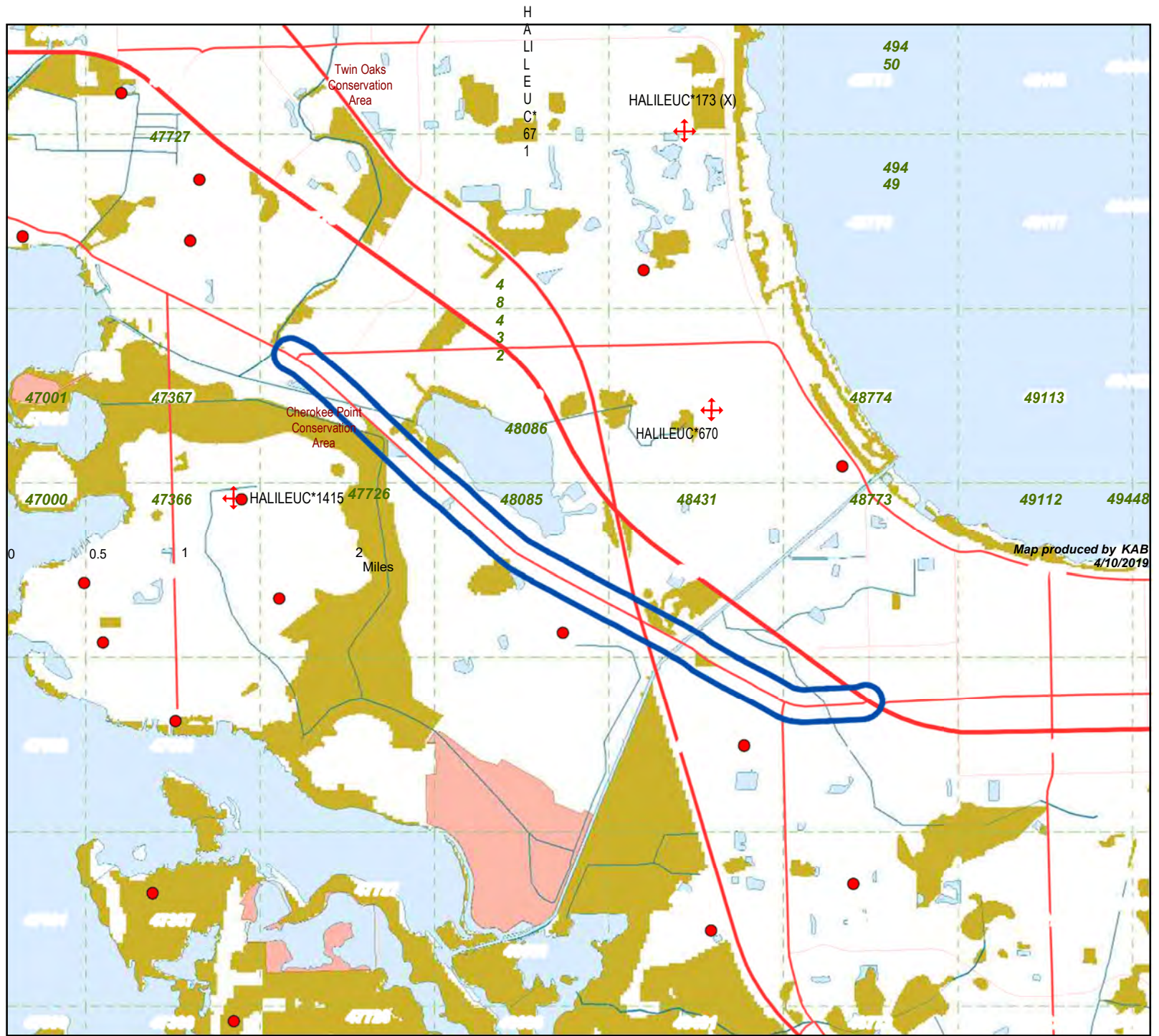
-  FNAI Rare Species Habitat
-  FNAI Biodiversity Matrix

-  Square Mile Units

















- County Boundary
- Interstate



ROSTS
OCI*18



NOTE
Map should not be interpreted without accompanying documents.

- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 

Map produced by KAB
4/10/2019

FNAI ELEMENT OCCURRENCE REPORT on or near *Neptune Road PD&E*



Global State Federal State Observation

Map Label	Scientific Name	Common Name	Rank	Rank	Status	Listing	Date	Description	EO Comments
HALILEUC*1387	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2002	2005-07-12: Source does not provide a description.	Nest status: Active, 2002, 2001, 2000, 1999; Not active, 2003;(U03FWC01FLUS)
HALILEUC*1391	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2001	2005-07-12: Source does not provide a description.	Nest status: Active, 2001, 2000, 1999; Not active, 2003, 2002;(U03FWC01FLUS)
HALILEUC*173	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	1989	No general description given	Nest status 1999-2003: Inactive - 2003; Unknown/not assessed - 2002, 2001, 2000, 1999; Status 1995-98: Inactive - 1998, 1997, 1996, 1995; (U03FWC01FLUS). Previous data (note different format) NEST; 1995: GONE; 1994: GONE; 1993: GONE; 1992: GONE; 1991: GONE; 1990: INACTIVE; 1989: PRODUCED 2 YOUNG; 1981-1988 ACTIVE. FLEDGED YOUNG 1986-1987. UNKNOWN 1981-1985.
HALILEUC*670	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2003	No general description given	Nest status 1995-2003: Continuously active. (U03FWC01FLUS). Previous data (note different format) NEST; 1995: PRODUCED 2 YOUNG; 1994: ACTIVE, PRODUCED 0 YOUNG; 1993: PRODUCED 2 YOUNG; 1992: PRODUCED 1 YOUNG; 1991: PRODUCED 2 YOUNG; 1990: ACTIVE BUT PRODUCED 0 YOUNG.
HALILEUC*671	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2003	No general description given	Nest status 1995-2003: Continuously active. (U03FWC01FLUS). Previous data (note different format) NEST; 1995: PRODUCED 2 YOUNG; 1994: PRODUCED 2 YOUNG; 1993: ACTIVE, PRODUCED 0 YOUNG; 1992: PRODUCED 2 YOUNG; 1991: PRODUCED 2 YOUNG; 1990: PRODUCED 2 YOUNG.
HALILEUC*678	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2003	No general description given	Nest status 1995-2003: Continuously active. (U03FWC01FLUS). Previous data (note different format) NEST; 1995: ACTIVE, PRODUCED 0 YOUNG; 1994: PRODUCED 1 YOUNG; 1993: ACTIVE, PRODUCED 0 YOUNG; 1992: PRODUCED 0 YOUNG; 1991: PRODUCED 1 YOUNG;

PRODUCED 2 YOUNG; 1990;
PRODUCED 1 YOUNG; 1989;
PRODUCTIVITY UNKNOWN.

FNAI ELEMENT OCCURRENCE REPORT on or near *Neptune Road PD&E*



Global State Federal State Observation

Map Label	Scientific Name	Common Name	Rank	Rank	Status	Listing	Date	Description	EO Comments
HALILEUC*835	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2003	No general description given	Nest status 1995-2003: Continuously active. (U03FWC01FLUS). Previous data (note different format) Nest; 1994: Produced 1 young.
HALILEUC*838	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2003	No general description given	Nest status 1995-2003: Continuously active. (U03FWC01FLUS). Previous data (note different format) Nest; 1995: Produced 2 young; 1994: Produced 2 young; 1993: Produced 2 young; 1992: Produced 2 young; 1991: Inactive; 1990: Active, produced 0 young; 1989: Produced 2 young; 1988: Produced 2 young; 1987: Active, produced 0 young; 1986: Produced 2 young; 1985: Active, produced 0 young.
ROSTSOCI*18	<i>Rostrhamus sociabilis</i>	Snail Kite	G4G5	S2	E	FE	2006	Freshwater lake with a relatively narrow littoral zone.	2006: polygons classified as priority kite management area by U. S. Fish and Wildlife Service based on years of nesting data (U06FWS01FLUS). 1981-1992: Foraging and nesting site. Kites began nesting (recolonizing former nesting range) at Lake Tohopekaliga during the 1980s in response to droughts and low water levels in south Florida (Everglades and Lake Okeechobee). Considered a drought-related area (versus primary or secondary areas) by A89TAK01FLUS. Numbers of kites recorded in mid-winter surveys (November-December) from 1981 to 1992 range from 0-19 birds; mean number of kites from 1982-1991 = 18. EO not truly independent. Individuals may move among subjectively drawn EO boundaries.
SELOFLOR*14	<i>Selonodon floridensis</i>	Florida Cebrioid Beetle	G2G4	S2S4	N	N	1936-05-05	1936-05-05: No description given (B99GAL01FLUS).	1936-05-05: Two specimens were collected on this date and in April of 1887. There are undated records for 6 other specimens. (B99GAL01FLUS).

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Matrix Unit ID: 47729					
Documented					
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N
Likely					
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Scrub		G2	S2	N	N
Potential					
<i>Andropogon arctatus</i>	pinewoods bluestem	G3	S3	N	T
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	G4T3	S3	N	ST
<i>Bonamia grandiflora</i>	Florida bonamia	G3	S3	T	E
<i>Calamintha ashei</i>	Ashe's savory	G3	S3	N	T
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chionanthus pygmaeus</i>	pygmy fringe tree	G2G3	S2S3	E	E
<i>Coleataenia abscissa</i>	cutthroatgrass	G3	S3	N	E
<i>Deeringothamnus pulchellus</i>	beautiful pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3Q	S3	T	FT
<i>Eriogonum longifolium var. gnaphalifolium</i>	scrub buckwheat	G4T3	S3	T	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Gymnopogon chapmanianus</i>	Chapman's skeletongrass	G3	S3	N	N
<i>Hartwrightia floridana</i>	hartwrightia	G2	S2	N	T
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Liatris ohlingerae</i>	Florida blazing star	G2	S2	E	E
<i>Lithobates capito</i>	Gopher Frog	G3	S3	N	N
<i>Lupinus aridorum</i>	scrub lupine	G3T1	S1	E	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulae</i>	Florida Long-tailed Weasel	G5T3	S3	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G3	S3	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Nolina brittoniana</i>	Britton's beargrass	G3	S3	E	E
<i>Paronychia chartacea var. chartacea</i>	paper-like nailwort	G3T3	S3	T	E
<i>Peucaea aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Picoides borealis</i>	Red-cockaded Woodpecker	G3	S2	E	FE
<i>Platanthera integra</i>	yellow fringeless orchid	G3G4	S3	N	E
<i>Podomys floridanus</i>	Florida Mouse	G3	S3	N	N
<i>Polygala lewtonii</i>	Lewton's polygala	G2G3	S2S3	E	E
<i>Polygonella myriophylla</i>	Small's jointweed	G3	S3	E	E
<i>Pteroglossaspis ecristata</i>	giant orchid	G2G3	S2	N	T
<i>Puma concolor coryi</i>	Florida Panther	G5T1	S1	E	FE
<i>Rostrhamus sociabilis</i>	Snail Kite	G4G5	S2	E	FE
<i>Sceloporus woodi</i>	Florida Scrub Lizard	G2G3	S2S3	N	N
<i>Sciurus niger shermani</i>	Sherman's Fox Squirrel	G5T3	S3	N	SSC
<i>Selonodon floridensis</i>	Florida Cebionid Beetle	G2G4	S2S4	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T2	S2	N	N
<i>Warea carteri</i>	Carter's warea	G3	S3	E	E

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Matrix Unit ID: 47730					
Likely					
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Scrub		G2	S2	N	N
Potential					
<i>Andropogon arctatus</i>	pinewoods bluestem	G3	S3	N	T
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2	S2	T	FT
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	G4T3	S3	N	ST
<i>Bonamia grandiflora</i>	Florida bonamia	G3	S3	T	E
<i>Calamintha ashei</i>	Ashe's savory	G3	S3	N	T
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chionanthus pygmaeus</i>	pygmy fringe tree	G2G3	S2S3	E	E
<i>Coleataenia abscissa</i>	cutthroatgrass	G3	S3	N	E
<i>Deeringothamnus pulchellus</i>	beautiful pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3Q	S3	T	FT
<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	scrub buckwheat	G4T3	S3	T	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Gymnopogon chapmanianus</i>	Chapman's skeletongrass	G3	S3	N	N
<i>Hartwrightia floridana</i>	hartwrightia	G2	S2	N	T
<i>Illicium parviflorum</i>	star anise	G2	S2	N	E
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Liatris ohlingerae</i>	Florida blazing star	G2	S2	E	E
<i>Lithobates capito</i>	Gopher Frog	G3	S3	N	N
<i>Lupinus aridorum</i>	scrub lupine	G3T1	S1	E	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulae</i>	Florida Long-tailed Weasel	G5T3	S3	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G3	S3	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Nolina brittoniana</i>	Britton's beargrass	G3	S3	E	E
<i>Paronychia chartacea</i> var. <i>chartacea</i>	paper-like nailwort	G3T3	S3	T	E
<i>Peucaea aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Picoides borealis</i>	Red-cockaded Woodpecker	G3	S2	E	FE
<i>Platanthera integra</i>	yellow fringeless orchid	G3G4	S3	N	E
<i>Podomys floridanus</i>	Florida Mouse	G3	S3	N	N
<i>Polygala lewtonii</i>	Lewton's polygala	G2G3	S2S3	E	E
<i>Polygonella myriophylla</i>	Small's jointweed	G3	S3	E	E
<i>Pteroglossaspis ecristata</i>	giant orchid	G2G3	S2	N	T
<i>Puma concolor coryi</i>	Florida Panther	G5T1	S1	E	FE
<i>Rostrhamus sociabilis</i>	Snail Kite	G4G5	S2	E	FE
<i>Sceloporus woodi</i>	Florida Scrub Lizard	G2G3	S2S3	N	N
<i>Schizachyrium niveum</i>	scrub bluestem	G1G2	S1S2	N	E
<i>Sciurus niger shermani</i>	Sherman's Fox Squirrel	G5T3	S3	N	SSC
<i>Selonodon floridensis</i>	Florida Cebrionid Beetle	G2G4	S2S4	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T2	S2	N	N

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
<i>Warea carteri</i>	Carter's warea	G3	S3	E	E
Matrix Unit ID: 48088					
Documented					
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N
Likely					
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Scrub		G2	S2	N	N
Potential					
<i>Andropogon arctatus</i>	pinewoods bluestem	G3	S3	N	T
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	G4T3	S3	N	ST
<i>Bonamia grandiflora</i>	Florida bonamia	G3	S3	T	E
<i>Calamintha ashei</i>	Ashe's savory	G3	S3	N	T
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chionanthus pygmaeus</i>	pygmy fringe tree	G2G3	S2S3	E	E
<i>Coleataenia abscissa</i>	cutthroatgrass	G3	S3	N	E
<i>Deeringothamnus pulchellus</i>	beautiful pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3Q	S3	T	FT
<i>Eriogonum longifolium var. gnaphalifolium</i>	scrub buckwheat	G4T3	S3	T	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Gymnopogon chapmanianus</i>	Chapman's skeletongrass	G3	S3	N	N
<i>Hartwrightia floridana</i>	hartwrightia	G2	S2	N	T
<i>Illicium parviflorum</i>	star anise	G2	S2	N	E
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Liatris ohlingerae</i>	Florida blazing star	G2	S2	E	E
<i>Lithobates capito</i>	Gopher Frog	G3	S3	N	N
<i>Lupinus aridorum</i>	scrub lupine	G3T1	S1	E	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulae</i>	Florida Long-tailed Weasel	G5T3	S3	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G3	S3	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Nolina brittoniana</i>	Britton's beargrass	G3	S3	E	E
<i>Paronychia chartacea var. chartacea</i>	paper-like nailwort	G3T3	S3	T	E
<i>Peucaea aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Picoides borealis</i>	Red-cockaded Woodpecker	G3	S2	E	FE
<i>Platanthera integra</i>	yellow fringeless orchid	G3G4	S3	N	E
<i>Podomys floridanus</i>	Florida Mouse	G3	S3	N	N
<i>Polygala lewtonii</i>	Lewton's polygala	G2G3	S2S3	E	E
<i>Polygonella myriophylla</i>	Small's jointweed	G3	S3	E	E
<i>Pteroglossaspis ecristata</i>	giant orchid	G2G3	S2	N	T
<i>Puma concolor coryi</i>	Florida Panther	G5T1	S1	E	FE
<i>Rostrhamus sociabilis</i>	Snail Kite	G4G5	S2	E	FE
<i>Sceloporus woodi</i>	Florida Scrub Lizard	G2G3	S2S3	N	N
<i>Sciurus niger shermani</i>	Sherman's Fox Squirrel	G5T3	S3	N	SSC

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
<i>Selonodon floridensis</i>	Florida Cebrionid Beetle	G2G4	S2S4	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T2	S2	N	N
<i>Warea carteri</i>	Carter's warea	G3	S3	E	E
Matrix Unit ID: 48089					
Likely					
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Potential					
<i>Andropogon arctatus</i>	pinewoods bluestem	G3	S3	N	T
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	G4T3	S3	N	ST
<i>Bonamia grandiflora</i>	Florida bonamia	G3	S3	T	E
<i>Calamintha ashei</i>	Ashe's savory	G3	S3	N	T
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chionanthus pygmaeus</i>	pygmy fringe tree	G2G3	S2S3	E	E
<i>Coleataenia abscissa</i>	cutthroatgrass	G3	S3	N	E
<i>Deeringothamnus pulchellus</i>	beautiful pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3Q	S3	T	FT
<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	scrub buckwheat	G4T3	S3	T	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Gymnopogon chapmanianus</i>	Chapman's skeletongrass	G3	S3	N	N
<i>Hartwrightia floridana</i>	hartwrightia	G2	S2	N	T
<i>Illicium parviflorum</i>	star anise	G2	S2	N	E
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Liatris ohlingerae</i>	Florida blazing star	G2	S2	E	E
<i>Lithobates capito</i>	Gopher Frog	G3	S3	N	N
<i>Lupinus aridorum</i>	scrub lupine	G3T1	S1	E	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulae</i>	Florida Long-tailed Weasel	G5T3	S3	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G3	S3	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Nolina brittoniana</i>	Britton's beargrass	G3	S3	E	E
<i>Paronychia chartacea</i> var. <i>chartacea</i>	paper-like nailwort	G3T3	S3	T	E
<i>Peucaea aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Picoides borealis</i>	Red-cockaded Woodpecker	G3	S2	E	FE
<i>Platanthera integra</i>	yellow fringeless orchid	G3G4	S3	N	E
<i>Podomys floridanus</i>	Florida Mouse	G3	S3	N	N
<i>Polygala lewtonii</i>	Lewton's polygala	G2G3	S2S3	E	E
<i>Polygonella myriophylla</i>	Small's jointweed	G3	S3	E	E
<i>Pteroglossaspis ecristata</i>	giant orchid	G2G3	S2	N	T
<i>Rostrhamus sociabilis</i>	Snail Kite	G4G5	S2	E	FE
<i>Sceloporus woodi</i>	Florida Scrub Lizard	G2G3	S2S3	N	N
<i>Sciurus niger shermani</i>	Sherman's Fox Squirrel	G5T3	S3	N	SSC
<i>Selonodon floridensis</i>	Florida Cebrionid Beetle	G2G4	S2S4	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T2	S2	N	N
<i>Warea carteri</i>	Carter's warea	G3	S3	E	E

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Matrix Unit ID: 48433					
Documented					
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N
Likely					
<i>Caracara cheriway</i>	Crested Caracara	G5	S2	T	FT
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Potential					
<i>Andropogon arctatus</i>	pinewoods bluestem	G3	S3	N	T
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	G4T3	S3	N	ST
<i>Bonamia grandiflora</i>	Florida bonamia	G3	S3	T	E
<i>Calamintha ashei</i>	Ashe's savory	G3	S3	N	T
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chionanthus pygmaeus</i>	pygmy fringe tree	G2G3	S2S3	E	E
<i>Coleataenia abscissa</i>	cutthroatgrass	G3	S3	N	E
<i>Conradina brevifolia</i>	short-leaved rosemary	G2Q	S2	E	E
<i>Deeringothamnus pulchellus</i>	beautiful pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3Q	S3	T	FT
<i>Eriogonum longifolium var. gnaphalifolium</i>	scrub buckwheat	G4T3	S3	T	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Gymnopogon chapmanianus</i>	Chapman's skeletongrass	G3	S3	N	N
<i>Hartwrightia floridana</i>	hartwrightia	G2	S2	N	T
<i>Illicium parviflorum</i>	star anise	G2	S2	N	E
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Liatris ohlingerae</i>	Florida blazing star	G2	S2	E	E
<i>Lithobates capito</i>	Gopher Frog	G3	S3	N	N
<i>Lupinus aridorum</i>	scrub lupine	G3T1	S1	E	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulae</i>	Florida Long-tailed Weasel	G5T3	S3	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G3	S3	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Nolina brittoniana</i>	Britton's beargrass	G3	S3	E	E
<i>Paronychia chartacea var. chartacea</i>	paper-like nailwort	G3T3	S3	T	E
<i>Peucaea aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Picoides borealis</i>	Red-cockaded Woodpecker	G3	S2	E	FE
<i>Platanthera integra</i>	yellow fringeless orchid	G3G4	S3	N	E
<i>Podomys floridanus</i>	Florida Mouse	G3	S3	N	N
<i>Polygala lewtonii</i>	Lewton's polygala	G2G3	S2S3	E	E
<i>Polygonella myriophylla</i>	Small's jointweed	G3	S3	E	E
<i>Pteroglossaspis ecristata</i>	giant orchid	G2G3	S2	N	T
<i>Puma concolor coryi</i>	Florida Panther	G5T1	S1	E	FE
<i>Rostrhamus sociabilis</i>	Snail Kite	G4G5	S2	E	FE
<i>Sceloporus woodi</i>	Florida Scrub Lizard	G2G3	S2S3	N	N
<i>Sciurus niger shermani</i>	Sherman's Fox Squirrel	G5T3	S3	N	SSC
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T2	S2	N	N

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
<i>Warea carteri</i>	Carter's warea	G3	S3	E	E
Matrix Unit ID: 48434					
Likely					
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Potential					
<i>Andropogon arctatus</i>	pinewoods bluestem	G3	S3	N	T
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Athene cunicularia floridana</i>	Florida Burrowing Owl	G4T3	S3	N	ST
<i>Bonamia grandiflora</i>	Florida bonamia	G3	S3	T	E
<i>Calamintha ashei</i>	Ashe's savory	G3	S3	N	T
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chionanthus pygmaeus</i>	pygmy fringe tree	G2G3	S2S3	E	E
<i>Coleataenia abscissa</i>	cutthroatgrass	G3	S3	N	E
<i>Deeringothamnus pulchellus</i>	beautiful pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3Q	S3	T	FT
<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	scrub buckwheat	G4T3	S3	T	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Gymnopogon chapmanianus</i>	Chapman's skeletongrass	G3	S3	N	N
<i>Hartwrightia floridana</i>	hartwrightia	G2	S2	N	T
<i>Illicium parviflorum</i>	star anise	G2	S2	N	E
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Liatris ohlingerae</i>	Florida blazing star	G2	S2	E	E
<i>Lithobates capito</i>	Gopher Frog	G3	S3	N	N
<i>Lupinus aridorum</i>	scrub lupine	G3T1	S1	E	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulae</i>	Florida Long-tailed Weasel	G5T3	S3	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G3	S3	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Nolina brittoniana</i>	Britton's beargrass	G3	S3	E	E
<i>Paronychia chartacea</i> var. <i>chartacea</i>	paper-like nailwort	G3T3	S3	T	E
<i>Peucaea aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Picoides borealis</i>	Red-cockaded Woodpecker	G3	S2	E	FE
<i>Platanthera integra</i>	yellow fringeless orchid	G3G4	S3	N	E
<i>Podomys floridanus</i>	Florida Mouse	G3	S3	N	N
<i>Polygala lewtonii</i>	Lewton's polygala	G2G3	S2S3	E	E
<i>Pteroglossaspis ecristata</i>	giant orchid	G2G3	S2	N	T
<i>Puma concolor coryi</i>	Florida Panther	G5T1	S1	E	FE
<i>Rostrhamus sociabilis</i>	Snail Kite	G4G5	S2	E	FE
<i>Sceloporus woodi</i>	Florida Scrub Lizard	G2G3	S2S3	N	N
<i>Sciurus niger shermani</i>	Sherman's Fox Squirrel	G5T3	S3	N	SSC
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T2	S2	N	N
<i>Warea carteri</i>	Carter's warea	G3	S3	E	E

Matrix Unit ID: 48775

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Likely					
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Potential					
<i>Andropogon arctatus</i>	pinewoods bluestem	G3	S3	N	T
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Athene cucicularia floridana</i>	Florida Burrowing Owl	G4T3	S3	N	ST
<i>Bonamia grandiflora</i>	Florida bonamia	G3	S3	T	E
<i>Calamintha ashei</i>	Ashe's savory	G3	S3	N	T
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chionanthus pygmaeus</i>	pygmy fringe tree	G2G3	S2S3	E	E
<i>Coleataenia abscissa</i>	cutthroatgrass	G3	S3	N	E
<i>Deeringothamnus pulchellus</i>	beautiful pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3Q	S3	T	FT
<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	scrub buckwheat	G4T3	S3	T	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Gymnopogon chapmanianus</i>	Chapman's skeletongrass	G3	S3	N	N
<i>Hartwrightia floridana</i>	hartwrightia	G2	S2	N	T
<i>Illicium parviflorum</i>	star anise	G2	S2	N	E
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Liatris ohlingerae</i>	Florida blazing star	G2	S2	E	E
<i>Lithobates capito</i>	Gopher Frog	G3	S3	N	N
<i>Lupinus aridorum</i>	scrub lupine	G3T1	S1	E	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3	S3	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G3	S3	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Nolina brittoniana</i>	Britton's beargrass	G3	S3	E	E
<i>Paronychia chartacea</i> var. <i>chartacea</i>	paper-like nailwort	G3T3	S3	T	E
<i>Peucaea aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Picoides borealis</i>	Red-cockaded Woodpecker	G3	S2	E	FE
<i>Platanthera integra</i>	yellow fringeless orchid	G3G4	S3	N	E
<i>Podomys floridanus</i>	Florida Mouse	G3	S3	N	N
<i>Polygala lewtonii</i>	Lewton's polygala	G2G3	S2S3	E	E
<i>Pteroglossaspis ecristata</i>	giant orchid	G2G3	S2	N	T
<i>Puma concolor coryi</i>	Florida Panther	G5T1	S1	E	FE
<i>Rostrhamus sociabilis</i>	Snail Kite	G4G5	S2	E	FE
<i>Sceloporus woodi</i>	Florida Scrub Lizard	G2G3	S2S3	N	N
<i>Sciurus niger shermani</i>	Sherman's Fox Squirrel	G5T3	S3	N	SSC
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T2	S2	N	N
<i>Warea carteri</i>	Carter's warea	G3	S3	E	E

Likely
-
Rare
species
and
natural
communities
likely
to
occur
on
this
site
based
on
suitable
habitat
and/or
known
occurrence
s in
the
vicinity.
Potential -
This
site
lies
within
the
known
or
predicted
range
of the
species
listed.

Elements and Element Occurrences

An **element** is any exemplary or rare component of the natural environment, such as a species, natural community, bird rookery, spring, sinkhole, cave, or other ecological feature.

An **element occurrence (EO)** is an area of land and/or water in which a species or natural community is, or was, present. An EO should have practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location.

Element Ranking and Legal Status

Using a ranking system developed by NatureServe and the Natural Heritage Program Network, the Florida Natural Areas Inventory assigns two ranks for each element. The global rank is based on an element's worldwide status; the state rank is based on the status of the element in Florida. Element ranks are based on many factors, the most important ones being estimated number of Element Occurrences (EOs), estimated abundance (number of individuals for species; area for natural communities), geographic range, estimated number of adequately protected EOs, relative threat of destruction, and ecological fragility.

FNAI GLOBAL ELEMENT RANK

- G1** = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- G2** = Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- G3** = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
- G4** = Apparently secure globally (may be rare in parts of range).
- G5** = Demonstrably secure globally.
- GH** = Of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker).
- GX** = Believed to be extinct throughout range.
- GXC** = Extirpated from the wild but still known from captivity or cultivation.
- G#?** = Tentative rank (e.g., G2?).
- G#G#** = Range of rank; insufficient data to assign specific global rank (e.g., G2G3).
- G#T#** = Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1).
- G#Q** = Rank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q).
- G#T#Q** = Same as above, but validity as subspecies or variety is questioned.
- GU** = Unrankable; due to a lack of information no rank or range can be assigned (e.g., GUT2).
- GNA** = Ranking is not applicable because the element is not a suitable target for conservation (e.g. a hybrid species).
- GNR** = Element not yet ranked (temporary).
- GNRTNR** = Neither the element nor the taxonomic subgroup has yet been ranked.

FNAI STATE ELEMENT RANK

- S1** = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
- S2** = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- S3** = Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
- S4** = Apparently secure in Florida (may be rare in parts of range).
- S5** = Demonstrably secure in Florida.
- SH** = Of historical occurrence in Florida, possibly extirpated, but may be rediscovered (e.g., ivory-billed woodpecker).
- SX** = Believed to be extirpated throughout Florida.
- SU** = Unrankable; due to a lack of information no rank or range can be assigned.
- SNA** = State ranking is not applicable because the element is not a suitable target for conservation (e.g. a hybrid species).
- SNR** = Element not yet ranked (temporary).

FEDERAL LEGAL STATUS

Legal status information provided by FNAI for information only. For official definitions and lists of protected species, consult the relevant federal agency.

Definitions derived from U.S. Endangered Species Act of 1973, Sec. 3. Note that the federal status given by FNAI refers only to Florida populations and that federal status may differ elsewhere.

C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.

E = Endangered: species in danger of extinction throughout all or a significant portion of its range.

E, T = Species currently listed endangered in a portion of its range but only listed as threatened in other areas

E, PDL = Species currently listed endangered but has been proposed for delisting.

E, PT = Species currently listed endangered but has been proposed for listing as threatened.

E, XN = Species currently listed endangered but tracked population is a non-essential experimental population.

T = Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.

PE = Species proposed for listing as endangered

PS = Partial status: some but not all of the species' infraspecific taxa have federal

PT = Species proposed for listing as threatened

SAT = Treated as threatened due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.

SC = Not currently listed, but considered a "species of concern" to USFWS.

STATE LEGAL STATUS

Provided by FNAI for information only. For official definitions and lists of protected species, consult the relevant state agency.

Animals: Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists" published by Florida Fish and Wildlife Conservation Commission, 1 August 1997, and subsequent updates.

C = Candidate for listing at the Federal level by the U. S. Fish and Wildlife Service

FE = Listed as Endangered Species at the Federal level by the U. S. Fish and Wildlife Service

FT = Listed as Threatened Species at the Federal level by the U. S. Fish and Wildlife Service

FXN = Federal listed as an experimental population in Florida

FT(S/A) = Federal Threatened due to similarity of appearance

ST = State population listed as Threatened by the FFWCC. Defined as a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become an endangered species within the foreseeable future.

SSC = Listed as Species of Special Concern by the FFWCC. Defined as a population which warrants special protection, recognition, or consideration because it has an inherent significant vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation which, in the foreseeable future, may result in its becoming a threatened species. (SSC* for *Pandion haliaetus* (Osprey) indicates that this status applies in Monroe county only.)

N = Not currently listed, nor currently being considered for listing.

Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505 or see: <http://www.doacs.state.fl.us/pi/>.

E = Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.

T = Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.

N = Not currently listed, nor currently being considered for listing.

Element Occurrence Ranking

FNAI ranks of quality of the element occurrence in terms of its viability (EORANK). Viability is estimated using a combination of factors that contribute to continued survival of the element at the location. Among these are the size of the EO, general condition of the EO at the site, and the conditions of the landscape surrounding the EO (e.g. an immediate threat to an EO by local development pressure could lower an EO rank).

A = Excellent estimated viability
A? = Possibly excellent estimated viability
AB = Excellent or good estimated viability
AC = Excellent, good, or fair estimated viability
B = Good estimated viability
B? = Possibly good estimated viability
BC = Good or fair estimated viability
BD = Good, fair, or poor estimated viability
C = Fair estimated viability
C? = Possibly fair estimated viability
CD = Fair or poor estimated viability
D = Poor estimated viability
D? = Possibly poor estimated viability
E = Verified extant (viability not assessed)
F = Failed to find
H = Historical
NR = Not ranked, a placeholder when an EO is not (yet) ranked.
U = Unrankable
X = Extirpated

*For additional detail on the above ranks see: <http://www.natureserve.org/explorer/eorankguide.htm>

FNAI also uses the following EO ranks:

H? = Possibly historical
F? = Possibly failed to find
X? = Possibly extirpated

The following offers further explanation of the H and X ranks as they are used by FNAI:

The rank of H is used when there is a lack of recent field information verifying the continued existence of an EO, such as (a) when an EO is based only on historical collections data; or (b) when an EO was ranked A, B, C, D, or E at one time and is later, without field survey work, considered to be possibly extirpated due to general habitat loss or degradation of the environment in the area. This definition of the H rank is dependent on an interpretation of what constitutes "recent" field information. Generally, if there is no known survey of an EO within the last 20 to 40 years, it should be assigned an H rank. While these time frames represent suggested maximum limits, the actual time period for historical EOs may vary according to the biology of the element and the specific landscape context of each occurrence (including anthropogenic alteration of the environment). Thus, an H rank may be assigned to an EO before the maximum time frames have lapsed. Occurrences that have not been surveyed for periods exceeding these time frames should not be ranked A, B, C, or D. The higher maximum limit for plants and communities (i.e., ranging from 20 to 40 years) is based upon the assumption that occurrences of these elements generally have the potential to persist at a given location for longer periods of time. This greater potential is a reflection of plant biology and community dynamics. However, landscape factors must also be considered. Thus, areas with more anthropogenic impacts on the environment (e.g., development) will be at the lower end of the range, and less-impacted areas will be at the higher end.

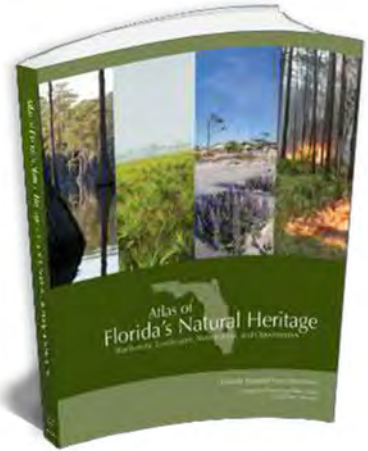
The rank of X is assigned to EOs for which there is documented destruction of habitat or environment, or persuasive evidence of eradication based on adequate survey (i.e., thorough or repeated survey efforts by one or more experienced observers at times and under conditions appropriate for the Element at that location).



Atlas of Florida's Natural Heritage

Biodiversity, Landscapes, Stewardship, and Opportunities

The Florida Natural Areas Inventory is pleased to announce the publication of the ***Atlas of Florida's Natural Heritage: Biodiversity, Landscapes, Stewardship, and Opportunities***. This high-quality, full-color *Atlas* is sure to become a standard reference for anyone involved in the conservation, management, study, or enjoyment of Florida's rich natural resources. We hope the *Atlas* will inspire, educate, and raise awareness of and interest in biodiversity and conservation issues.



Learn more about the Atlas, view sample pages and order your copy today at:
FloridasNaturalHeritage.org

Follow our blog – *FNAI News & Notes*:

<http://fnai.blogspot.com/>

and



APPENDIX C

USFWS IPaC Trust Resources Report



United States Department of the Interior



FISH AND WILDLIFE SERVICE
South Florida Ecological Services Field Office
1339 20th Street
Vero Beach, FL 32960-3559
Phone: (772) 562-3909 Fax: (772) 562-4288
<http://fws.gov/verobeach>

In Reply Refer To:

April 05, 2019

Consultation Code: 04EF2000-2019-SLI-0634

Event Code: 04EF2000-2019-E-01830

Project Name: Neptune Road Widening PD&E

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
-

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

South Florida Ecological Services Field Office

1339 20th Street

Vero Beach, FL 32960-3559

(772) 562-3909

Project Summary

Consultation Code: 04EF2000-2019-SLI-0634

Event Code: 04EF2000-2019-E-01830

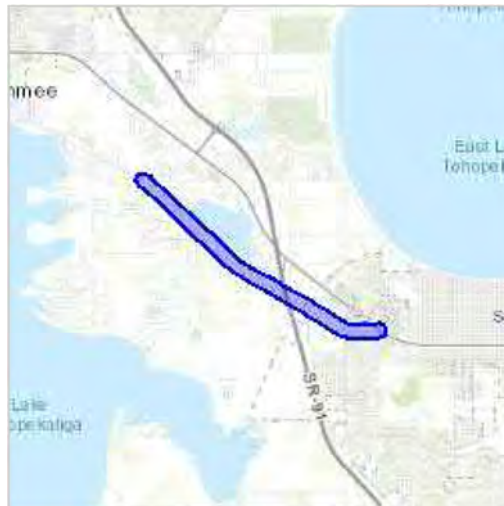
Project Name: Neptune Road Widening PD&E

Project Type: TRANSPORTATION

Project Description: Neptune Road widening from Partin Settlement Road to US 192.

Project Location:

Approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/place/28.263529156229207N81.3448808170172W>



Counties: Osceola, FL

Endangered Species Act Species

There is a total of 22 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Florida Panther <i>Puma (=Felis) concolor coryi</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1763 Habitat assessment guidelines: https://ecos.fws.gov/ipac/guideline/assessment/population/8/office/41420.pdf	Endangered
Puma (=mountain Lion) <i>Puma (=Felis) concolor (all subsp. except coryi)</i> Population: FL No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6049	Similarity of Appearance (Threatened)

Birds

NAME	STATUS
<p>Audubon's Crested Caracara <i>Polyborus plancus audubonii</i> Population: FL pop. No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8250</p>	Threatened
<p>Everglade Snail Kite <i>Rostrhamus sociabilis plumbeus</i> There is final critical habitat for this species. Your location is outside the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/7713 Species survey guidelines: https://ecos.fws.gov/ipac/guideline/survey/population/1221/office/41420.pdf</p>	Endangered
<p>Florida Grasshopper Sparrow <i>Ammodramus savannarum floridanus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/32</p>	Endangered
<p>Florida Scrub-jay <i>Aphelocoma coerulescens</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6174</p>	Threatened
<p>Ivory-billed Woodpecker <i>Campephilus principalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8230</p>	Endangered
<p>Red-cockaded Woodpecker <i>Picoides borealis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7614</p>	Endangered
<p>Whooping Crane <i>Grus americana</i> Population: U.S.A. (CO, ID, FL, NM, UT, and the western half of Wyoming) No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/758</p>	Experimental Population, Non- Essential
<p>Wood Stork <i>Mycteria americana</i> Population: AL, FL, GA, MS, NC, SC No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8477 Habitat assessment guidelines: https://ecos.fws.gov/ipac/guideline/assessment/population/124/office/41420.pdf</p>	Threatened

Reptiles

NAME	STATUS
<p>American Alligator <i>Alligator mississippiensis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/776</p>	<p>Similarity of Appearance (Threatened)</p>
<p>Eastern Indigo Snake <i>Drymarchon corais couperi</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/646</p>	<p>Threatened</p>

Flowering Plants

NAME	STATUS
<p>Britton's Beargrass <i>Nolina brittoniana</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4460</p>	Endangered
<p>Florida Bonamia <i>Bonamia grandiflora</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2230</p>	Threatened
<p>Lewton's Polygala <i>Polygala lewtonii</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6688</p>	Endangered
<p>Papery Whitlow-wort <i>Paronychia chartacea</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1465</p>	Threatened
<p>Pigeon Wings <i>Clitoria fragrans</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/991</p>	Threatened
<p>Pygmy Fringe-tree <i>Chionanthus pygmaeus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1084</p>	Endangered
<p>Sandlace <i>Polygonella myriophylla</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5745</p>	Endangered
<p>Scrub Buckwheat <i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5940</p>	Threatened
<p>Scrub Lupine <i>Lupinus aridorum</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/736</p>	Endangered
<p>Wide-leaf Warea <i>Warea amplexifolia</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/412</p>	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

APPENDIX D

Wetlands and Surface Waters Photographic Log



FLUCFCS 510: Streams and Waterways, which include Partin Canal (top right and bottom left), C-31 Canal (top left), and roadside ditches (bottom right)

WETLAND & SURFACE WATER PHOTOGRAPHIC LOG

Neptune Road from Partin Settlement Road to US 192
 Project Development and Environment Study
 FPID: 445415-1
 Osceola County, Florida





FLUCFCS 534: Reservoirs less than 10 acres (typ.); this includes stormwater retention ponds throughout the study area

WETLAND & SURFACE WATER PHOTOGRAPHIC LOG

Neptune Road from Partin Settlement Road to US 192
 Project Development and Environment Study
 FPID: 445415-1
 Osceola County, Florida





FLUCFCS Code 641: Freshwater Marshes (typ.)

WETLAND & SURFACE WATER PHOTOGRAPHIC LOG

Neptune Road from Partin Settlement Road to US 192
Project Development and Environment Study
FPID: 445415-1
Osceola County, Florida





FLUCFCS Code 643: Wet Prairies (typ.) (foreground) with 617: Mixed Wetland Hardwoods (typ.) (background)

WETLAND & SURFACE WATER PHOTOGRAPHIC LOG

Neptune Road from Partin Settlement Road to US 192
 Project Development and Environment Study
 FPID: 445415-1
 Osceola County, Florida





FLUCFCS Code 617: Mixed Wetland Hardwoods (typ.)

WETLAND & SURFACE WATER PHOTOGRAPHIC LOG

Neptune Road from Partin Settlement Road to US 192
 Project Development and Environment Study
 FPID: 445415-1
 Osceola County, Florida



APPENDIX E

Uniform Mitigation Assessment Method (UMAM) Data Sheets

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-6, WL-8, WL-12
FLUCCs code 617	Further classification (optional) Mixed Wetland Hardwoods	Impact or Mitigation Site? Impact	Assessment Area Size 0.26 ac. - Alt. 1
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands These forested wetlands within the study area are hydrologically connected to Fish Lake and other non-forested wetlands. The forested wetlands are also located adjacent to residential and agricultural land uses.			
Assessment area description The AA consists of several forested wetlands located south of Fish Lake. These wetlands have similar species composition and community structure, with a canopy consisting of bald cypress, red maple, carolina willow, with scattered Brazilian pepper. Understory vegetation was minimal, with elderberry, virginia chain fern, and swamp fern.			
Significant nearby features Fish Lake		Uniqueness (considering the relative rarity in relation to the regional These wetlands are not unique when compared to other mixed wetland hardwood forests in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):			
Additional relevant factors: N/A			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-15, WL-17
FLUCCs code 617	Further classification (optional) Mixed Wetland Hardwoods	Impact or Mitigation Site? Impact	Assessment Area Size 1.03 ac. - Alt. 1
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands These forested wetlands within the study area appear to be isolated. They are near Neptune Road, Florida's Turnpike and improved pastures or other agricultural land uses.			
Assessment area description The AA consists of two forested wetlands found east of the Florida's Turnpike. These wetlands have similar species composition and community structure, with a canopy consisting of bald cypress, red maple, carolina willow, with scattered Brazilian pepper. Understory vegetation was minimal, with elderberry, virginia chain fern, and swamp fern.			
Significant nearby features Canal C-31		Uniqueness (considering the relative rarity in relation to the regional These wetlands are not unique when compared to other mixed wetland hardwood forests in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):			
Additional relevant factors: N/A			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road	Application Number N/A	Assessment Area Name or Number WL-15, WL-17
Impact or Mitigation Impact - Alt 1	Assessment conducted by: Tori Bacheler/Frank Suarez	Assessment date: 11/30/2018

Scoring Guidance
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed

Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface water functions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

.500(6)(a) Location and Landscape Support	Habitat support around the wetlands is minimal due to agricultural land uses and adjacent roadways. Wildlife access is limited due to roads and fences that are adjacent to the wetlands. Facultative exotic vegetation is present in surrounding upland areas, such as Brazilian pepper and primrose willow.					
<table border="1"> <tr> <td>w/o pres or current</td> <td></td> <td>with</td> </tr> <tr> <td>4</td> <td></td> <td>0</td> </tr> </table>		w/o pres or current		with	4	
w/o pres or current		with				
4		0				
.500(6)(b) Water Environment (n/a for uplands)	The wetlands receive runoff from adjacent roadways as well as agricultural and residential areas, likely carrying pollutants and nutrient load. The wetlands also receive litter from the adjacent roadway. Water levels and soil moisture are appropriate.					
<table border="1"> <tr> <td>w/o pres or current</td> <td></td> <td>with</td> </tr> <tr> <td>5</td> <td></td> <td>0</td> </tr> </table>		w/o pres or current		with	5	
w/o pres or current		with				
5		0				
.500(6)(c) Community structure	Desirable wetland species are present, however, exotic species, such as Brazilian pepper, occur in varying degrees. Development surrounding the wetlands as well as isolation limit recruitment of hydrophytic vegetation. There is evidence of loss of zonation and community structure.					
<table border="1"> <tr> <td>w/o pres or current</td> <td></td> <td>with</td> </tr> <tr> <td>6</td> <td></td> <td>0</td> </tr> </table>		w/o pres or current		with	6	
w/o pres or current		with				
6		0				

Score = sum of above scores/30 (if uplands, divide by 20)		
current or w/o pres		with
0.50		0

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres = 1.03 x 0.50 = 0.52

Delta = [with-current]
0.57

If mitigation
Time lag (t-factor) =
Risk factor =

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-1, WL-2
FLUCCs code 641	Further classification (optional) Freshwater Marshes	Impact or Mitigation Site? Impact	Assessment Area Size 0.49 ac. - Alt 1
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands Freshwater marshes within the study area eventually connect to Lake Tohopekaliga and other wetlands outside of the study area. These freshwater marshes are also located adjacent to residential land uses.			
Assessment area description The AA consists of two freshwater marshes located adjacent to Cross Prairie Parkway and south of Neptune Road. These wetlands have similar species composition and community structure, with vegetation consisting mostly of soft rush, torpedo grass, maidencane, with scattered saltbush and primrose willow.			
Significant nearby features Lake Tohopekaliga		Uniqueness (considering the relative rarity in relation to the regional These marshes are not unique when compared to other freshwater marshes in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE) and nesting/foraging habitat for Florida sandhill crane (ST)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): Tricolored heron and great blue heron			
Additional relevant factors: N/A			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-7, WL-9, WL-11
FLUCCs code 641	Further classification (optional) Freshwater Marshes	Impact or Mitigation Site? Impact	Assessment Area Size 0.36 ac. - Alt 1
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands Freshwater marshes within the study area connect to other wetlands which connect to Fish Lake. These freshwater marshes are also located adjacent to residential land uses.			
Assessment area description The AA consists of several freshwater marshes found south of Fish Lake and north of Neptune Road. These wetlands have similar species composition and community structure, with vegetation consisting mostly of soft rush, torpedo grass, maidencane, with scattered saltbush and primrose willow.			
Significant nearby features Fish Lake		Uniqueness (considering the relative rarity in relation to the regional These marshes are not unique when compared to other freshwater marshes in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE) and nesting/foraging habitat for Florida sandhill crane (ST)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): Tricolored heron and great blue heron			
Additional relevant factors: N/A			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-4
FLUCCs code 643	Further classification (optional) Wet Prairies	Impact or Mitigation Site? Impact	Assessment Area Size 0.22 ac. - Alt 1
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands This wet prairie is hydrologically connected to Fish Lake and other wetlands. Wet prairie is also located adjacent to agricultural land uses.			
Assessment area description The AA consists of a wet prairie located toward the western extent of the study area, north of Neptune Road. Vegetation consists mostly of soft rush, torpedo grass, whitetop sedge, and arrowhead. This wetland was historically one contiguous wetland with WL-3 and WL-5, but have been fragmented by the construction of the Partin Canal and the Cross Prairie Parkway.			
Significant nearby features Fish Lake and Partin Canal		Uniqueness (considering the relative rarity in relation to the regional This wet prairie is not unique when compared to other wet prairies in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE) and nesting/foraging habitat for Florida sandhill crane (ST)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): Northern cardinal, blue jay, osprey, belted kingfisher			
Additional relevant factors: As part of the PD&E study, these wetlands are a part of the wetlands that were impacted for the construction of Cross Prairie Parkway. As such, the UMAM scores match the scores permitted under SFWMD Permit # 49-01518-P			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-5
FLUCCs code 643	Further classification (optional) Wet Prairies	Impact or Mitigation Site? Impact	Assessment Area Size 0.21 ac. - Alt 1
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands Wet prairie is hydrologically connected to Fish Lake and other wetlands. Wet prairie is also located adjacent to residential land uses.			
Assessment area description The AA consists of a wet prairie located toward the western extent of the study area, north of Neptune Road. Vegetation consists mostly of soft rush, torpedo grass, whitetop sedge, and arrowhead. This wetland was historically one contiguous wetland with WL-3 and WL-4, but has been fragmented by the construction of the Partin Canal and the Cross Prairie Parkway.			
Significant nearby features Fish Lake and Partin Canal		Uniqueness (considering the relative rarity in relation to the regional This wet prairie is not unique when compared to other wet prairies in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE) and nesting/foraging habitat for Florida sandhill crane (ST)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): Northern cardinal, blue jay, osprey, belted kingfisher			
Additional relevant factors: As part of the PD&E study, these wetlands are a part of the wetlands that were impacted for the construction of Cross Prairie Parkway. As such, the UMAM scores are similar to the scores permitted under SFWMD Permit # 49-01518-P			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-5
FLUCCs code 643	Further classification (optional) Wet Prairies	Impact or Mitigation Site? Impact	Assessment Area Size 0.21 ac. - Alt 1
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands Wet prairie is hydrologically connected to Fish Lake and other wetlands. Wet prairie is also located adjacent to residential land uses.			
Assessment area description The AA consists of a wet prairie located toward the western extent of the study area, north of Neptune Road. Vegetation consists mostly of soft rush, torpedo grass, whitetop sedge, and arrowhead. This wetland was historically one contiguous wetland with WL-3 and WL-4, but has been fragmented by the construction of the Partin Canal and the Cross Prairie Parkway.			
Significant nearby features Fish Lake and Partin Canal		Uniqueness (considering the relative rarity in relation to the regional This wet prairie is not unique when compared to other wet prairies in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE) and nesting/foraging habitat for Florida sandhill crane (ST)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): Northern cardinal, blue jay, osprey, belted kingfisher			
Additional relevant factors: As part of the PD&E study, these wetlands are a part of the wetlands that were impacted for the construction of Cross Prairie Parkway. As such, the UMAM scores are similar to the scores permitted under SFWMD Permit # 49-01518-P			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-6
FLUCCs code 617	Further classification (optional) Mixed Wetland Hardwoods	Impact or Mitigation Site? Impact	Assessment Area Size 0.04 ac. - Alt. 2
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands This forested wetland is hydrologically connected to Fish Lake and other non-forested wetlands. The forested wetlands are also located adjacent to residential land uses.			
Assessment area description The AA consists of a forested wetland located south of Fish Lake and north of Neptune Road. The canopy consists of bald cypress, red maple, carolina willow, with scattered Brazilian pepper. Understory vegetation was minimal, with elderberry, virginia chain fern, and swamp fern.			
Significant nearby features Fish Lake		Uniqueness (considering the relative rarity in relation to the regional This wetland is not unique when compared to other mixed wetland hardwood forests in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):			
Additional relevant factors: N/A			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-15, WL-17
FLUCCs code 617	Further classification (optional) Mixed Wetland Hardwoods	Impact or Mitigation Site? Impact	Assessment Area Size 1.03 ac. - Alt. 2
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands These forested wetlands within the study area appear to be isolated. They are near Neptune Road, Florida's Turnpike and improved pastures or other agricultural uses.			
Assessment area description The AA consists of two forested wetlands found east of the Florida's Turnpike. These wetlands have similar species composition and community structure, with a canopy consisting of bald cypress, red maple, carolina willow, with scattered Brazilian pepper. Understory vegetation was minimal, with elderberry, virginia chain fern, and swamp fern.			
Significant nearby features Canal C-31		Uniqueness (considering the relative rarity in relation to the regional These wetlands are not unique when compared to other mixed wetland hardwood forests in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):			
Additional relevant factors: N/A			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-1, WL-2
FLUCCs code 641	Further classification (optional) Freshwater Marshes	Impact or Mitigation Site? Impact	Assessment Area Size 1.72 ac. - Alt 2
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands Freshwater marshes within the study area eventually connect to Lake Tohopekaliga and other wetlands outside of the study area. These freshwater marshes are also located adjacent to residential land uses.			
Assessment area description The AA consists of two freshwater marshes located adjacent to Cross Prairie Parkway and south of Neptune Road. These wetlands have similar species composition and community structure, with vegetation consisting mostly of soft rush, torpedo grass, maidencane, with scattered saltbush and primrose willow.			
Significant nearby features Lake Tohopekaliga		Uniqueness (considering the relative rarity in relation to the regional These marshes are not unique when compared to other freshwater marshes in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE) and nesting/foraging habitat for Florida sandhill crane (ST)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): Tricolored heron and great blue heron			
Additional relevant factors: N/A			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-4
FLUCCs code 643	Further classification (optional) Wet Prairies	Impact or Mitigation Site? Impact	Assessment Area Size 0.22 a. - Alt 2
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands This wet prairie is hydrologically connected to Fish Lake and other wetlands. Wet prairie is located adjacent to agricultural land uses.			
Assessment area description The AA consists of a wet prairie located toward the western extent of the study area, north of Neptune Road. Vegetation consists mostly of soft rush, torpedo grass, whitetop sedge, and arrowhead. This wetland was historically one contiguous wetland with WL-3 and WL-5, but has been fragmented by the construction of the Partin Canal and the Cross Prairie Parkway.			
Significant nearby features Fish Lake and Partin Canal		Uniqueness (considering the relative rarity in relation to the regional This wet prairie is not unique when compared to other wet prairies in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE) and nesting/foraging habitat for Florida sandhill crane (ST)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): Northern cardinal, blue jay, osprey, belted kingfisher			
Additional relevant factors: As part of the PD&E study, these wetlands are a part of the wetlands that were impacted for the construction of Cross Prairie Parkway. As such, the UMAM scores match the scores permitted under SFWMD Permit # 49-01518-P			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

**PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)**

Site/Project Name Neptune Road Widening from US 192 to Partin Settlement Road		Application Number N/A	Assessment Area Name or Number WL-5
FLUCCs code 643	Further classification (optional) Wet Prairies	Impact or Mitigation Site? Impact	Assessment Area Size 0.06 ac. - Alt 2
Basin/Watershed Name/Number Lake Tohopekaliga	Affected Waterbody(Class) Class III	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance) N/A	
Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands Wet prairie is hydrologically connected to Fish Lake and other wetlands. Wet prairie is also located adjacent to residential land uses.			
Assessment area description The AA consists of a wet prairie located toward the western extent of the study area, north of Neptune Road. Vvegetation consists mostly of soft rush, torpedo grass, whitetop sedge, and arrowhead. This wetland was historically one contiguous wetland with WL-3 and WL-4, but has been fragmented by the construction of the Partin Canal and the Cross Prairie Parkway.			
Significant nearby features Fish Lake and Partin Canal		Uniqueness (considering the relative rarity in relation to the regional This wet prairie is not unique when compared to other wet prairies in the region.	
Functions Primary production, nutrient transport, nutrient cycling, foraging, water quality, water conveyance		Mitigation for previous permit/other historic use N/A	
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to Anticipated utilization by wading birds, amphibians, and reptiles		Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the Foraging habitat for wood stork (FE) and nesting/foraging habitat for Florida sandhill crane (ST)	
Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.): Northern cardinal, blue jay, osprey, belted kingfisher			
Additional relevant factors: As part of the PD&E study, these wetlands are a part of the wetlands that were impacted for the construction of Cross Prairie Parkway. As such, the UMAM scores are similar to the scores permitted under SFWMD Permit # 49-01518-P			
Assessment conducted by: Tori Bacheler/Frank Suarez		Assessment date(s): 11/30/2018	

APPENDIX F

Historical Aerials



K:\VRB_Environmental\149244410 Neptune PDE Study\ENV\GIS\MXD\Historical Aerials 1969.mxd

Source: FDOT APLUS

Historical Aerial Map - 1969
Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida

Kimley»Horn

© 2019 Kimley-Horn and Associates, Inc.
445 24th Street, Suite 200, Vero Beach, FL 32960
Phone (772) 794-4100



K:\VRB_Environmental\149244410 Neptune PDE Study\ENV\GIS\MXD\Historical Aerials 1971.mxd

Source: FDOT APLUS

Historical Aerial Map - 1971
Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida



© 2019 Kimley-Horn and Associates, Inc.
445 24th Street, Suite 200, Vero Beach, FL 32960
Phone (772) 794-4100



K:\VRB_Environmental\149244410 Neptune PDE Study\ENV\GIS\MXD\Historical Aerials 1996.mxd

Source: FDOT APLUS

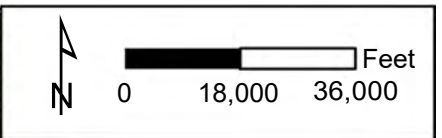
Historical Aerial Map - 1996
Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida



© 2019 Kimley-Horn and Associates, Inc.
445 24th Street, Suite 200, Vero Beach, FL 32960
Phone (772) 794-4100

APPENDIX G

USFWS Maps of Consultation Areas

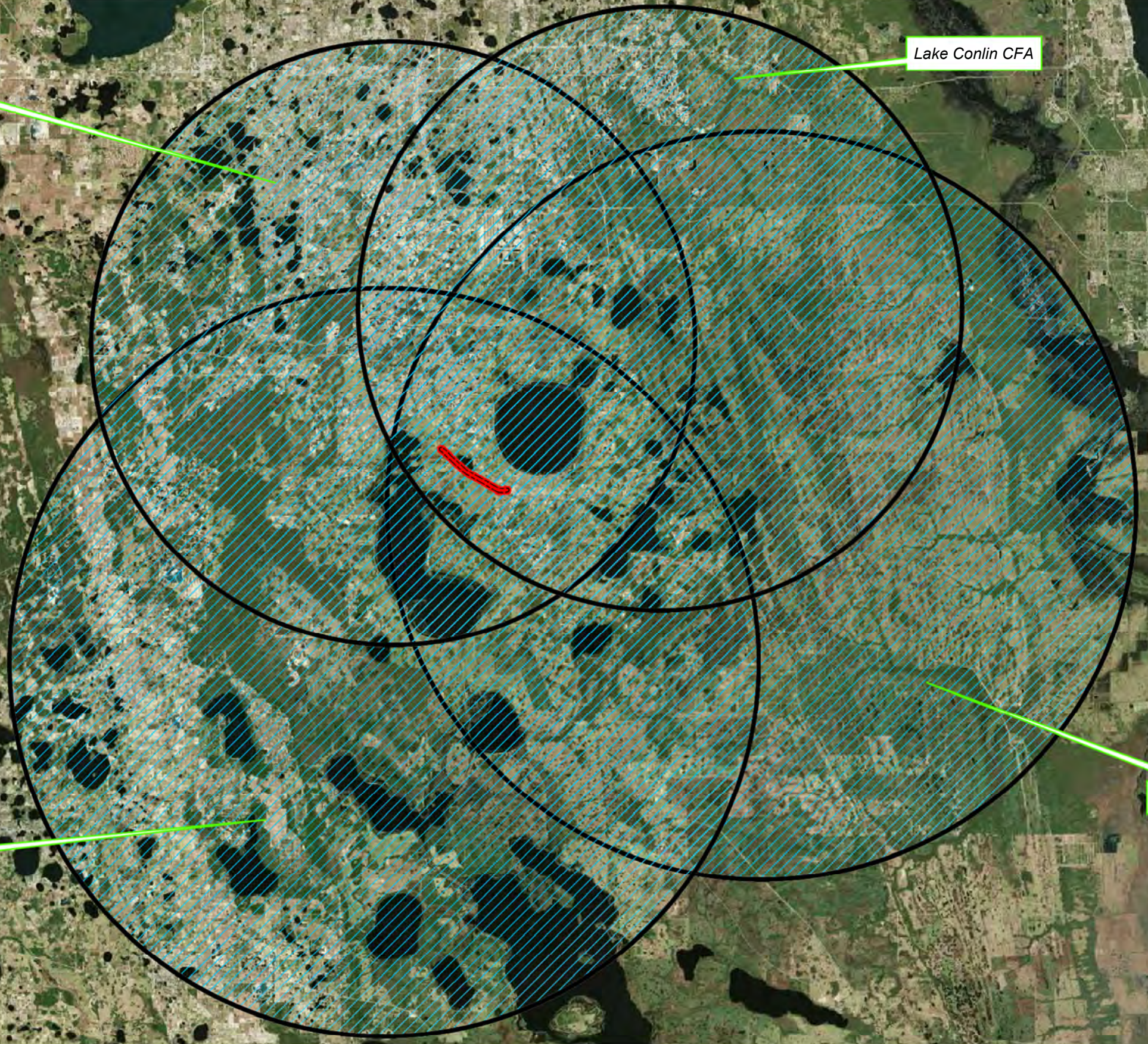


Lake Russell CFA

Lake Conlin CFA

Lake Mary Jane CFA

Gatorland CFA



Legend

- Neptune Road 500-foot buffer
- Wood Stork CFA

K:\VRB_Environmental\149244410 Neptune PDE Study\ENV\GIS\MXD\CFA Map.mxd

Source: Aerial courtesy of NearMap



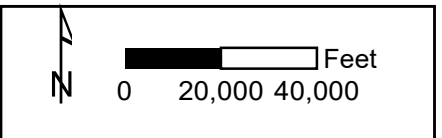
Wood Stork Core Foraging Area (CFA) Map
Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida

1 inch = 30,000 feet



MAY 2019

G

JOB NUMBER: 149244410



Legend

-  Neptune Road 500-foot buffer
-  Crested Caracara Consultation Area

K:\VRB_Environmental\149244410 Neptune PDE Study\ENV\GIS\MXD\Caracara Map.mxd

Source: Aerial courtesy of Nearmap

USFWS Consultation Area Map
Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida

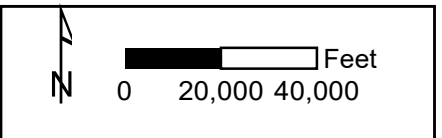


1 inch = 40,000 feet



MAY 2019

JOB NUMBER: 149244410

APPENDIX G



Legend

-  Neptune Road 500-foot buffer
-  Red-cockaded Woodpecker Consultation Area

K:\WRB_Environmental\149244410 Neptune PDE Study\ENV\GIS\WXD\RCW Map.mxd

Source: Aerial courtesy of Nearmap

USFWS Consultation Area Map
Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida

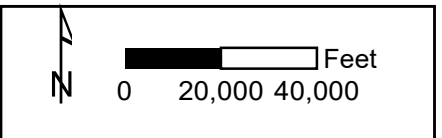


1 inch = 40,000 feet

MAY 2019

JOB NUMBER: 149244410

APPENDIX G



K:\VRB_Environmental\149244410 Neptune PDE Study\ENV\GIS\MXD\S1 Map.mxd

Legend

- Neptune Road 500-foot buffer
- Florida Scrub-Jay Consultation Area

Source: Aerial courtesy of Nearmap



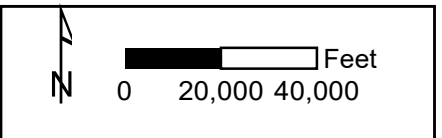
USFWS Consultation Area Map
Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida

1 inch = 40,000 feet

MAY 2019



JOB NUMBER: 149244410

APPENDIX G



K:\VRB_Environmental\149244410 Neptune PDE Study\ENV\GIS\MXD\Snail kite Map.mxd

Legend

-  Neptune Road 500-foot buffer
-  Everglade Snail Kite Consultation Area

Source: Aerial courtesy of Neomaps



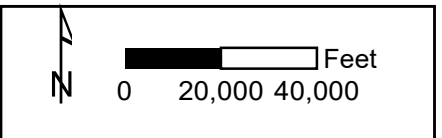
USFWS Consultation Area Map
Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida

1 inch = 40,000 feet

MAY 2019



JOB NUMBER: 149244410

APPENDIX G



K:\WRB_Environmental\149244410 Neptune PDE Study\ENV\GIS\WXDL\WR Plants Map.mxd

Legend

-  Neptune Road 500-foot buffer
-  Lake Wales Ridge Plants Consultation Area

Source: Aerial courtesy of Nearmap



USFWS Consultation Area Map
Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida

1 inch = 40,000 feet

MAY 2019

JOB NUMBER: 149244410

APPENDIX G

APPENDIX H

Florida Bonneted Bat Survey Report (July 2020)

FLORIDA BONNETED BAT (EUMOPS FLORIDANUS)
ACOUSTIC SURVEY

Neptune Road Project Development & Environment (PD&E) Study

From Partin Settlement Road to US 192

Financial Project Number: 445415-1

Osceola County, Florida

Prepared by:



Inwood Consulting Engineers
3000 Dovera Drive, Suite 200
Oviedo, FL 32765

July 2020

Table of Contents

1.0	INTRODUCTION	1
2.0	PROJECT DESCRIPTION	1
3.0	STATUS, LIFE HISTORY AND HABITAT	3
3.1	Federal Status	3
3.2	Life History.....	3
3.3	Habitat.....	3
4.0	METHODOLOGY.....	4
4.1	Preliminary Analysis.....	4
4.2	Acoustic Survey.....	4
4.3	Acoustic Data Analysis	7
4.4	Roost Survey	7
5.0	RESULTS.....	8
5.1	Acoustic Survey.....	8
5.2	Roost Survey	8
6.0	CONCLUSION	10
7.0	REFERENCES	11

LIST OF TABLES

Table 1.	Detector Deployment Summary.....	5
Table 2.	Potential Roost Survey Data.....	10

List of Figures

Figure 1:	Project Location Map.....	2
Figure 2:	Acoustic Survey Station Location Map.....	6
Figure 3:	Potential Roost Location Map	9

Appendices

- Appendix A: Agency Coordination – Approved Florida Bonneted Bat Survey Methodology
- Appendix B: Photographs
- Appendix C: Detector Deployment Data Forms
- Appendix D: Survey Data Forms
- Appendix E: Weather Documentation
- Appendix F: Florida Bonneted Bat Programmatic Key 2019

1.0 Introduction

Osceola County is conducting a Project Development and Environment (PD&E) Study to evaluate the proposed widening of Neptune Road from Partin Settlement Road to US 192 in Osceola County, Florida. The project corridor is approximately four miles in length and is located in Section 25, Township 25S, Range 29E; Sections 30, 31, and 32, Township 25S, Range 30E; and Sections 4 and 5, Township 26S and Range 30E.. The Project Location Map is shown on Figure 1.

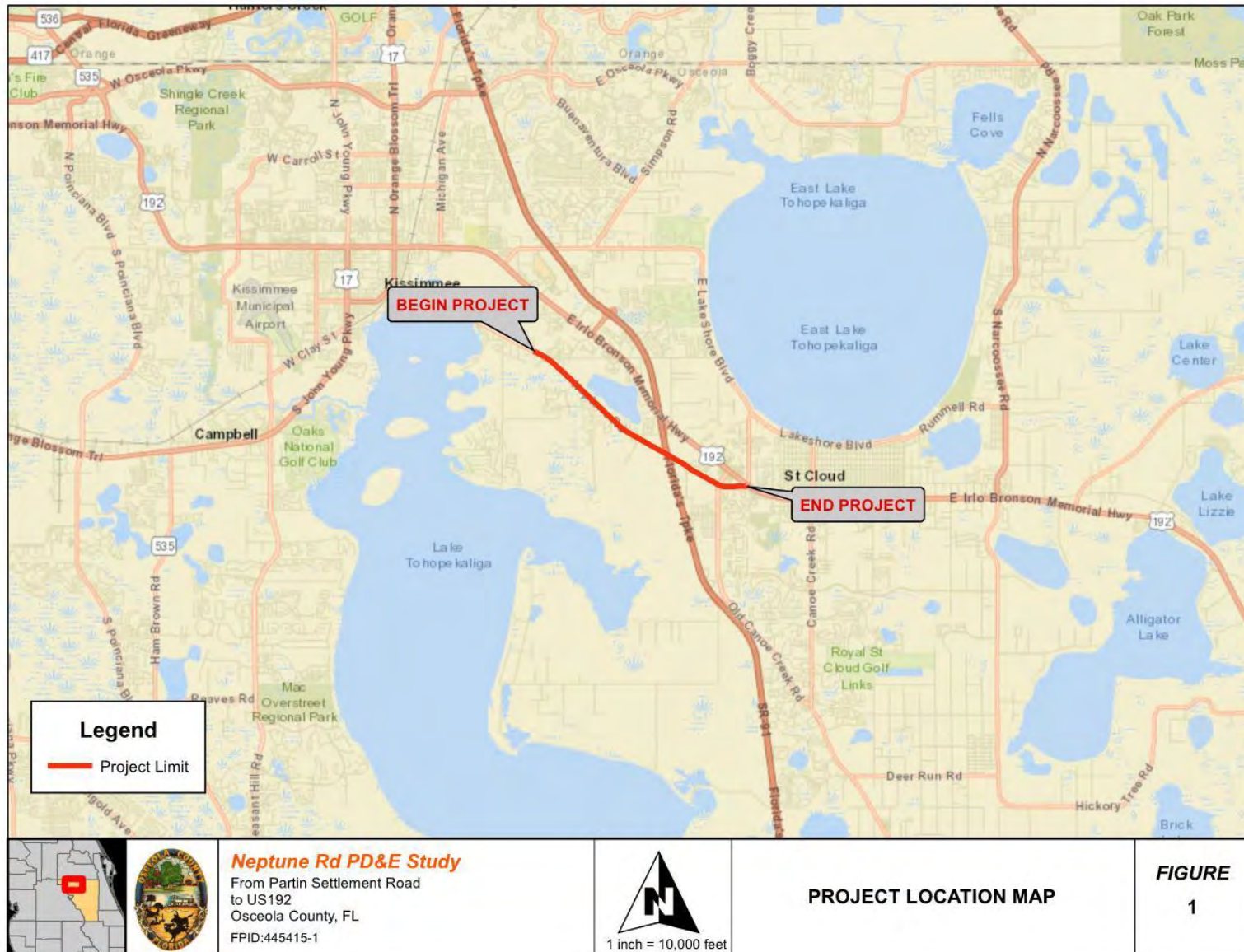
The project is located within the United States Fish and Wildlife Service's (USFWS) Consultation Area (CA) for the Florida bonneted bat (*Eumops floridanus*). Potential roosting and foraging habitat occurs within the project corridor. As a result, Inwood Consulting Engineers, Inc. (Inwood) conducted an assessment to determine the potential effects from the proposed project to the Florida bonneted bat. The assessment is prepared in accordance with Section 7 of the Endangered Species Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 et seq.). The assessment included a full acoustic survey and roosting survey of the project corridor. The surveys were conducted from May through July 2020 and in accordance with the current Florida Bonneted Bat Consultation Guidelines (October 2019) (guidelines).

This report provides the methodology, results, and conclusions of the 2020 Florida bonneted bat survey conducted for the Neptune Road PD&E Study along with the anticipated effect determination and is intended to supplement the Natural Resource Evaluation report prepared as part of the PD&E study.

2.0 Project Description

The project includes widening approximately four miles of Neptune Road from Partin Settlement Road to US 192. The proposed improvements include widening the existing two-lane roadway to four-lane lanes with the addition of sidewalks. Additionally, five proposed pond sites were evaluated. Both the mainline and proposed pond sites were included in the survey efforts.

Figure 1: Project Location Map



3.0 Status, Life History and Habitat

3.1 Federal Status

The Florida bonneted bat is a member of the Molossidae family and is the largest bat found in Florida. **Previously known as the Florida mastiff bat, Wagner's mastiff bat, and mastiff bat** (*Eumops glaucinus floridanus*), the Florida bonneted bat was found to be a separate species in 2004 (Timm and Genoways 2004). The USFWS listed the Florida bonneted bat as endangered in October 2013 (USFWS 2013). The basis for this listing is due to habitat loss, degradation, and modification, as well as other manmade and natural factors including a small population size with few colonies, restricted range, slow reproductivity and low fecundity. The Florida bonneted bat was also listed because the existing regulatory mechanisms did not adequately protect it from these threats (USFWS 2013).

3.2 Life History

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

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

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

3.3 Habitat

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

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

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

4.0 Methodology

4.1 Preliminary Analysis

Prior to conducting the acoustic and roosting surveys, a preliminary analysis of publicly available documentation and geographic information systems (GIS) data were reviewed to determine the potential occurrence of the Florida bonneted bat within the project corridor. Inwood biologists conducted a field review on May 6, 2020 to identify habitats within the project corridor that provide suitable roosting and/or foraging habitat for the Florida bonneted bat and identify optimal acoustic sites.

The guidelines currently require a minimum of five detector nights per 0.06 miles for linear projects. Based on the approximate four-mile proposed project length, a minimum of 35 detector nights were required. A total of 11 acoustic monitoring sites were identified to sufficiently cover the survey requirements based on project length, proposed pond site locations and existing habitats along the project corridor. The monitoring site locations were determined by the surrounding habitats observed during the pre-survey field review. These sites were chosen to survey habitats most suitable for foraging and roosting, while being placed in areas with limited clutter to maximize the effectiveness of the equipment. Based on the preliminary analysis, Inwood developed a Florida Bonneted Bat Survey Methodology for the Neptune Road PD&E Study that was submitted to the USFWS on May 7, 2020 (Appendix A). This methodology was approved by the USFWS on May 8, 2020.

The acoustic and roosting surveys, as well as the call data analysis were conducted by a qualified biologist with the required acoustic survey course training.

4.2 Acoustic Survey

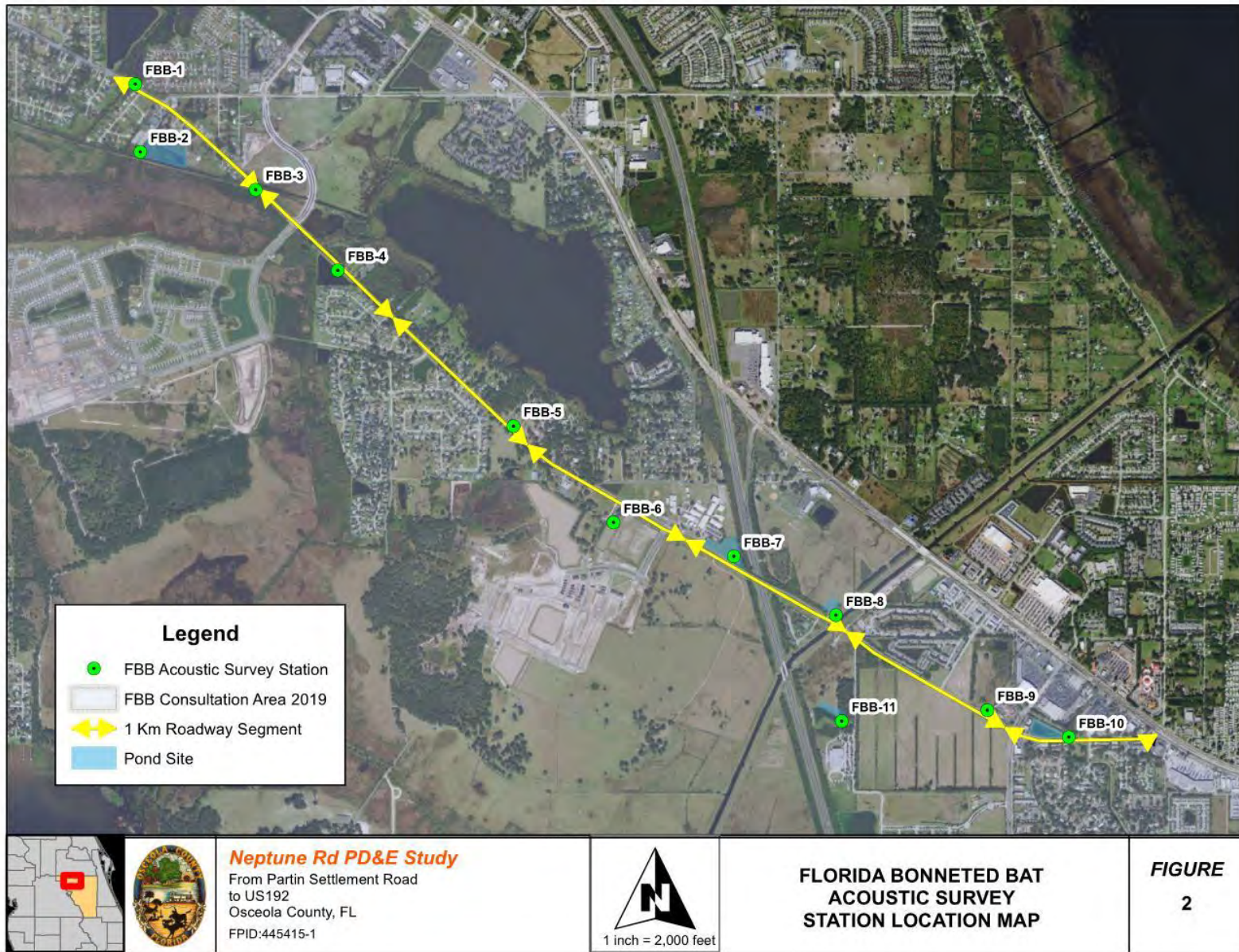
The acoustic survey was conducted from May 19, 2020 through June 22, 2020. The survey was conducted in multiple deployments to accommodate weather conditions and

equipment utilization as a total of 4 detectors were utilized for the survey. Photographs of detector deployment and representative habitat are included in Appendix B. Detector Deployment Data Forms are provided in Appendix C. Table 1 provides the details of the detector deployment. Figure 2 provides the location for each acoustic site.

Table 1. Detector Deployment Summary

Site	Detector Number		Latitude	Longitude
FBB1	11535	11536	28°16'47"N	81°21'52"W
FBB2	11537	11534	28°16'33"N	81°21'51"W
FBB3	11536	11535	28°16'28"N	81°21'32"W
FBB4	11534		28°16'15"N	81°21'17"W
FBB5	11535		28°15'45"N	81°20'36"W
FBB6	11534		28°20'21"N	81°20'21"W
FBB7	11537	11536	28°15'24"N	81°19'56"W
FBB8	11537		28°15'17"N	81°18'40"W
FBB9	11536		28°15'02"N	81°19'11"W
FBB10	11534		28°14'57"N	81°18'58"W
FBB11	11535	11537	28°14'59"N	81°14'59"W

Figure 2: Acoustic Survey Station Location Map



Each site consisted of one full spectrum detector (Pettersson DX500) with an omnidirectional microphone and directional cone. The microphones were mounted approximately 20 feet above the ground on metal poles to elevate the microphone above the shrub level. The poles were placed in a four foot tall pvc pipe holder that was hammered into the ground or attached to vegetation to provide stability. The detectors were preset to automatically record at least ½ hour before sunset and ½ hour after sunrise. Each detector and microphone were calibrated in accordance with manufacturer and USFWS guidelines. The equipment was checked daily to ensure proper functioning of the detector and microphone. Survey Data forms are included in Appendix D. Each detector was deployed for a minimum of five nights.

Inwood monitored the weather utilizing the nearest National Oceanic Atmospheric Administration (NOAA) National Weather Service Station to ensure the weather conditions complied with the USFWS criteria. The nearest NOAA weather station for the project is located at the Kissimmee Gateway Airport (Station KISM) and is approximately 6.5 miles west of the project center. Additionally, biologists document weather conditions during the daily equipment checks and were occasionally on site during survey commencement times. Supporting weather documentation is included in Appendix E.

Acoustic sampling efforts were repeated for nights when the weather conditions did not meet the following criteria:

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

4.3 Acoustic Data Analysis

Full spectrum data were recorded on 32 gigabyte (GB) SanDisk memory cards. The data were downloaded and analyzed utilizing SonoBat software, version 4.4.5. All calls were analyzed to determine the presence and subsequent identification of species, including the Florida bonneted bat. All calls are vetted to determine the potential of being a Florida bonneted bat.

4.4 Roost Survey

During the initial field analysis, detector deployments and daily equipment checks, biologists surveyed the area for potential roosts. A 100% pedestrian roost survey was conducted on July 1, 2020 by two Inwood biologists in accordance with the roost survey protocol outlined in the guidelines. Pedestrian transects were spaced in order to view potential roost structures from multiple angles. All trees/structures with cavities and/or crevices were documented via GPS location. Areas around each cavity were inspected for

evidence of bat activity including guano, staining, chirping. Additionally, potential roosting cavities and crevices were inspected using a wireless camera when possible.

5.0 Results

5.1 Acoustic Survey

Acoustic surveys were conducted from May 19, 2020 through June 22, 2020. Eleven acoustic monitoring sites collected data for a total of 55 detector nights. A total of 166,254 files were collected. The SonaBat analysis resulted in a total of 10,502 bat call sequences from eight bat species. Bat species identified during the data analysis include:

- Big brown bat (*Eptesicus fuscus*)
- Brazilian free-tailed bat (*Tadarida brasiliensis*)
- Eastern red bat (*Lasiurus borealis*)
- Evening bat (*Nycticeius humeralis*)
- Northern yellow bat (*Lasiurus intermedius*)
- Rafinesque's big-eared bat (*Corynorhinus rafinewqui*)
- Southeastern Myotis (*Myotis lucifugus*)
- Tri-colored bat (*Perimyotis subflavus*)

No Florida bonneted bat calls were identified as a result of the acoustic survey. SonaBat analysis identified 28 calls as Florida bonneted bat calls. Manual vetting resulted in none of the calls being identified as Florida bonneted bat calls. The 28 calls identified by SonaBat were found to be either noise, other taxa or bat species.

Nightly weather conditions were recorded for each deployment. The survey efforts were repeated for nights that the weather criteria were not met. Weather data is included in Appendix E.

5.2 Roost Survey

The 100% roost survey conducted on July 1, 2019 identified four potential roosts consisting of three natural and one artificial structure. The location of each structure is provided on Figure 3. Each structure was inspected for evidence of roosting such as staining, guano and chirping. Table 2 provides a summary of the observed structures.

Figure 3: Potential Roost Location Map

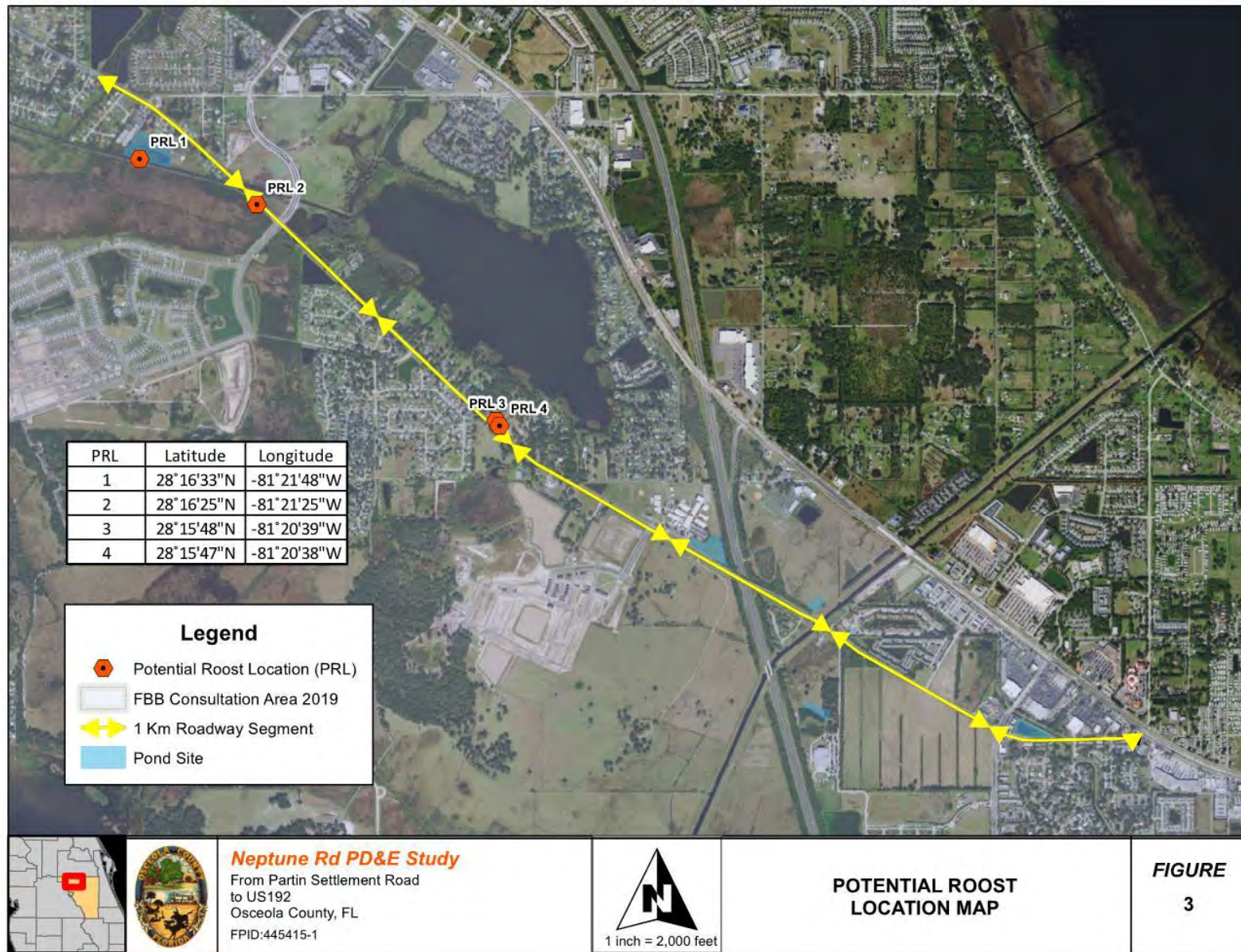


Table 2. Potential Roost Survey Data

Potential Roost Location	Structure Type	Health	Approximate Diameter	Approximate Height of Cavity	Latitude	Longitude	Staining Observed	Guano Observed	Auditory Chirping
1	Red Maple	Good	10"	15'	28°16'33"N	81°21'48"W	No	No	No
2	Utility Pole	N/A	16"	40'	28°16'25"N	81°21'25"W	No	No	No
3	Water Oak	Poor	23"	15'	28°15'48"N	81°20'39"W	Yes	No	No
4	Pine	Poor	18"	30'	28°15'47"N	81°20'38"W	No	No	No

Cavities 1, 3, and 4 were inspected using a wireless camera. The camera scoping of these cavities did not identify bat roosting. Inspection of Cavity 2 via wireless camera was not possible due to it being a utility pole, however, no evidence of roosting was identified during the visual inspection. Photo documentation of the potential roost cavities are provided in Appendix B.

Based on the roost assessment, no evidence of roosting by Florida bonneted bats or other bats was observed.

6.0 Conclusion

Based on the guidelines, it was determined that potential Florida bonneted bat roosting and foraging habitat occurs within the project corridor. The corridor is highly developed, and the majority of this habitat is adjacent to the project footprint, particularly potential roosting habitat. As a result of the roost and acoustic surveys, no evidence of roosting or foraging was observed.

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

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

7.0 References

- Belwood, J.J. 1981. **Wagner's mastiff bat**, *Eumops glaucinus floridanus* (Molossidae) in southwestern Florida. *Journal of Mammalogy* 62:411-413.
- Belwood, J.J. 1992. Florida mastiff bat *Eumops glaucinus floridanus*. Pages 216-233 in S.R. Humphrey (ed), *Rare and endangered biota of Florida*. Vol. I. Mammals. University Press of Florida. Gainesville, Florida.
- Timm, R. and J.Arroyo-Cabrales. 2008. *Eumops floridanus*. In: IUCN 2011, IUCN Red List of Threatened Species. Version 2011.2 <http://iucnredlist.org/>.
- Timm, R. M. and H. H. Genoways. 2004. The Florida bonnet bat, *Eumops floridanus* (Chiroptera: Molossidae): distribution, morphometrics, systematics, and ecology. *Journal of Mammalogy* 85:852-865.
- USFWS. 2013. Endangered and threatened wildlife and plants; endangered species status for the Florida bonneted bat; Final Rule. *Federal Register* 78:61004.
- USFWS, South Florida Ecological Services Office. 2019. Florida Bonneted Bat Consultation Guidelines.

Appendix A

Agency Coordination Approved Florida Bonneted Bat Survey Methodology



May 7, 2020

Mr. John Wrublik
Planning and Resource Conservation
U.S. Fish and Wildlife Service
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960
john_wrublik@fws.gov

Subject: Neptune Road Project Development and Environment (PD&E) Study
from Partin Settlement Road to US 192
Florida Bonneted Bat Acoustic Survey Methodology Memorandum
Financial Project Number: 445415-1
Osceola County, Florida

Dear Mr. Wrublik,

Osceola County is conducting a Project Development and Environment (PD&E) Study to evaluate improvements to Neptune Road. This project involves a segment of Neptune Road extending from Partin Settlement Road to US 192 and is located within Section 25, Township 25S, Range 29E; Sections 30, 31, and 32, Township 25S, Range 30E; and Sections 4 and 5, Township 26S and Range 30E. A project location map (**Figure 1**) is included as part of this correspondence.

The project area is located within the U.S. Fish and Wildlife Service's (USFWS) Consultation Area (CA) for the Florida bonneted bat (FBB) (*Eumops floridanus*). Inwood Consulting Engineers, Inc. (Inwood) is preparing to conduct a FBB acoustic bat survey in the project area. The current survey protocol for linear projects requires 5 detector nights per 0.6 mile (1 Km). Based on a preliminary field review of the project area, Inwood is proposing 11 survey sites to accommodate the linear survey requirement, including pond sites, for a total of 55 survey nights. The survey sites are shown on **Figure 2** and match the sites discussed during the April 9, 2020 coordination meeting. These sites have been selected and ground-truthed based on existing habitats within the project area that provide suitable roosting and/or foraging habitat for the FBB. Potential roosting habitat for the FBB includes forests or other areas with tall or mature trees or other areas with potential roost structures including utility poles and artificial roosts. Potential foraging habitat consists of relatively open areas that provide sources of prey and drinking water including open fresh water, permanent or seasonal freshwater wetlands, wetland and upland forests, wetland and upland shrub, and agricultural areas. Photographs of survey site locations are provided with this correspondence.

TRANSPORTATION
WATER RESOURCES
PLANNING / PD&E
ECOLOGY
STRUCTURES
UTILITIES

3000 Dovera Drive
Suite 200
Oviedo, FL 32765

P: 407-971-8850
F: 407-971-8955
www.inwoodinc.com



Inwood will conduct the survey in accordance with current USFWS Florida Bonneted Bat Consultation Guidelines (October 2019). The survey will be conducted by a qualified biologist who has taken the required acoustic survey course. The survey will be conducted in May and June 2020. A full spectrum detector (Pettersson DX500) with an omnidirectional microphone mounted a minimum of 10 feet above the ground will be deployed at each survey site. The detectors will be preset to automatically record at least ½ hour before sunset and ½ hour after sunrise. Each detector will be deployed for five consecutive nights. Inwood will monitor the weather utilizing the nearest NOAA National Weather Service Station to ensure the weather conditions meet the USFWS criteria. Additional survey nights may be necessary if any of the following weather conditions occur within the first five hours of the survey:

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

SonoBat software will be utilized to analyze the recordings. Additionally, these files will be visually reviewed and manually vetted by experienced personnel. All data will be provided to USFWS upon completion of the study.

Finally, per the discussion during the April 9, 2020 coordination meeting, the County is requesting that the FBB survey be valid for 2 years, following completion of the survey, assuming no significant changes to the project footprint or impact areas.

Please review the proposed FBB acoustic survey, above, and the attached figures, and provide concurrence that these are acceptable to USFWS. We appreciate your cooperation and look forward to working with you on this project.

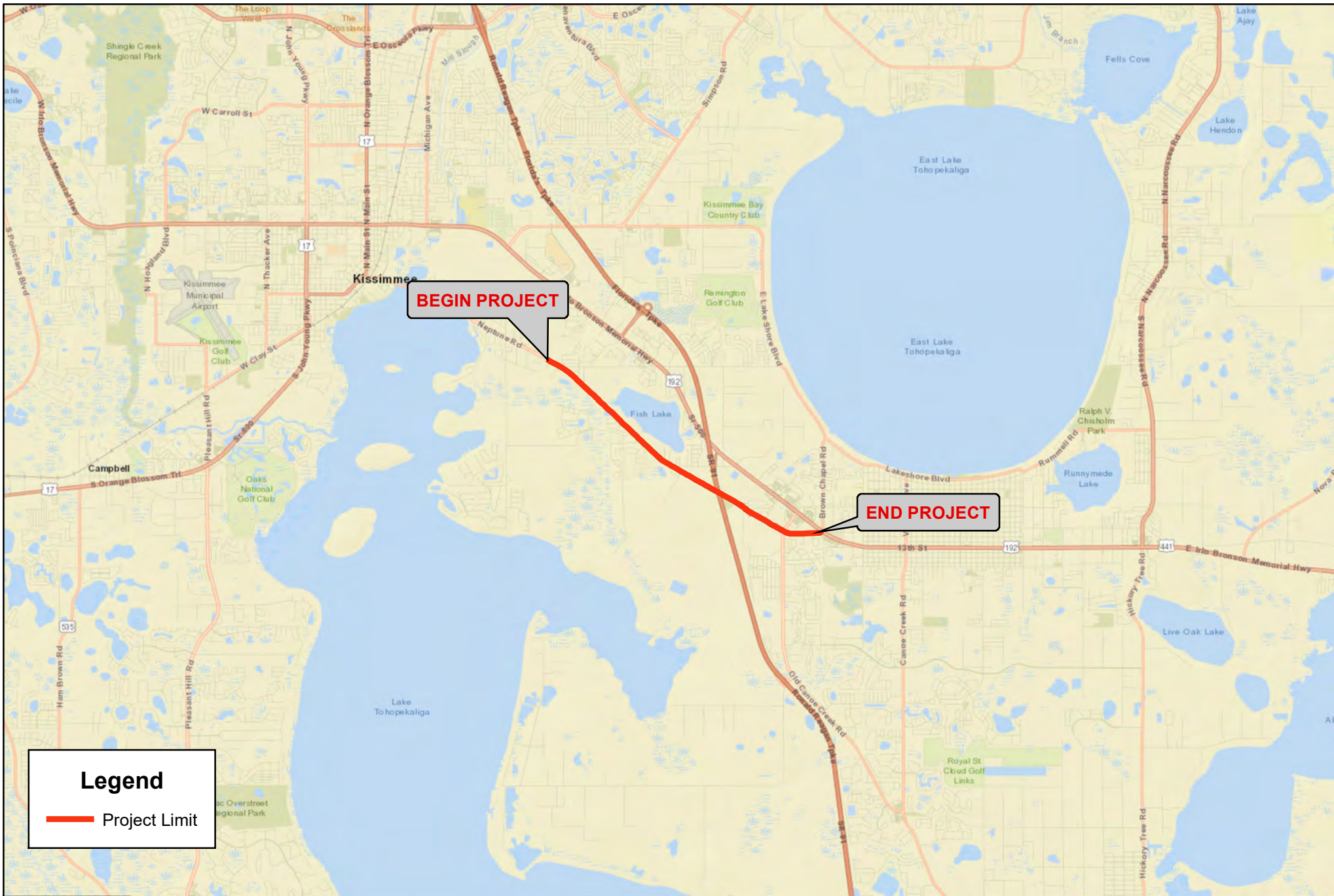
Sincerely,

A handwritten signature in blue ink, appearing to read "Jason Houck", written in a cursive style.

Jason Houck, GISP, PWS
Associate Principal – Ecological
Services Manager

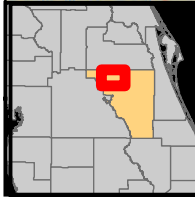
cc: Joshua Devries, Abra Horne, David Graeber, Heather Chasez, Clif Tate, Sarah Johnson, Jada Barhorst

Enclosures: Figures and Photo Document



Legend

 Project Limit



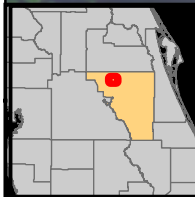
Neptune Rd
 From Partin Settlement Road
 to US192



1 inch = 8,333 feet

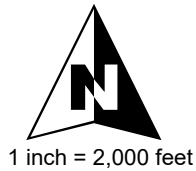
PROJECT LOCATION MAP

FIGURE
1



Neptune Rd

From Partin Settlement Road
to US192



**FLORIDA BONNETED BAT
ACOUSTIC SURVEY
STATION LOCATION MAP**

**FIGURE
2**

SITE 1



SITE 2



SITE 3



SITE 4



SITE 5



SITE 6



SITE 7



SITE 8



SITE 9



SITE 10



SITE 11



From: Wrublik, John <john_wrublik@fws.gov>
Sent: Friday, May 8, 2020 6:30 AM
To: Jason Houck
Cc: Joshua DeVries; Abra Horne; Tate, Clif; Graeber, David; Chasez, Heather; Johnson, Sarah; Jada Barhorst
Subject: Re: [EXTERNAL] FPID 445415-1: Neptune Road PD&E - FBB Survey Methodology Memo

Jason,

I have reviewed the Florida bonneted bat survey information provided for the Neptune Road project, and it is acceptable to the Service.

Sincerely,

John M. Wrublik
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960
Office: (772) 469-4282
Fax: (772) 562-4288
email: John_Wrublik@fws.gov

NOTE: This email correspondence and any attachments to and from this sender is subject to the Freedom of Information Act (FOIA) and may be disclosed to third parties.

From: Jason Houck <jhouck@inwoodinc.com>
Sent: Thursday, May 7, 2020 1:38 PM
To: Wrublik, John <john_wrublik@fws.gov>
Cc: Joshua DeVries <Joshua.Devries@OSCEOLA.ORG>; Abra Horne <Abra.Horne@OSCEOLA.ORG>; Tate, Clif <Clif.Tate@kimley-horn.com>; Graeber, David <David.Graeber@dot.state.fl.us>; Chasez, Heather <Heather.Chasez@dot.state.fl.us>; Johnson, Sarah <Sarah.Johnson@kimley-horn.com>; Jada Barhorst <jbarhorst@inwoodinc.com>
Subject: [EXTERNAL] FPID 445415-1: Neptune Road PD&E - FBB Survey Methodology Memo

John,

Good afternoon and I hope you are well. This email is a follow up to our April 9, 2020 coordination meeting for the Neptune Road PD&E study in Osceola County (FPID 445415-1).

Since the meeting, Inwood has been contracted by Osceola County via the prime consultant, Kimley Horn, to conduct the Florida bonneted bat survey for this project. We conducted a field review yesterday to finalize the stations following the linear survey protocol in the October 2019 guidance. We were able to access all of them and, as a result, we did not change anything from what was presented to you on April 9. I would appreciate it if you would review the attached proposed methodology. Please indicate whether the approach is satisfactory to the Service or if you have any questions, concerns, or need any additional information. We would like to begin the acoustic data collection no later than May 18th.

As always, please let me know if you have any questions and I look forward to working with you on this project.

Thanks,

Jason

Jason Houck, GISP, PWS

ASSOCIATE PRINCIPAL - ECOLOGICAL SERVICES MANAGER

FWC Authorized Gopher Tortoise Agent

INWOOD CONSULTING ENGINEERS

3000 Dovera Dr., Suite 200, Oviedo, FL 32765

O: 407-971-8850

D: 407-906-1853

F: 407-971-8955

C: 321-202-3907

www.inwoodinc.com



Please consider the environment before printing this e-mail

Appendix B
Photographs



Photo 1: FBB Site 1 Deployment



Photo 2: FBB Site 1 Representative Habitat



Photo 3: FBB Site 2 Deployment



Photo 4: FBB Site 2 Representative Habitat



Photo 5: FBB Site 3 Deployment



Photo 6: FBB Site 3 Representative Habitat



Photo 7: FBB Site 4 Deployment



Photo 8: FBB Site 4 Representative Habitat



Photo 9: FBB Site 5 Deployment



Photo 10: FBB Site 5 Representative Habitat



Photo 11: FBB Site 6 Deployment



Photo 12: FBB Site 6 Representative Habitat



Photo 13: FBB Site 7 Deployment



Photo 14: FBB Site 7 Representative Habitat



Photo 15: FBB Site 8 Deployment



Photo 16: FBB Site 8 Representative Habitat



Photo 17: FBB Site 9 Deployment



Photo 18: FBB Site 9 Representative Habitat



Photo 19: FBB Site 10 Deployment



Photo 20: FBB Site 10 Representative Habitat



Photo 21: FBB Site 11 Deployment



Photo 22: FBB Site 11 Representative Habitat



Photo 23: Potential Roost 1 Cavity



Photo 24: Potential Roost 1 Tree, (cavity location circled in red)



Photo 25: Potential Roost 2 Cavity



Photo 26: Potential Roost Utility Pole



Photo 27: Potential Roost 3 Cavity



Photo 28: Potential Roost 3 Tree



Photo 29: Potential Roost 4 Cavity



Photo 31: Potential Roost 4 Tree (cavity location circled in red)

Appendix C
Detector Deployment Data Forms

Detector Deployment Data Form

Project: <u>Neptune Rd</u>	State: <u>FL</u>	County: <u>Osceola</u>	Site: <u>FBB1</u>	Date: <u>5-19-2020</u>
Biologist: <u>J. Barkers + J. Hauck</u>		GPS ID: <u>Jadis Lane</u>	Camera ID: <u>Jadis Phone</u>	

DETECTOR DATA

Detector ID	Detector Make	Detector Model	Microphone Make	Microphone Type	Microphone Height	Microphone Orientation		
<u>11535</u>	<u>Peterson</u>	<u>DX500</u>	<u>DX500 external</u>	<u>Omnidirectional</u>	<u>20 ft.</u>	<u>Horizontal</u>		
Latitude	Longitude	Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
<u>28° 16' 47" W</u>	<u>-81° 21' 52" W</u>	<input checked="" type="checkbox"/>	<u>EDGE ROW</u>	<u>45</u>	<u>Med</u>	<u>NO</u>	<u>19:44</u>	<u>7:06</u>
DETECTOR CHECKLIST: Time <u>15:50</u>		Mic Test <input checked="" type="checkbox"/>	Mic Placement <input checked="" type="checkbox"/>	Battery Check <input checked="" type="checkbox"/>	CF Card <input checked="" type="checkbox"/>	Weatherproof <input checked="" type="checkbox"/>		
Detector/Gear Working and Armed <input checked="" type="checkbox"/>			Photo #/ID: <u>#2</u>	Waypoint #/ID: <u>2-FBB1</u>				

Detector Placement/Site Description:

Placed near edge of Brazilian pepper overlooking Refentim Pond, just N of Neptune Rd.

Remarks:



Site sketch/photo (label to match BD# above)

Detector Deployment Data Form

Project: <i>Waffle Rd</i>	State: <i>FL</i>	County: <i>Osceola</i>	Site: <i>FB 2</i>	Date: <i>5-19-2020</i>
Biologist: <i>J. Barkerst, J. Hauck</i>		GPS ID: <i>Jada iPhone</i>		Camera ID: <i>Jada iPhone</i>

DETECTOR DATA

Detector ID	Detector Make	Detector Model	Microphone Make	Microphone Type	Microphone Height	Microphone Orientation		
<i>11537</i>	<i>Peterson</i>	<i>D500X</i>	<i>Peterson D500X external</i>	<i>omnidirectional</i>	<i>20 ft.</i>	<i>horizontal</i>		
Latitude	Longitude	Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
<i>28° 10' 33" N</i>	<i>-81° 21' 51" W</i>	<input checked="" type="checkbox"/>	<i>Edge open canal</i>	<i>45</i>	<i>Med</i>	<i>NO</i>	<i>19:44</i>	<i>7:06</i>
DETECTOR CHECKLIST: Time <i>4:33pm</i>		Mic Test <input checked="" type="checkbox"/>	Mic Placement <input checked="" type="checkbox"/>	Battery Check <input checked="" type="checkbox"/>	CF Card <input checked="" type="checkbox"/>	Weatherproof <input checked="" type="checkbox"/>		
Detector/Gear Working and Armed <input checked="" type="checkbox"/>			Photo #/ID: <i>Photo 3</i>			Waypoint #/ID: <i>3: FB 2</i>		

Detector Placement/Site Description:


Placed on the N side of Partin Canal, facing East down canal

Remarks:



Site sketch/photo (label to match BD# above)

Detector Deployment Data Form

Project: <i>Neptune Rd</i>		State: <i>FL</i>	County: <i>Osceola County</i>	Site: <i>FBB 3</i>	Date: <i>5-19-2020</i>						
Biologist: <i>S. Burkhardt, J. Hoach</i>			GPS ID: <i>JADA's iPhone</i>		Camera ID: <i>Jada's iPhone</i>						
DETECTOR DATA											
Detector ID	Detector Make	Detector Model	Microphone Make	Microphone Type	Microphone Height	Microphone Orientation					
<i>11536</i>	<i>Peterson</i>	<i>D501X</i>	<i>Peterson 5501X external</i>	<i>omnidirectional</i>	<i>20 ft.</i>	<i>Horizontal</i>					
Latitude		Longitude		Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time	
<i>28°16' 28" N</i>		<i>81° 21' 32" W</i>		<input checked="" type="checkbox"/>	<i>Edge low</i>	<i>45</i>	<i>Med</i>	<i>NO</i>	<i>19:45</i>	<i>6:35</i>	
DETECTOR CHECKLIST: Time <i>17:00</i> <i>17:00</i>				Mic Test <input checked="" type="checkbox"/>	Mic Placement <input checked="" type="checkbox"/>	Battery Check <input checked="" type="checkbox"/>	CF Card <input checked="" type="checkbox"/>	Weatherproof <input checked="" type="checkbox"/>			
Detector/Gear Working and Armed <input checked="" type="checkbox"/>				Photo #/ID: <i>4</i>			Waypoint #/ID: <i>4 : FBB 3</i>				
Detector Placement/Site Description:											
<i>Placed on S. side of Parlin Canal</i>											
<i>facing E - overlooking cleared</i>											
<i>berm + canal</i>											
Remarks:											

Site sketch/photo (label to match BD# above)

Detector Deployment Data Form

Project: <u>Napture Road</u>	State: <u>FL</u>	County: <u>Osceola</u>	Site: <u>FBB 4</u>	Date: <u>5-19-2020</u>
Biologist: <u>J. Barkusky J. Houch</u>		GPS ID: <u>Jads iPhon</u>	Camera ID: <u>Jads iPhon</u>	

DETECTOR DATA

Detector ID	Detector Make	Detector Model	Microphone Make	Microphone Type	Microphone Height	Microphone Orientation
<u>11534</u>	<u>Pettersen</u>	<u>DSO-X</u>	<u>Pettersen</u> <u>DSO-X External</u>	<u>Omnidirectional</u>	<u>20ft</u>	<u>Horizontal</u>

Latitude	Longitude	Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
<u>28°16'15" N</u>	<u>-81°21'17" W</u>	<u>Yes</u>	<u>Low edge</u>	<u>45</u>	<u>MED</u>	<u>NO</u>	<u>19:42</u>	<u>7:03</u>

DETECTOR CHECKLIST: Time 17:38 Mic Test Mic Placement Battery Check CF Card Weatherproof

Detector/Gear Working and Armed Photo #/ID: # 5 Waypoint #/ID: S:FBB4

Detector Placement/Site Description:

Detector placed near edge of retention pond on west side of pond near edge habitat and cleared row around pond. Facing East S. of Napture Rd.

Remarks:



Site sketch/photo (label to match BD# above)

Detector Deployment Data Form

Project: Neptune Road PD&E	State: FL	County: Osceola	Site: FBB #5	Date: 5/26/2020
Biologist: J. Barhorst, A. Burke		GPS ID: Jada's iPhone		Camera ID: iPhone

DETECTOR DATA

Detector ID	Detector Make	Detector Model	Microphone Make	Microphone Type	Microphone Height	Microphone Orientation		
11535	Pettersson	D500X	Pettersson	omnidirectional	20 ft	Horizontal west		
Latitude	Longitude	Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
28.15.45N	81 20 36 W	✓	Low/Elev	45	Very low	NO	19:47	7:02
DETECTOR CHECKLIST: Time 5:32		Mic Test ✓	Mic Placement ✓	Battery Check ✓	CF Card ✓	Weatherproof ✓		
Detector/Gear Working and Armed ✓			Photo #/ID: 009			Waypoint #/ID: 009: FBB35		

Detector Placement/Site Description:

on 20 foot pole; facing west
 across open land adjacent to
 Neptune Rd.
 Scattered oak/pines

Remarks: changed sensitivity to very low
 due to road noise



Site sketch/photo (label to match BD# above)

Biologists were in the project area and noted rain at 7:15pm that ended at 7:40pm (1940)

Detector Deployment Data Form

Project: Neptune Road PD&E State: FL County: Osceola Site: FBB6 Date: 5.26.2020

Biologist: J. Burkert, A. Burke GPS ID: Jake's iPhone Camera ID: Jake's iPhone

DETECTOR DATA

Detector ID	Detector Make	Detector Model	Microphone Make	Microphone Type	Microphone Height	Microphone Orientation
11534	Pettersson	D500X	Pettersson	Omnidirectional	20 ft pole	Hor. South

Latitude	Longitude	Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
28.15' 31" N	81' 20' 21" W	✓	Edge	45	Very low	No	1946 h	7:01

DETECTOR CHECKLIST: Time 6:02 Mic Test ✓ Mic Placement ✓ Battery Check ✓ CF Card ✓ Weatherproof ✓

Detector/Gear Working and Armed ✓ Photo #/ID: 007 Waypoint #/ID: 007..FBB6

Detector Placement/Site Description:

pole 20 feet facing South
over retention pond
open field behind pond

Remarks: Biologists were in project area when
Rain shower started @ approximately
7:15pm ended @ 7:40 before
recording



Site sketch/photo (label to match BD# above)

Detector Deployment Data Form

Project: Neptune Road PD&E	State: FL	County: Osceola	Site: FBB 7	Date: 5-26-2020
Biologist: J. Burkhardt, A. Burke		GPS ID: Jalis iPhone	Camera ID: Jalis iPhone	

DETECTOR DATA

Detector ID	Detector Make	Detector Model	Microphone Make	Microphone Type	Microphone Height	Microphone Orientation			
11537	Pettersson		Pettersson	omnidirectional	20 feet	Horizontal Northwest			
Latitude	Longitude	Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time	
28° 15' 24" N	81° 19' 56" W	✓	Low Edge	45	very low	NO	19:40h	7:05h	
DETECTOR CHECKLIST: Time <u>6:33</u>		Mic Test <u>✓</u>	Mic Placement <u>✓</u>	Battery Check <u>✓</u>	CF Card <u>✓</u>	Weatherproof <u>✓</u>			
Detector/Gear Working and Armed <u>✓</u>			Photo #/ID: 8	Waypoint #/ID: 8...FBB7					

Detector Placement/Site Description:


pole 20ft high, mic facing North West over dry pond and adjacent to Neptune Rd. (North of Neptune) Brazilian pepper lining road. Just West of Turnpike

Remarks: Biologists were in the project area and noted rain @ approximately 7:15 that stopped @ 7:40 (19:40)



Site sketch/photo (label to match BD# above)

Detector Deployment Data Form

Project: Neptune Road PD&E		State: FL	County: Osceola		Site: FBB8		Date: 6-11-2020			
Biologist: J. Barborst T. McPherson				GPS ID: iPhone		Camera ID: 5.6 iPhone				
DETECTOR DATA										
Detector ID	Detector Make	Detector Model	Microphone Make		Microphone Type	Microphone Height	Microphone Orientation			
11537	Peterson	0500	Peterson External mic		omnidirectional	20 ft	Horizontal			
Latitude		Longitude		Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
28° 15' 17" N		-81° 19' 40" W		Yes			MED	Yes	1955h	0700h
DETECTOR CHECKLIST: Time <u>5:20 pm</u> Mic Test <input checked="" type="checkbox"/> Mic Placement <input checked="" type="checkbox"/> Battery Check <input checked="" type="checkbox"/> CF Card <input checked="" type="checkbox"/> Weatherproof <input checked="" type="checkbox"/>										
Detector/Gear Working and Armed <input checked="" type="checkbox"/>				Photo #/ID: 10			Waypoint #/ID: FBB8			
<p>Detector Placement/Site Description:</p> <p>North of Neptune Rd, just west of the Saint Cloud Canal, placed on fence line facing NW toward open pasture/wet prairie</p> <p>Remarks:</p>										
										
Site sketch/photo (label to match BD# above)										

Detector Deployment Data Form

Project: Neptune Road PD&E	State: FL	County: Osceola	Site: FBB 9	Date: 6/2/20
Biologist: J. Barborst, B. Shepherd		GPS ID: JB iphon	Camera ID: JB iphon	

DETECTOR DATA

Detector ID	Detector Make	Detector Model	Microphone Make	Microphone Type	Microphone Height	Microphone Orientation		
11536	Peterson	V500x	Peterson External mic	Omidirectional	20 ft.	Horizontal		
Latitude	Longitude	Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
28°15' 02"N	81° 19' 11"W	Yes	Low	45	Med	NO	19:53	6:58
DETECTOR CHECKLIST: Time 12:17pm Mic Test <input checked="" type="checkbox"/> Mic Placement <input checked="" type="checkbox"/> Battery Check <input checked="" type="checkbox"/> CF Card <input checked="" type="checkbox"/> Weatherproof <input checked="" type="checkbox"/>								
Detector/Gear Working and Armed <input checked="" type="checkbox"/>			Photo #/ID: Photo 12			Waypoint #/ID: Photo 12:BB12		

Detector Placement/Site Description:

N. of Neptune Rd, just east of Sargeant Graham Pt. Road near edge of treeline facing open pasture. Mic facing NNE.

Remarks:



Site sketch/photo (label to match BD# above)

Detector Deployment Data Form

Project: Neptune Road PD&E State: FL County: Osceola Site: FBB 10 Date: 6-14-20

Biologist: J. Burloist, G. Huddle GPS ID: J.B. iphase Camera ID: J.B. iphase

DETECTOR DATA

Detector ID	Detector Make	Detector Model	Microphone Make	Microphone Type	Microphone Height	Microphone Orientation
11534	Peterson	DS60X	Peterson External Mic	OMNIDIRECTIONAL	20 ft.	Hor. Zoned

Latitude	Longitude	Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
28°15'58"N	81°18'58"W	Yes	Edge	45	Med	NO	1957	7:01

DETECTOR CHECKLIST: Time 7:41 Mic Test Mic Placement Battery Check CF Card Weatherproof

Detector/Gear Working and Armed Photo #/ID: 13 Waypoint #/ID: Photo 13: FBB 11

Detector Placement/Site Description:
 Placed on the north bank of the canal
 North of the retention pond behind the
 Plaza @ the corner of Neptune +
 Old Cove Creek Rd. Placed on upper
 bank/canal berm, facing SE

Remarks:



Site sketch/photo (label to match BD# above)

Detector Deployment Data Form

Project: Neptune Road PD&E State: FL County: Osceola Site: FBS11 Date: 6.12.20

Biologist: J. Barkhurst B. Shephard GPS ID: 515 iPhone Camera ID: J.B. iPhone

DETECTOR DATA

Detector ID	Detector Make	Detector Model	Microphone Make	Microphone Type	Microphone Height	Microphone Orientation
11535	Pettersson	D500	Pettersson 250' External	omnidirectional	20 ft.	Horizontal

Latitude	Longitude	Horn	Clutter	Gain	Trigger Sensitivity	HP filter	Start Time	Stop Time
28°14' 59" N	81° 14' 59" W	Yes	Low	45	MED	NO	19:55	0700h

DETECTOR CHECKLIST: Time 11:40 Mic Test Mic Placement Battery Check CF Card Weatherproof

Detector/Gear Working and Armed Photo #/ID: Photo 11 Waypoint #/ID: Photo 11 FBS11

Detector Placement/Site Description:

Place on 20 ft pole N of Neptune Elementary. Just N of the retention pond, facing W over mowed bank and cattle pasture

Remarks:



Site sketch/photo (label to match BD# above)

Appendix D
Survey Data Forms

Bat Survey Data

Project: Neptune Road PD&E				State: FL			County: Osceola					
Date	Time	Site #	Detector #	Start Time	End Time	Mic Test	Mic Placement	CF Card	Battery	Detector/Gear working/labeled	Weather	Biologist
5/19/20	3:50 pm	FB81	11535	19:44	7:06	✓	✓	✓	✓	✓	✓	J. Sankowsky S. Haddock
5/19/20	4:40 pm	FB82	11537	19:44	7:06	✓	✓	✓	✓	✓	✓	"
5/19/20	5:07 pm	FB83	11536	19:45	7:05	✓	✓	✓	✓	✓	✓	"
5/19/20	5:49 pm	FB84	11534	19:42	7:03	✓	✓	✓	✓	✓	✓	"
5/20/20	5:15 pm	FB81	11535	19:45	7:05	✓	✓	✓	✓	✓	✓	J. Sankowsky T. Mueller
	5:40 pm	FB82	11537	19:45	7:05	✓	✓	✓	✓	✓	✓	T. Sankowsky T. Mueller
	6:27 pm	FB83	11536	19:46	7:05	✓	✓	✓	✓	✓	✓	J. Sankowsky T. Mueller
	6:51 pm	FB84	11534	19:42	7:03	✓	✓	✓	✓	✓	✓	J. Sankowsky T. Mueller
5/21/20	5:05 pm	FB81	11535	19:45	7:05	✓	✓	✓	✓	✓	✓	J. Sankowsky T. Mueller
	5:38 pm	FB82	11537	19:45	7:05	✓	✓	✓	✓	✓	✓	J. Sankowsky T. Mueller
	6:02 pm	FB83	11536	19:46	7:04	✓	✓	✓	✓	✓	✓	J. Sankowsky T. Mueller
	6:34 pm	FB84	11534	19:42	7:03	✓	✓	✓	✓	✓	✓	J. Sankowsky T. Mueller
5/22/20	2:55 pm	FB81	11535	19:46	7:04	✓	✓	✓	✓	✓	✓	J. Sankowsky G. Haddock
5/22/20	3:16 pm	FB82	11537	19:46	7:04	✓	✓	✓	✓	✓	✓	J. Sankowsky G. Haddock
5/22/20	3:49 pm	FB83	11536	19:47	7:04	✓	✓	✓	✓	✓	✓	J. Sankowsky G. Haddock
5/22/20	4:15 pm	FB84	11534	19:43	7:02	✓	✓	✓	✓	✓	✓	J. Sankowsky G. Haddock
5/23/20	1:06 pm	FB82	11537	19:46	7:04	✓	✓	✓	✓	✓	✓	J. Sankowsky A. Burkner
5/23/20	1:40	FB81	11535	19:46	7:04	✓	✓	✓	✓	✓	✓	J. Sankowsky A. Burkner
5/23/20	1:58	FB83	11536	19:47	7:03	✓	✓	✓	✓	✓	✓	J. Sankowsky A. Burkner

↓ Pulled Egg up next Due to weather/Storm

↕ Add check dessicant
↕ Add faceplate?

Bat Survey Data

Project: Neptune Road PD&E						State: FL			County: Osceola			Biologist
Date	Time	Site #	Detector #	Start Time	End Time	Mic Test	Mic Placement	CF Card	Battery	Detector/Gear working/armed	Weather	Biologist
5/23/2020	2:13 pm	FB84	11534	19:44	7:02	✓	✓	✓	✓	✓	✓	J. Barhorst A. Burke
5/24/2020	5:55 pm	FB81	11535	19:47	7:04	✓	✓	✓	✓	✓	✓	J. Barhorst G. Haddie
5/24/2020	6:08 pm	FB82	11537	19:47	7:04	✓	✓	✓	✓	✓	✓	J. Barhorst G. Haddie
5/24/2020	6:31 pm	FB83	11536	19:48	7:03	✓	✓	✓	✓	✓	✓	J. Barhorst G. Haddie
5/24/2020	7:11 pm	FB84	11539	19:45	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst G. Haddie
5/24/2020	5:32	FB85	11535	19:47	7:02	✓	✓	✓	✓	✓	✓	J. Barhorst A. Burke
5/24/2020	1:02	FB84	11534	19:46	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst A. Burke
5/24/2020	6:33	FB87	11537	19:48	7:03	✓	✓	✓	✓	✓	✓	J. Barhorst A. Burke
5/27/2020	6:03 pm	FB85	11535	19:47	7:02	✓	✓	✓	✓	✓	✓	J. Barhorst T. McWeller
5/27/2020	6:26 pm	FB86	11534	19:46	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst T. McWeller
5/27/2020	6:46 pm	FB87	11537	19:44	7:03	✓	✓	✓	✓	✓	✓	J. Barhorst T. McWeller
5/27/2020	8:02 pm	FB86	11534	19:47	7:00	✓	✓	✓	✓	✓	✓	J. Barhorst S. Hocke
5/28/2020	1:52	FB87	11537	19:49	7:03	✓	✓	✓	✓	✓	✓	J. Barhorst S. Hocke
5/28/2020	2:28	FB85	11535	19:48	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst S. Hocke
5/29/2020	9:54 am	FB85	11535	19:49	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst T. McWeller
5/29/2020	10:31	FB85	11534	19:48	7:00	✓	✓	✓	✓	✓	✓	J. Barhorst T. McWeller
5/29/2020	11:00	FB87	11537	19:50	7:02	✓	✓	✓	✓	✓	✓	J. Barhorst T. McWeller
5/30/2020	10:07 am	FB85	11535	19:49	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst G. Haddie
5/30/2020	10:23 am	FB86	11534	19:48	7:00	✓	✓	✓	✓	✓	✓	J. Barhorst G. Haddie

Bat Survey Data

Project: Neptune Road PD&E				State: FL			County: Osceola					
Date	Time	Site #	Detector #	Start Time	End Time	Mic Test	Mic Placement	CF Card	Battery	Detector/Gear working/armed	Weather	Biologist
5-30-2020	10:39	FBB7	11537	19:50	7:02	✓	✓	✓	✓	✓	✓	J. Barhorst G. Huddle
5-31-2020	11:12	FBB5	11535	19:50	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst A. Burke
5-31-2020	11:29	FBB6	11534	19:49	7:00	✓	✓	✓	✓	✓	✓	J. Barhorst A. Burke
5-31-2020	11:52	FBB7	11537	19:51	7:02	✓	✓	✓	✓	✓	✓	J. Barhorst A. Burke
6/1/20	12:16	FBB5	11535	19:50	7:00	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/1/20	12:29	FBB6	11534	19:49	6:59	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/1/20	12:41	FBB7	11537	19:51	7:02	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/2/20	3:41	FBB2	11536	19:52	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/2/20	4:12	FBB5	11535	19:51	7:00	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/2/20	4:23	FBB6	11534	19:50	6:59	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/2/20	4:43	FBB7	11537	19:52	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/8/20	5:05	FBB5	11535	19:55	7:00	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/8/20	5:25	FBB6	11534	19:55	7:00	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/8/20	5:36	FBB7	11536	19:55	7:00	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/9/20	6:08	FBB6	11534	19:56	7:00	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/9/20	12:14	FBB7	11536	19:56	7:10	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/10/20	11:41	FBB1	11536	19:55	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/10/20	12:10	FBB2	11534	19:55	7:01	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller
6/10/20	12:37	FBB3	11535	19:54	6:59	✓	✓	✓	✓	✓	✓	J. Barhorst T. Mueller

Bat Survey Data

Project: Neptune Road PD&E							State: FL			County: Osceola			
Date	Time	Site #	Detector #	Start Time	End Time	Mic Test	Mic Placement	CF Card	Battery	Detector/Gear working/alarmed	Weather	Biologist	
6/11/20	6:03	FB81	11536	19:56	7:01	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/11/20	6:25	FB82	11539	19:56	7:01	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/11/20	7:03	FB83	11535	19:59	6:57	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/12/20	10:35	FB82	11534	19:56	7:01	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/12/20	11:15	FB86	11534	19:55	7:00	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/13/20	10:10 ¹	FB82	11534	18:56	7:01	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/13/20	10:16 ^{pm}	FB88	11537	19:55	7:00	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/15/20	10:29 ^{pm}	FB89	11536	19:53	6:58	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/13/20	10:44 ^{pm}	FB811	11535	19:55	7:00	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/14/20	5:39 ^{pm}	FB88	11537	19:56	7:00	✓	✓	✓	✓	✓	✓	T. Barbour G. Haddie	
6/14/20	6:06 ^{pm}	FB811	11535	19:55	7:00	✓	✓	✓	✓	✓	✓	T. Barbour G. Haddie	
6/14/20	7:41 ^{pm}	FB810	11534	19:57	7:01	✓	✓	✓	✓	✓	✓	T. Barbour G. Haddie	
6/14/20	7:53 ^{pm}	FB89	11536	19:54	6:58	✓	✓	✓	✓	✓	✓	T. Barbour G. Haddie	
6/15/20	3:39 ^{pm}	FB88	11537	19:56	7:00	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/15/20	3:53 ^{pm}	FB89	11536	19:54	6:58	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/15/20	4:11 ^{pm}	FB811	11535	19:56	7:00	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/15/20	5:19 ^{pm}	FB810	11534	19:57	7:01	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/16/20	12:41	FB88	11537	19:56	7:00	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	
6/16/20	12:56	FB89	11536	19:59	6:58	✓	✓	✓	✓	✓	✓	T. Barbour T. McPherson	

Bat Survey Data

Project: Neptune Road PD&E							State: FL			County: Osceola			
Date	Time	Site #	Detector #	Start Time	End Time	Mic Test	Mic Placement	CF Card	Battery	Detector/Gear working/armed	Weather	Biologist	
6.16.20	1:55	FBB10	11534	1957	7:01	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.16.20	2:15	FBB11	11535	1956	7:00	⊗	took down station due to mic	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.17.20	10:23 AM	FBB5	11537	1957	7:00	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6/17/20	10:57	FBB9	11576	1955	6:59	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6/17/20	10:43	FBB10	11534	1958	7:02	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.18.20	11:00	FBB9	11530	1955	6:59	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.18.20	11:11 AM	FBB11	11537	1958	7:02	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.18.20	11:41	FBB10	11534	1958	7:02	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.19.20	11:19	FBB7	11536	1955	6:55	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.19.20	11:39	FBB11	11537	1958	7:02	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.19.20	12:16	FBB10	11534	1959	7:02	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.20.20	10:03	FBB11	11537	1958	7:02	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.20.20	10:18	FBB10	11534	1958	7:02	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.21.20	11:55	FBB11	11537	1958	7:02	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	
6.21.20	12:14	FBB10	11534	1959	7:02	✓	✓	✓	✓	✓	✓	T. B. Horst T. Mueller	

Appendix E
Weather Documentation

weather.gov



Weather observations for the past three days

Kissimmee Gateway Airport



Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)				Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt	6 hour					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
								Max.	Min.								
22	07:56	Calm	10.00	Fair	CLR	78	72	78	74	82%	NA	80	30.12	1019.9			
22	06:56	Calm	10.00	Fair	CLR	74	72			94%	NA	NA	30.11	1019.7			
22	05:56	Calm	10.00	Fair	CLR	74	72			94%	NA	NA	30.09	1019.0			
22	04:56	Calm	10.00	Fair	CLR	74	72			94%	NA	NA	30.08	1018.5			
22	03:56	Calm	10.00	Fair	CLR	76	72			88%	NA	76	30.09	1018.7			
22	02:56	Calm	10.00	Fair	CLR	76	72			88%	NA	76	30.09	1018.7			
22	01:56	W 5	10.00	Fair	CLR	76	72	89	76	88%	NA	76	30.10	1019.1			
22	00:56	Calm	10.00	Fair	CLR	78	72			82%	NA	80	30.08	1018.6			
21	23:56	SW 5	10.00	Fair	CLR	78	71			79%	NA	80	30.07	1018.1			
21	22:56	SW 7	10.00	A Few Clouds	FEW050	80	70			71%	NA	83	30.06	1017.9			
21	21:56	S 6	10.00	Mostly Cloudy	BKN048	82	71			69%	NA	86	30.06	1017.8			
21	20:56	S 5	10.00	Mostly Cloudy	BKN120	87	75			67%	NA	96	30.04	1017.0			
21	19:56	S 3	10.00	Mostly Cloudy	BKN055	89	74	93	89	61%	NA	98	30.02	1016.5			
21	18:56	SW 3	10.00	Partly Cloudy	SCT060	91	71			52%	NA	98	30.02	1016.5			
21	17:56	W 3	10.00	Partly Cloudy	SCT055	93	71			49%	NA	100	30.01	1016.3			
21	16:56	SW 6	10.00	Partly Cloudy	SCT049	93	71			49%	NA	100	30.04	1017.0			
21	15:56	SW 6	10.00	Partly Cloudy	SCT049	92	71			51%	NA	99	30.05	1017.5			
21	14:56	W 7	10.00	Partly Cloudy	SCT050	91	71			52%	NA	98	30.06	1018.0			
21	13:56	Vrbl 6	10.00	Partly Cloudy	SCT045	91	73	91	76	56%	NA	100	30.08	1018.4			
21	12:56	SW 6	10.00	Fair	CLR	89	72			57%	NA	96	30.09	1018.9			
21	11:56	Vrbl 6	10.00	Fair	CLR	87	73			63%	NA	94	30.09	1019.0			
21	10:56	Vrbl 3	10.00	Fair	CLR	86	71			61%	NA	91	30.10	1019.2			
21	09:56	NW 5	10.00	Fair	CLR	84	71			65%	NA	89	30.09	1019.0			
21	08:56	NW 7	10.00	Fair	CLR	82	73			74%	NA	87	30.09	1019.0			
21	07:56	W 3	10.00	A Few Clouds	FEW002	76	74	76	73	94%	NA	76	30.07	1018.3			
21	06:56	Calm	10.00	Fair	CLR	73	73			100%	NA	NA	30.05	1017.6			
21	05:56	Calm	10.00	Fair	CLR	73	73			100%	NA	NA	30.04	1017.2			
21	04:56	Calm	10.00	Fair	CLR	74	73			97%	NA	NA	30.02	1016.6			
21	03:56	Calm	10.00	Fair	CLR	74	73			97%	NA	NA	30.03	1016.7			
21	02:56	Calm	10.00	Fair	CLR	75	74			96%	NA	NA	30.05	1017.3			
21	01:56	W 5	10.00	Fair	CLR	75	73	79	75	94%	NA	NA	30.04	1017.3			
21	00:56	Calm	10.00	Fair	CLR	76	73			91%	NA	76	30.05	1017.4			

20	23:56	SW 7	10.00	A Few Clouds	FEW049	76	73			91%	NA	76	30.05	1017.5
20	22:56	S 6	10.00	A Few Clouds	FEW050	77	73			88%	NA	78	30.06	1017.8
20	21:56	SE 7	10.00	Light Rain	SCT060 SCT090 BKN110	78	75			90%	NA	80	30.05	1017.5
20	20:56	E 8	10.00	A Few Clouds	FEW075	79	71			77%	NA	82	30.03	1016.7
20	19:56	SE 12	10.00	Thunderstorm	BKN055	78	72	93	77	82%	NA	80	30.01	1016.0
20	18:56	NW 3	10.00	A Few Clouds	FEW049	91	70			50%	NA	97	29.99	1015.5
20	17:56	Calm	10.00	Partly Cloudy	SCT049	92	71			51%	NA	99	29.99	1015.5
20	16:56	Vrbl 5	10.00	A Few Clouds	FEW050	93	71			49%	NA	100	29.99	1015.6
20	15:56	Vrbl 3	10.00	Fair	CLR	90	72			56%	NA	98	30.02	1016.6
20	14:56	NW 6	10.00	Mostly Cloudy	BKN040	90	74			59%	NA	99	30.05	1017.4
20	13:56	Vrbl 5	10.00	A Few Clouds	FEW048	90	74	90	75	59%	NA	99	30.07	1018.1
20	12:56	S 5	10.00	Mostly Cloudy	BKN032	87	74			65%	NA	95	30.09	1018.8
20	11:56	SW 5	10.00	A Few Clouds	FEW025	85	75			72%	NA	93	30.10	1019.1
20	10:56	SW 6	10.00	Mostly Cloudy	BKN019 BKN026	83	75			77%	NA	90	30.10	1019.1
20	09:56	S 7	10.00	Overcast	OVC007	81	76			85%	NA	87	30.10	1019.2
20	08:56	SW 5	10.00	Overcast	OVC005	77	76			96%	NA	78	30.10	1019.1
20	07:56	S 5	10.00	Overcast	OVC005	75	74	75	73	96%	NA	NA	30.09	1018.8
20	06:56	S 5	10.00	Overcast	OVC009	74	74			100%	NA	NA	30.07	1018.1
20	05:56	S 3	10.00	Overcast	OVC007	73	73			100%	NA	NA	30.06	1017.7
20	04:56	E 5	10.00	Overcast	OVC007	74	73			97%	NA	NA	30.05	1017.6
20	03:56	Calm	10.00	Partly Cloudy	SCT005	74	73			97%	NA	NA	30.05	1017.3
20	02:56	Calm	10.00	Fair	CLR	74	73			97%	NA	NA	30.05	1017.4
20	01:56	Calm	10.00	Fair	CLR	74	73	78	74	97%	NA	NA	30.06	1017.7
20	00:56	Calm	10.00	Fair	CLR	74	73			97%	NA	NA	30.07	1018.2
19	23:56	S 5	10.00	Fair	CLR	75	73			94%	NA	NA	30.08	1018.4
19	22:56	SE 5	10.00	Fair	CLR	75	73			94%	NA	NA	30.08	1018.6
19	21:56	SE 5	10.00	Overcast	FEW008 OVC110	76	74			94%	NA	76	30.07	1018.1
19	20:56	SE 9	10.00	Overcast	FEW008 OVC110	77	75			94%	NA	78	30.06	1017.9
19	19:56	E 8	10.00	Overcast	BKN012 OVC037	78	74	88	76	87%	NA	80	30.06	1017.9
19	18:56	SW 5	10.00	A Few Clouds	FEW110	77	72			85%	NA	78	30.04	1017.2
19	17:56	Calm	10.00	Mostly Cloudy	FEW010 BKN016 BKN022	77	72			85%	NA	78	30.03	1016.9
19	16:56	S 10	10.00	Mostly Cloudy	BKN055 BKN070	76	73			91%	NA	76	30.05	1017.6
19	15:56	S 13	10.00	Thunderstorm in Vicinity	FEW060 SCT075	77	74			90%	NA	78	30.05	1017.5
19	14:56	SE 14 G 17	6.00	Thunderstorm in Vicinity Rain Fog/Mist	SCT030 BKN040 OVC070	79	77			94%	NA	83	30.06	1017.8

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air Temperature (°F)	Dwpt	Max. 6 hour Temperature (°F)	Min. 6 hour Temperature (°F)	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.)	sea level (mb)	1 hr Precipitation (in.)	3 hr Precipitation (in.)	6 hr Precipitation (in.)
19	13:56	Vrbl 3	10.00	Mostly Cloudy	BKN033	87	74	87	77	65%	NA	95	30.06	1017.8			
19	12:56	N 5	10.00	Mostly Cloudy	BKN021 BKN048	86	74			67%	NA	94	30.07	1018.1			
19	11:56	W 3	10.00	Mostly Cloudy	BKN021 BKN048	83	74			74%	NA	90	30.10	1019.1			
19	10:56	W 5	10.00	Fair	CLR	82	74			77%	NA	88	30.11	1019.5			
19	09:56	Calm	10.00	Fair	CLR	79	75			88%	NA	83	30.10	1019.3			
19	08:56	W 3	10.00	Partly Cloudy	SCT007	77	75			94%	NA	78	30.09	1018.7			

National Weather Service
 Southern Region Headquarters
 Fort Worth, Texas
[Disclaimer](#)

[Back to previous page](#)

Last Modified: Febuary, 7 2012
[Privacy Policy](#)

weather.gov



Weather observations for the past three days



Kissimmee Gateway Airport

Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)				Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt	6 hour					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
						Max.	Min.										
20	07:56	S 5	10.00	Overcast	OVC005	75	74	75	73	96%	NA	NA	30.09	1018.8			
20	06:56	S 5	10.00	Overcast	OVC009	74	74			100%	NA	NA	30.07	1018.1			
20	05:56	S 3	10.00	Overcast	OVC007	73	73			100%	NA	NA	30.06	1017.7			
20	04:56	E 5	10.00	Overcast	OVC007	74	73			97%	NA	NA	30.05	1017.6			
20	03:56	Calm	10.00	Partly Cloudy	SCT005	74	73			97%	NA	NA	30.05	1017.3			
20	02:56	Calm	10.00	Fair	CLR	74	73			97%	NA	NA	30.05	1017.4			
20	01:56	Calm	10.00	Fair	CLR	74	73	78	74	97%	NA	NA	30.06	1017.7			
20	00:56	Calm	10.00	Fair	CLR	74	73			97%	NA	NA	30.07	1018.2			
19	23:56	S 5	10.00	Fair	CLR	75	73			94%	NA	NA	30.08	1018.4			
19	22:56	SE 5	10.00	Fair	CLR	75	73			94%	NA	NA	30.08	1018.6			
19	21:56	SE 5	10.00	Overcast	FEW008 OVC110	76	74			94%	NA	76	30.07	1018.1			
19	20:56	SE 9	10.00	Overcast	FEW008 OVC110	77	75			94%	NA	78	30.06	1017.9			
19	19:56	E 8	10.00	Overcast	BKN012 OVC037	78	74	88	76	87%	NA	80	30.06	1017.9			
19	18:56	SW 5	10.00	A Few Clouds	FEW110	77	72			85%	NA	78	30.04	1017.2			
19	17:56	Calm	10.00	Mostly Cloudy	FEW010 BKN016 BKN022	77	72			85%	NA	78	30.03	1016.9			
19	16:56	S 10	10.00	Mostly Cloudy	BKN055 BKN070	76	73			91%	NA	76	30.05	1017.6			
19	15:56	S 13	10.00	Thunderstorm in Vicinity	FEW060 SCT075	77	74			90%	NA	78	30.05	1017.5			
19	14:56	SE 14 G 17	6.00	Thunderstorm in Vicinity Rain Fog/Mist	SCT030 BKN040 OVC070	79	77			94%	NA	83	30.06	1017.8			
19	13:56	Vrbl 3	10.00	Mostly Cloudy	BKN033	87	74	87	77	65%	NA	95	30.06	1017.8			
19	12:56	N 5	10.00	Mostly Cloudy	BKN021 BKN048	86	74			67%	NA	94	30.07	1018.1			
19	11:56	W 3	10.00	Mostly Cloudy	BKN021 BKN048	83	74			74%	NA	90	30.10	1019.1			
19	10:56	W 5	10.00	Fair	CLR	82	74			77%	NA	88	30.11	1019.5			
19	09:56	Calm	10.00	Fair	CLR	79	75			88%	NA	83	30.10	1019.3			
19	08:56	W 3	10.00	Partly Cloudy	SCT007	77	75			94%	NA	78	30.09	1018.7			
19	07:56	W 3	10.00	Fair	CLR	77	75	77	75	94%	NA	78	30.07	1018.3			
19	06:56	S 3	10.00	Fair	CLR	75	74			96%	NA	NA	30.06	1017.9			

19	05:56	S 3	10.00	A Few Clouds	FEW014	75	74			96%	NA	NA	30.04	1017.1
19	04:56	SE 6	10.00	Overcast	FEW009 OVC018	76	75			97%	NA	75	30.03	1016.8
19	03:56	SE 3	10.00	Overcast	OVC024	76	75			97%	NA	75	30.03	1016.8
19	02:56	E 5	10.00	A Few Clouds	FEW120	76	75			97%	NA	75	30.04	1017.1
19	01:56	Calm	10.00	Fair	CLR	76	75	76	75	97%	NA	75	30.05	1017.4
19	00:56	E 3	10.00	Fair	CLR	75	75			100%	NA	NA	30.06	1017.9
18	23:56	Calm	10.00	Fair	CLR	75	75			100%	NA	NA	30.06	1018.0
18	22:56	Calm	10.00	Fair	CLR	75	75			100%	NA	NA	30.07	1018.3
18	21:56	NE 3	10.00	A Few Clouds	FEW100	76	75			97%	NA	75	30.06	1017.9
18	20:56	Calm	10.00	A Few Clouds	FEW110	76	75			97%	NA	75	30.05	1017.5
18	19:56	SE 8	10.00	Overcast	FEW065 SCT080 OVC120	76	74	91	72	94%	NA	76	30.03	1016.9
18	18:56	SE 8	10.00	Thunderstorm Light Rain	FEW013 BKN038 OVC065	73	72			96%	NA	NA	30.06	1017.9
18	17:56	E 21	0.50	Thunderstorm in Vicinity Heavy Rain Fog and Breezy	BKN027 OVC037	75	73			94%	NA	NA	30.03	1017.0
18	16:56	E 10	10.00	Thunderstorm in Vicinity	SCT046	87	73			63%	NA	94	29.99	1015.3
18	15:56	E 14	10.00	Fair	CLR	87	75			67%	NA	96	30.00	1015.8
18	14:56	E 3	10.00	Mostly Cloudy	SCT049 BKN070	89	70			53%	NA	94	30.02	1016.4
18	13:56	NW 5	10.00	Fair	CLR	88	71	89	77	57%	NA	94	30.03	1016.9
18	12:56	Calm	7.00	Mostly Cloudy	BKN034	87	71			59%	NA	93	30.05	1017.7
18	11:56	Calm	10.00	Partly Cloudy	SCT029	85	72			65%	NA	91	30.08	1018.5
18	10:56	SW 5	10.00	Fair	CLR	84	73			70%	NA	90	30.08	1018.4
18	09:56	Calm	10.00	Fair	CLR	82	73			74%	NA	87	30.08	1018.4
18	08:56	Calm	10.00	Fair	CLR	80	72			76%	NA	84	30.08	1018.5
18	07:56	Calm	10.00	Fair	CLR	77	72	77	72	85%	NA	78	30.07	1018.0
18	06:56	Calm	9.00	A Few Clouds	FEW100	73	72			96%	NA	NA	30.05	1017.5
18	05:56	Calm	10.00	Fair	CLR	72	71			97%	NA	NA	30.05	1017.4
18	04:56	Calm	10.00	Fair	CLR	73	71			94%	NA	NA	30.03	1017.0
18	03:56	Calm	10.00	Fair	CLR	74	71			91%	NA	NA	30.03	1016.8
18	02:56	SE 3	10.00	Fair	CLR	74	71			91%	NA	NA	30.03	1016.9
18	01:56	S 6	10.00	Partly Cloudy	SCT065	75	71	82	75	88%	NA	NA	30.05	1017.6
18	00:56	SE 5	10.00	Mostly Cloudy	BKN065	76	72			88%	NA	76	30.08	1018.5
17	23:56	SE 7	10.00	Overcast	BKN060 OVC075	77	72			85%	NA	78	30.08	1018.7
17	22:56	SE 8	10.00	Overcast	FEW026 BKN050 OVC070	77	73			88%	NA	78	30.09	1018.9
17	21:56	NE 6	4.00			77	74			90%	NA	78	30.07	1018.1

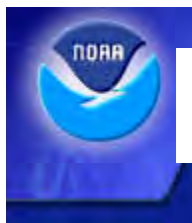
Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air Temp	Dwpt	Max. Min.		Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.)	sea level (mb)	Precipitation (in.)			
								6 hour	Temperature (°F)						1 hr	3 hr	6 hr	
				Heavy Rain Fog/Mist	FEW031 BKN050 OVC070													
17	20:56	SE 6	10.00	Mostly Cloudy	BKN070	81	72			74%	NA	85	30.04	1017.2				
17	19:56	SE 8	10.00	Overcast	BKN065 OVC090	82	72	89	82	72%	NA	87	30.03	1016.7				
17	18:56	SE 7	10.00	Mostly Cloudy	BKN070 BKN080	84	72			67%	NA	90	30.02	1016.4				
17	17:56	S 3	10.00	Partly Cloudy	SCT065	87	66			50%	NA	89	30.02	1016.6				
17	16:56	S 6	10.00	A Few Clouds	FEW090	88	65			46%	NA	90	30.03	1016.9				
17	15:56	S 6	10.00	Fair	CLR	87	67			51%	NA	90	30.04	1017.3				
17	14:56	S 9	10.00	A Few Clouds	FEW045	88	68			52%	NA	92	30.06	1017.8				
17	13:56	NE 5	10.00	Mostly Cloudy	SCT049 BKN065	86	68	86	74	55%	NA	89	30.08	1018.4				
17	12:56	SE 9	10.00	Mostly Cloudy	BKN035	84	70			63%	NA	88	30.09	1018.8				
17	11:56	E 6	10.00	Partly Cloudy	SCT030	82	70			67%	NA	86	30.10	1019.2				
17	10:56	S 7	10.00	A Few Clouds	FEW025	81	69			67%	NA	84	30.10	1019.2				
17	09:56	E 7	10.00	Fair	CLR	79	70			74%	NA	82	30.10	1019.3				
17	08:56	E 7	10.00	Fair	CLR	77	69			77%	NA	79	30.10	1019.3				

National Weather Service
Southern Region Headquarters
Fort Worth, Texas
[Disclaimer](#)

[Back to previous page](#)

Last Modified: Febuary, 7 2012
[Privacy Policy](#)

weather.gov



Weather observations for the past three days



Kissimmee Gateway Airport

Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)		6 hour Max. Min.	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
18	12:56	Calm	7.00	Mostly Cloudy	BKN034	87	71		59%	NA	93	30.05	1017.7			
18	11:56	Calm	10.00	Partly Cloudy	SCT029	85	72		65%	NA	91	30.08	1018.5			
18	10:56	SW 5	10.00	Fair	CLR	84	73		70%	NA	90	30.08	1018.4			
18	09:56	Calm	10.00	Fair	CLR	82	73		74%	NA	87	30.08	1018.4			
18	08:56	Calm	10.00	Fair	CLR	80	72		76%	NA	84	30.08	1018.5			
18	07:56	Calm	10.00	Fair	CLR	77	72	77 72	85%	NA	78	30.07	1018.0			
18	06:56	Calm	9.00	A Few Clouds	FEW100	73	72		96%	NA	NA	30.05	1017.5			
18	05:56	Calm	10.00	Fair	CLR	72	71		97%	NA	NA	30.05	1017.4			
18	04:56	Calm	10.00	Fair	CLR	73	71		94%	NA	NA	30.03	1017.0			
18	03:56	Calm	10.00	Fair	CLR	74	71		91%	NA	NA	30.03	1016.8			
18	02:56	SE 3	10.00	Fair	CLR	74	71		91%	NA	NA	30.03	1016.9			
18	01:56	S 6	10.00	Partly Cloudy	SCT065	75	71	82 75	88%	NA	NA	30.05	1017.6			
18	00:56	SE 5	10.00	Mostly Cloudy	BKN065	76	72		88%	NA	76	30.08	1018.5			
17	23:56	SE 7	10.00	Overcast	BKN060 OVC075	77	72		85%	NA	78	30.08	1018.7			
17	22:56	SE 8	10.00	Overcast	FEW026 BKN050 OVC070	77	73		88%	NA	78	30.09	1018.9			
17	21:56	NE 6	4.00	Heavy Rain Fog/Mist	FEW031 BKN050 OVC070	77	74		90%	NA	78	30.07	1018.1			
17	20:56	SE 6	10.00	Mostly Cloudy	BKN070	81	72		74%	NA	85	30.04	1017.2			
17	19:56	SE 8	10.00	Overcast	BKN065 OVC090	82	72	89 82	72%	NA	87	30.03	1016.7			
17	18:56	SE 7	10.00	Mostly Cloudy	BKN070 BKN080	84	72		67%	NA	90	30.02	1016.4			
17	17:56	S 3	10.00	Partly Cloudy	SCT065	87	66		50%	NA	89	30.02	1016.6			
17	16:56	S 6	10.00	A Few Clouds	FEW090	88	65		46%	NA	90	30.03	1016.9			
17	15:56	S 6	10.00	Fair	CLR	87	67		51%	NA	90	30.04	1017.3			
17	14:56	S 9	10.00	A Few Clouds	FEW045	88	68		52%	NA	92	30.06	1017.8			

17	13:56	NE 5	10.00	Mostly Cloudy	SCT049 BKN065	86	68	86	74	55%	NA	89	30.08	1018.4
17	12:56	SE 9	10.00	Mostly Cloudy	BKN035	84	70			63%	NA	88	30.09	1018.8
17	11:56	E 6	10.00	Partly Cloudy	SCT030	82	70			67%	NA	86	30.10	1019.2
17	10:56	S 7	10.00	A Few Clouds	FEW025	81	69			67%	NA	84	30.10	1019.2
17	09:56	E 7	10.00	Fair	CLR	79	70			74%	NA	82	30.10	1019.3
17	08:56	E 7	10.00	Fair	CLR	77	69			77%	NA	79	30.10	1019.3
17	07:56	E 7	10.00	Fair	CLR	74	69	74	71	85%	NA	NA	30.09	1019.0
17	06:56	Calm	10.00	Fair	CLR	71	69			94%	NA	NA	30.09	1018.8
17	05:56	NE 3	10.00	Fair	CLR	71	69			94%	NA	NA	30.08	1018.4
17	04:56	E 3	10.00	Fair	CLR	72	69			91%	NA	NA	30.07	1018.3
17	03:56	NE 3	10.00	Overcast	OVC060	73	69			87%	NA	NA	30.08	1018.6
17	02:56	NE 6	10.00	Light Rain	SCT060 OVC070	73	69			87%	NA	NA	30.08	1018.6
17	01:56	E 5	10.00	Overcast	OVC065	74	68	79	73	82%	NA	NA	30.10	1019.1
17	00:56	NE 5	10.00	Overcast	OVC070	74	68			82%	NA	NA	30.11	1019.6
16	23:56	E 7	10.00	Fair	CLR	74	68			82%	NA	NA	30.11	1019.4
16	22:56	E 8	10.00	Fair	CLR	74	68			82%	NA	NA	30.10	1019.2
16	21:56	E 9	10.00	Fair	CLR	75	68			79%	NA	NA	30.08	1018.5
16	20:56	E 12	10.00	Fair	CLR	77	68			74%	NA	79	30.06	1017.9
16	19:56	E 9	10.00	Partly Cloudy	SCT110	79	68	89	79	69%	NA	81	30.05	1017.4
16	18:56	E 10	10.00	Overcast	FEW050 OVC065	81	69			67%	NA	84	30.03	1016.8
16	17:56	Vrbl 3	10.00	Overcast	OVC100	86	63			46%	NA	87	30.03	1016.8
16	16:56	NW 6	10.00	Mostly Cloudy	BKN070	86	63			46%	NA	87	30.04	1017.0
16	15:56	Calm	10.00	A Few Clouds	FEW055	87	64			46%	NA	88	30.05	1017.4
16	14:56	Vrbl 7	10.00	Mostly Cloudy	FEW050 BKN110	87	64			46%	NA	88	30.06	1017.9
16	13:56	N 10	10.00	Mostly Cloudy	BKN048	86	65	86	74	49%	NA	88	30.08	1018.5
16	12:56	Vrbl 7	10.00	Mostly Cloudy	BKN042	85	64			50%	NA	86	30.09	1019.0
16	11:56	Vrbl 3	10.00	A Few Clouds	FEW030	82	65			56%	NA	84	30.11	1019.5
16	10:56	N 9	10.00	A Few Clouds	FEW028	81	65			58%	NA	83	30.11	1019.6
16	09:56	NE 9	10.00	A Few Clouds	FEW026	79	67			67%	NA	81	30.12	1019.7
16	08:56	NE 7	10.00	Fair	CLR	76	67			74%	NA	77	30.11	1019.5
16	07:56	NE 6	10.00	Fair	CLR	74	68	74	68	82%	NA	NA	30.09	1019.0
16	06:56	Calm	10.00	Fair	CLR	69	68			96%	NA	NA	30.08	1018.7
16	05:56	S 3	10.00	Fair	CLR	69	67			93%	NA	NA	30.06	1017.9
16	04:56	Calm	10.00	Fair	CLR	70	68			93%	NA	NA	30.06	1017.7


Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air Temperature (°F)		6 hour		Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.)	sea level (mb)	Precipitation (in.)		
						Air	Dwpt	Max.	Min.						1 hr	3 hr	6 hr
16	03:56	Calm	10.00	Fair	CLR	71	68			90%	NA	NA	30.05	1017.5			
16	02:56	Calm	10.00	Fair	CLR	72	68			87%	NA	NA	30.06	1017.7			
16	01:56	Calm	10.00	Fair	CLR	73	69	81	71	87%	NA	NA	30.07	1018.2			
16	00:56	NE 3	10.00	Fair	CLR	74	68			82%	NA	NA	30.08	1018.7			
15	23:56	NE 5	10.00	Fair	CLR	75	67			76%	NA	NA	30.09	1019.0			
15	22:56	NE 6	10.00	Fair	CLR	76	67			74%	NA	77	30.10	1019.2			
15	21:56	NE 9	10.00	Fair	CLR	77	66			69%	NA	79	30.09	1018.9			
15	20:56	NE 10	10.00	Fair	CLR	79	67			67%	NA	81	30.08	1018.4			
15	19:56	NE 16	10.00	Fair	CLR	81	66	91	81	61%	NA	83	30.05	1017.6			
15	18:56	NE 15	10.00	Partly Cloudy	SCT055	84	67			57%	NA	87	30.03	1016.7			
15	17:56	NE 14	10.00	Mostly Cloudy	FEW042 BKN060	87	69			55%	NA	91	30.02	1016.3			
15	16:56	NE 9	10.00	Partly Cloudy	SCT065	90	61			38%	NA	90	30.01	1016.2			
15	15:56	N 13 G 16	10.00	Fair	CLR	91	58			33%	NA	90	30.02	1016.5			
15	14:56	N 13	10.00	Fair	CLR	90	59			35%	NA	89	30.03	1016.9			
15	13:56	N 10	10.00	Fair	CLR	89	65	89	76	45%	NA	91	30.05	1017.4			

National Weather Service
 Southern Region Headquarters
 Fort Worth, Texas
[Disclaimer](#)

[Back to previous page](#)


Last Modified: Febuary, 7 2012
[Privacy Policy](#)

weather.gov



Weather observations for the past three days

Kissimmee Gateway Airport



Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)		Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt				6 hour Max.	6 hour Min.	altimeter (in)	sea level (mb)	1 hr
17	12:56	SE 9	10.00	Mostly Cloudy	BKN035	84	70	63%	NA	88	30.09	1018.8			
17	11:56	E 6	10.00	Partly Cloudy	SCT030	82	70	67%	NA	86	30.10	1019.2			
17	10:56	S 7	10.00	A Few Clouds	FEW025	81	69	67%	NA	84	30.10	1019.2			
17	09:56	E 7	10.00	Fair	CLR	79	70	74%	NA	82	30.10	1019.3			
17	08:56	E 7	10.00	Fair	CLR	77	69	77%	NA	79	30.10	1019.3			
17	07:56	E 7	10.00	Fair	CLR	74	69	74-71	85%	NA	30.09	1019.0			
17	06:56	Calm	10.00	Fair	CLR	71	69	94%	NA	NA	30.09	1018.8			
17	05:56	NE 3	10.00	Fair	CLR	71	69	94%	NA	NA	30.08	1018.4			
17	04:56	E 3	10.00	Fair	CLR	72	69	91%	NA	NA	30.07	1018.3			
17	03:56	NE 3	10.00	Overcast	OVC060	73	69	87%	NA	NA	30.08	1018.6			
17	02:56	NE 6	10.00	Light Rain	SCT060 OVC070	73	69	87%	NA	NA	30.08	1018.6			
17	01:56	E 5	10.00	Overcast	OVC065	74	68	79-73	82%	NA	30.10	1019.1			
17	00:56	NE 5	10.00	Overcast	OVC070	74	68	82%	NA	NA	30.11	1019.6			
16	23:56	E 7	10.00	Fair	CLR	74	68	82%	NA	NA	30.11	1019.4			
16	22:56	E 8	10.00	Fair	CLR	74	68	82%	NA	NA	30.10	1019.2			
16	21:56	E 9	10.00	Fair	CLR	75	68	79%	NA	NA	30.08	1018.5			
16	20:56	E 12	10.00	Fair	CLR	77	68	74%	NA	79	30.06	1017.9			
16	19:56	E 9	10.00	Partly Cloudy	SCT110	79	68	89-79	69%	NA	30.05	1017.4			
16	18:56	E 10	10.00	Overcast	FEW050 OVC065	81	69	67%	NA	84	30.03	1016.8			
16	17:56	Vrbl 3	10.00	Overcast	OVC100	86	63	46%	NA	87	30.03	1016.8			
16	16:56	NW 6	10.00	Mostly Cloudy	BKN070	86	63	46%	NA	87	30.04	1017.0			
16	15:56	Calm	10.00	A Few Clouds	FEW055	87	64	46%	NA	88	30.05	1017.4			
16	14:56	Vrbl 7	10.00	Mostly Cloudy	FEW050 BKN110	87	64	46%	NA	88	30.06	1017.9			
16	13:56	N 10	10.00	Mostly Cloudy	BKN048	86	65	86-74	49%	NA	30.08	1018.5			
16	12:56	Vrbl 7	10.00	Mostly Cloudy	BKN042	85	64	50%	NA	86	30.09	1019.0			
16	11:56	Vrbl 3	10.00	A Few Clouds	FEW030	82	65	56%	NA	84	30.11	1019.5			
16	10:56	N 9	10.00	A Few Clouds	FEW028	81	65	58%	NA	83	30.11	1019.6			
16	09:56	NE 9	10.00	A Few Clouds	FEW026	79	67	67%	NA	81	30.12	1019.7			
16	08:56	NE 7	10.00	Fair	CLR	76	67	74%	NA	77	30.11	1019.5			

16	07:56	NE 6	10.00	Fair	CLR	74	68	74	68	82%	NA	NA	30.09	1019.0
16	06:56	Calm	10.00	Fair	CLR	69	68			96%	NA	NA	30.08	1018.7
16	05:56	S 3	10.00	Fair	CLR	69	67			93%	NA	NA	30.06	1017.9
16	04:56	Calm	10.00	Fair	CLR	70	68			93%	NA	NA	30.06	1017.7
16	03:56	Calm	10.00	Fair	CLR	71	68			90%	NA	NA	30.05	1017.5
16	02:56	Calm	10.00	Fair	CLR	72	68			87%	NA	NA	30.06	1017.7
16	01:56	Calm	10.00	Fair	CLR	73	69	81	71	87%	NA	NA	30.07	1018.2
16	00:56	NE 3	10.00	Fair	CLR	74	68			82%	NA	NA	30.08	1018.7
15	23:56	NE 5	10.00	Fair	CLR	75	67			76%	NA	NA	30.09	1019.0
15	22:56	NE 6	10.00	Fair	CLR	76	67			74%	NA	77	30.10	1019.2
15	21:56	NE 9	10.00	Fair	CLR	77	66			69%	NA	79	30.09	1018.9
15	20:56	NE 10	10.00	Fair	CLR	79	67			67%	NA	81	30.08	1018.4
15	19:56	NE 16	10.00	Fair	CLR	81	66	91	81	61%	NA	83	30.05	1017.6
15	18:56	NE 15	10.00	Partly Cloudy	SCT055	84	67			57%	NA	87	30.03	1016.7
15	17:56	NE 14	10.00	Mostly Cloudy	FEW042 BKN060	87	69			55%	NA	91	30.02	1016.3
15	16:56	NE 9	10.00	Partly Cloudy	SCT065	90	61			38%	NA	90	30.01	1016.2
15	15:56	N 13 G 16	10.00	Fair	CLR	91	58			33%	NA	90	30.02	1016.5
15	14:56	N 13	10.00	Fair	CLR	90	59			35%	NA	89	30.03	1016.9
15	13:56	N 10	10.00	Fair	CLR	89	65	89	76	45%	NA	91	30.05	1017.4
15	12:56	NE 7	10.00	Fair	CLR	87	66			50%	NA	89	30.07	1018.0
15	11:56	NE 8	10.00	Mostly Cloudy	BKN037	85	68			57%	NA	88	30.08	1018.7
15	10:56	N 8	10.00	Mostly Cloudy	BKN028	84	68			59%	NA	87	30.09	1018.8
15	09:56	N 10	10.00	Mostly Cloudy	BKN018 BKN026	81	72			74%	NA	85	30.09	1018.8
15	08:56	N 8	10.00	Partly Cloudy	SCT011	79	73			82%	NA	82	30.09	1018.8
15	07:56	N 6	10.00	Fair	CLR	76	73	76	74	91%	NA	76	30.08	1018.4
15	06:56	N 8	10.00	Fair	CLR	74	73			97%	NA	NA	30.06	1017.7
15	05:56	NE 3	10.00	Fair	CLR	74	73			97%	NA	NA	30.04	1017.1
15	04:56	N 3	10.00	Fair	CLR	74	73			97%	NA	NA	30.04	1017.0
15	03:56	N 3	10.00	Fair	CLR	75	73			94%	NA	NA	30.04	1017.0
15	02:56	Calm	10.00	Fair	CLR	75	73			94%	NA	NA	30.03	1016.8
15	01:56	NE 3	10.00	Fair	CLR	76	73	77	74	91%	NA	76	30.05	1017.3
15	00:56	Vrbl 3	10.00	Fair	CLR	76	73			91%	NA	76	30.07	1018.0
14	23:56	N 6	10.00	Fair	CLR	77	75			94%	NA	78	30.08	1018.5
14	22:56	NE 5	10.00	Fair	CLR	77	75			94%	NA	78	30.08	1018.5
14	21:56	E 6	10.00	Fair	CLR	77	75			94%	NA	78	30.07	1018.3
14	20:56	NE 3	10.00	Fair	CLR	76	73			91%	NA	76	30.06	1017.7
14	19:56	E 5	10.00	Partly Cloudy	FEW030 SCT090	74	72	89	73	94%	NA	NA	30.05	1017.6
14	18:56	E 14	10.00			75	72			90%	NA	NA	30.05	1017.4

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air Temperature (°F)		Dwpt	Max. 6 hour	Min. 6 hour	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.) Pressure	sea level (mb)	Precipitation (in.)			
																1 hr	3 hr	6 hr	
				Thunderstorm in Vicinity	SCT016 BKN036 OVC060														
14	17:56	E 14 G 25	1.50	Thunderstorm Heavy Rain Fog/Mist	OVC040	74	71		91%	NA	NA	30.03	1017.0						
14	16:56	E 8	10.00	Mostly Cloudy	BKN060	86	70		59%	NA	91	30.01	1016.1						
14	15:56	E 10	10.00	Mostly Cloudy	BKN049	84	73		70%	NA	90	30.01	1016.3						
14	14:56	Vrbl 3	10.00	Mostly Cloudy	BKN050	88	68		52%	NA	92	30.03	1016.7						
14	13:56	E 5	10.00	Mostly Cloudy	SCT043 BKN055	88	69	88	77	54%	NA	93	30.04	1017.2					

National Weather Service
 Southern Region Headquarters
 Fort Worth, Texas
[Disclaimer](#)

[Back to previous page](#)

Last Modified: Febuary, 7 2012
[Privacy Policy](#)

weather.gov



Weather observations for the past three days



Kissimmee Gateway Airport

Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)		6 hour Max. Min.	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
15	12:56	NE 7	10.00	Fair	CLR	87	66		50%	NA	89	30.07	1018.0			
15	11:56	NE 8	10.00	Mostly Cloudy	BKN037	85	68		57%	NA	88	30.08	1018.7			
15	10:56	N 8	10.00	Mostly Cloudy	BKN028	84	68		59%	NA	87	30.09	1018.8			
15	09:56	N 10	10.00	Mostly Cloudy	BKN018 BKN026	81	72		74%	NA	85	30.09	1018.8			
15	08:56	N 8	10.00	Partly Cloudy	SCT011	79	73		82%	NA	82	30.09	1018.8			
15	07:56	N 6	10.00	Fair	CLR	76	73	76 74	91%	NA	76	30.08	1018.4			
15	06:56	N 8	10.00	Fair	CLR	74	73		97%	NA	NA	30.06	1017.7			
15	05:56	NE 3	10.00	Fair	CLR	74	73		97%	NA	NA	30.04	1017.1			
15	04:56	N 3	10.00	Fair	CLR	74	73		97%	NA	NA	30.04	1017.0			
15	03:56	N 3	10.00	Fair	CLR	75	73		94%	NA	NA	30.04	1017.0			
15	02:56	Calm	10.00	Fair	CLR	75	73		94%	NA	NA	30.03	1016.8			
15	01:56	NE 3	10.00	Fair	CLR	76	73	77 74	91%	NA	76	30.05	1017.3			
15	00:56	Vrbl 3	10.00	Fair	CLR	76	73		91%	NA	76	30.07	1018.0			
14	23:56	N 6	10.00	Fair	CLR	77	75		94%	NA	78	30.08	1018.5			
14	22:56	NE 5	10.00	Fair	CLR	77	75		94%	NA	78	30.08	1018.5			
14	21:56	E 6	10.00	Fair	CLR	77	75		94%	NA	78	30.07	1018.3			
14	20:56	NE 3	10.00	Fair	CLR	76	73		91%	NA	76	30.06	1017.7			
14	19:56	E 5	10.00	Partly Cloudy	FEW030 SCT090	74	72	89 73	94%	NA	NA	30.05	1017.6			
14	18:56	E 14	10.00	Thunderstorm in Vicinity	SCT016 BKN036 OVC060	75	72		90%	NA	NA	30.05	1017.4			
14	17:56	E 14 G 25	1.50	Thunderstorm Heavy Rain Fog/Mist	OVC040	74	71		91%	NA	NA	30.03	1017.0			
14	16:56	E 8	10.00	Mostly Cloudy	BKN060	86	70		59%	NA	91	30.01	1016.1			
14	15:56	E 10	10.00	Mostly Cloudy	BKN049	84	73		70%	NA	90	30.01	1016.3			
14	14:56	Vrbl 3	10.00	Mostly Cloudy	BKN050	88	68		52%	NA	92	30.03	1016.7			
14	13:56	E 5	10.00	Mostly Cloudy	SCT043 BKN055	88	69	88 77	54%	NA	93	30.04	1017.2			
14	12:56	E 3	10.00	Fair	CLR	86	69		57%	NA	90	30.06	1017.7			
14	11:56	SE 6	10.00			85	69		59%	NA	89	30.08	1018.4			

				Mostly Cloudy	SCT032 BKN043 BKN055									
14	10:56	Calm	10.00	Partly Cloudy	FEW024 SCT075	83	71		67%	NA	88	30.09	1018.7	
14	09:56	E 5	10.00	Partly Cloudy	SCT020 SCT027	81	72		74%	NA	85	30.07	1018.3	
14	08:56	E 6	10.00	Fair	CLR	79	73		82%	NA	82	30.06	1017.7	
14	07:56	N 5	10.00	Fair	CLR	77	72	77	73	85%	NA	78	30.04	1017.3
14	06:56	N 3	10.00	Fair	CLR	74	72		94%	NA	NA	30.02	1016.6	
14	05:56	N 3	10.00	Fair	CLR	74	72		94%	NA	NA	30.01	1016.3	
14	04:56	Calm	10.00	Fair	CLR	74	72		94%	NA	NA	30.01	1016.1	
14	03:56	Calm	10.00	Fair	CLR	74	72		94%	NA	NA	30.01	1016.2	
14	02:56	Calm	10.00	Fair	CLR	75	73		94%	NA	NA	30.01	1016.3	
14	01:56	NE 6	10.00	Fair	CLR	75	73	79	75	94%	NA	NA	30.03	1016.8
14	00:56	NE 3	10.00	Fair	CLR	76	73		91%	NA	76	30.03	1016.9	
13	23:56	Vrbl 3	10.00	Fair	CLR	77	73		88%	NA	78	30.02	1016.6	
13	22:56	E 6	10.00	Fair	CLR	77	73		88%	NA	78	30.02	1016.6	
13	21:56	E 7	10.00	Fair	CLR	78	73		85%	NA	80	30.01	1016.2	
13	20:56	E 3	10.00	Fair	CLR	78	73		85%	NA	80	30.00	1015.9	
13	19:56	E 3	10.00	Fair	CLR	79	73	88	78	82%	NA	82	29.99	1015.6
13	18:56	SE 3	10.00	Light Rain	SCT055 BKN075 BKN090	79	74		85%	NA	83	29.98	1015.2	
13	17:56	S 5	10.00	Light Rain	BKN055 BKN070 OVC110	79	73		82%	NA	82	29.98	1015.0	
13	16:56	SE 6	7.00	Overcast	SCT065 OVC110	82	72		72%	NA	87	29.98	1015.0	
13	15:56	NE 10	10.00	Mostly Cloudy	SCT060 BKN110	83	71		67%	NA	88	29.98	1015.0	
13	14:56	E 15	10.00	Partly Cloudy	SCT060	84	72		67%	NA	90	29.98	1015.0	
13	13:56	S 6	10.00	Partly Cloudy	SCT050	87	68	87	77	53%	NA	90	29.99	1015.5
13	12:56	SE 8	10.00	Partly Cloudy	SCT035	86	67		53%	NA	89	30.00	1015.9	
13	11:56	Calm	10.00	Mostly Cloudy	SCT028 BKN070	84	68		59%	NA	87	30.02	1016.3	
13	10:56	SE 6	10.00	Partly Cloudy	FEW028 SCT070	82	70		67%	NA	86	30.02	1016.4	
13	09:56	E 6	10.00	Partly Cloudy	SCT015	81	71		72%	NA	85	30.02	1016.4	
13	08:56	SE 6	10.00	Partly Cloudy	SCT015	80	72		76%	NA	84	30.01	1016.2	
13	07:56	NE 6	10.00	Fair	CLR	77	73	77	75	88%	NA	78	29.99	1015.5
13	06:56	Calm	10.00	Light Rain	BKN100	76	73		91%	NA	76	29.96	1014.6	
13	05:56	S 7	10.00	Fair	CLR	76	72		88%	NA	76	29.96	1014.3	
13	04:56	Calm	10.00	Fair	CLR	75	73		94%	NA	NA	29.97	1014.9	
13	03:56	SW 3	10.00	Fair	CLR	76	72		88%	NA	76	29.98	1015.0	
13	02:56	S 3	10.00	Fair	CLR	76	73		91%	NA	76	29.98	1015.2	
13	01:56	Calm	10.00	Fair	CLR	77	72	83	76	85%	NA	78	30.01	1016.3
13	00:56	E 6	10.00	Fair	CLR	77	72		85%	NA	78	30.02	1016.4	

12	23:56	E 6	10.00	Fair	CLR	78	73		85%	NA	80	30.03	1017.0
12	22:56	E 9	10.00	Fair	CLR	79	72		79%	NA	82	30.03	1016.9
12	21:56	E 9	10.00	Fair	CLR	79	71		77%	NA	82	30.02	1016.6
12	20:56	E 13	10.00	Fair	CLR	81	70		69%	NA	84	30.01	1016.1
12	19:56	E 13	10.00	Fair	CLR	83	68	89 83	61%	NA	86	30.00	1015.7
12	18:56	E 15	10.00	Fair	CLR	86	69		57%	NA	90	29.98	1015.0
12	17:56	SE 10	10.00	Fair	CLR	88	69		54%	NA	93	29.97	1014.9
12	16:56	E 8	10.00	A Few Clouds	FEW044	88	69		54%	NA	93	29.99	1015.6
12	15:56	SE 6	10.00	Fair	CLR	88	70		55%	NA	93	30.01	1016.2
12	14:56	SE 6	10.00	Fair	CLR	87	71		59%	NA	93	30.03	1016.8
12	13:56	SE 10	10.00	A Few Clouds	FEW045	86	73	87 77	65%	NA	93	30.06	1017.7

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air Temperature (°F)		Dwpt	Max. Min. 6 hour		Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.) Pressure	sea level (mb)	Precipitation (in.)		
																1 hr	3 hr	6 hr

National Weather Service
 Southern Region Headquarters
 Fort Worth, Texas
[Disclaimer](#)

[Back to previous page](#)

Last Modified: Febuary, 7 2012
[Privacy Policy](#)



Weather observations for the past three days

Kissimmee Gateway Airport



Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)				Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt	6 hour					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
						Max.	Min.										
12	14:56	SE 6	10.00	Fair	CLR	87	71			59%	NA	93	30.03	1016.8			
12	13:56	SE 10	10.00	A Few Clouds	FEW045	86	73	87	77	65%	NA	93	30.06	1017.7			
12	12:56	SE 8	10.00	Fair	CLR	86	69			57%	NA	90	30.07	1018.3			
12	11:56	E 8	10.00	Partly Cloudy	SCT030	83	69			63%	NA	87	30.09	1018.7			
12	10:56	SE 7	10.00	Partly Cloudy	SCT029	84	71			65%	NA	89	30.09	1019.0			
12	09:56	E 8	10.00	Mostly Cloudy	BKN025	82	71			69%	NA	86	30.10	1019.1			
12	08:56	E 6	10.00	Fair	CLR	80	71			74%	NA	83	30.10	1019.2			
12	07:56	Calm	10.00	Fair	CLR	77	72	77	73	85%	NA	78	30.09	1018.9			
12	06:56	Calm	10.00	Fair	CLR	74	71			91%	NA	NA	30.08	1018.6			
12	05:56	Calm	10.00	Fair	CLR	73	71			94%	NA	NA	30.07	1018.2			
12	04:56	Calm	10.00	Fair	CLR	73	72			96%	NA	NA	30.06	1017.8			
12	03:56	Calm	10.00	Fair	CLR	74	71			91%	NA	NA	30.07	1018.3			
12	02:56	SE 3	10.00	Fair	CLR	75	71			88%	NA	NA	30.08	1018.4			
12	01:56	Calm	10.00	Fair	CLR	76	70	82	76	82%	NA	77	30.09	1018.9			
12	00:56	E 5	10.00	Fair	CLR	76	71			85%	NA	77	30.10	1019.1			
11	23:56	SE 5	9.00	Fair	CLR	77	71			82%	NA	79	30.11	1019.7			
11	22:56	SE 6	10.00	Fair	CLR	78	71			79%	NA	80	30.12	1019.9			
11	21:56	E 6	10.00	Fair	CLR	79	72			79%	NA	82	30.12	1019.7			
11	20:56	E 10	10.00	A Few Clouds	FEW080	80	72			76%	NA	84	30.09	1018.9			
11	19:56	E 9	10.00	Mostly Cloudy	BKN070	82	74	90	77	77%	NA	88	30.08	1018.5			
11	18:56	E 10	10.00	Fair	CLR	84	75			74%	NA	92	30.06	1017.8			
11	17:56	Calm	10.00	Fair	CLR	79	74			85%	NA	83	30.05	1017.5			
11	16:56	S 7	10.00	Thunderstorm Light Rain	BKN027 BKN031 OVC065	79	75			88%	NA	83	30.07	1018.1			
11	15:56	NE 8	10.00	Partly Cloudy	SCT037	88	74			63%	NA	97	30.07	1018.2			
11	14:56	SE 6	10.00	Thunderstorm in Vicinity	SCT035 BKN075	88	75			66%	NA	98	30.09	1018.7			
11	13:56	SE 7	10.00	Thunderstorm in Vicinity	CLR	88	74	89	77	63%	NA	97	30.09	1018.9			
11	12:56	Vrbl 6	8.00	A Few Clouds	FEW029	87	76			70%	NA	98	30.10	1019.1			
11	11:56	SE 7	10.00	Overcast	BKN024 OVC040	85	76			75%	NA	95	30.11	1019.7			
11	10:56	SE 7	10.00	A Few Clouds	FEW018	85	76			75%	NA	95	30.11	1019.6			
11	09:56	S 3	10.00	Fair	CLR	83	76			79%	NA	91	30.12	1019.8			
11	08:56	Calm	10.00	Fair	CLR	81	73			77%	NA	86	30.11	1019.7			

11	07:56	E 3	10.00	Partly Cloudy	SCT018	77	75	77	73	94%	NA	78	30.11	1019.5
11	06:56	Calm	10.00	Partly Cloudy	SCT018	74	74			100%	NA	NA	30.09	1018.9
11	05:56	Calm	10.00	Partly Cloudy	SCT016	74	74			100%	NA	NA	30.07	1018.3
11	04:56	Calm	9.00	Fair	CLR	73	73			100%	NA	NA	30.05	1017.6
11	03:56	Calm	10.00	Fair	CLR	74	73			97%	NA	NA	30.05	1017.7
11	02:56	Calm	10.00	Fair	CLR	74	73			97%	NA	NA	30.06	1017.8
11	01:56	Calm	10.00	Fair	CLR	75	73	76	74	94%	NA	NA	30.06	1018.0
11	00:56	Calm	10.00	Fair	CLR	74	74			100%	NA	NA	30.09	1018.8
10	23:56	Calm	10.00	Partly Cloudy	SCT120	75	74			96%	NA	NA	30.10	1019.1
10	22:56	Calm	10.00	Fair	CLR	75	74			96%	NA	NA	30.10	1019.0
10	21:56	Calm	10.00	Fair	CLR	75	74			96%	NA	NA	30.09	1018.7
10	20:56	SE 5	10.00	A Few Clouds	FEW095	75	74			96%	NA	NA	30.07	1018.2
10	19:56	S 5	10.00	Light Rain	OVC090	76	74	93	72	94%	NA	76	30.07	1018.2
10	18:56	SW 5	6.00	Thunderstorm in Vicinity Light Rain Fog/Mist	FEW042 OVC055	74	72			94%	NA	NA	30.07	1018.1
10	17:56	NW 14 G 31	1.50	Thunderstorm Heavy Rain Fog/Mist	FEW042 BKN050 OVC095	72	70			94%	NA	NA	30.09	1018.7
10	16:56	E 12	10.00	Thunderstorm in Vicinity	FEW055 BKN085	86	74			67%	NA	94	30.01	1016.3
10	15:56	E 21	10.00	Mostly Cloudy and Breezy	BKN090	90	74			59%	NA	99	30.01	1016.2
10	14:56	Vrbl 5	10.00	Fair	CLR	92	72			52%	NA	100	30.03	1016.8
10	13:56	Vrbl 5	10.00	Mostly Cloudy	BKN085 BKN110	91	72	91	79	54%	NA	99	30.04	1017.2
10	12:56	Vrbl 5	10.00	A Few Clouds	FEW030	89	75			63%	NA	99	30.05	1017.7
10	11:56	S 7	10.00	Partly Cloudy	SCT025	88	76			68%	NA	99	30.06	1017.8
10	10:56	S 8	10.00	A Few Clouds	FEW020	87	72			61%	NA	93	30.06	1018.0
10	09:56	SE 5	10.00	Fair	CLR	85	77			77%	NA	96	30.06	1018.0
10	08:56	S 3	10.00	Fair	CLR	82	77			85%	NA	90	30.06	1017.9
10	07:56	Calm	10.00	Fair	CLR	79	76	79	75	90%	NA	83	30.04	1017.2
10	06:56	E 3	10.00	Fair	CLR	76	75			97%	NA	75	30.03	1016.7
10	05:56	Calm	10.00	A Few Clouds	FEW048	75	74			96%	NA	NA	30.01	1016.3
10	04:56	Calm	10.00	Fair	CLR	76	74			94%	NA	76	30.00	1015.8
10	03:56	Calm	10.00	Fair	CLR	76	74			94%	NA	76	30.00	1015.8
10	02:56	Calm	10.00	Fair	CLR	76	74			94%	NA	76	30.01	1016.1
10	01:56	Calm	10.00	Mostly Cloudy	BKN060	76	74	83	76	94%	NA	76	30.03	1016.7
10	00:56	Calm	10.00	Fair	CLR	77	73			88%	NA	78	30.03	1016.7
09	23:56	Calm	10.00	Fair	CLR	77	73			88%	NA	78	30.03	1017.0
09	22:56	Calm	10.00	A Few Clouds	FEW120	79	71			77%	NA	82	30.04	1017.1
09	21:56	NE 5	10.00	Fair	CLR	79	71			77%	NA	82	30.04	1017.2
09	20:56	NE 9	10.00	Fair	CLR	80	70			71%	NA	83	30.02	1016.6
09	19:56	NE 16 G 21	10.00	Partly Cloudy	SCT100	83	75	91	82	77%	NA	90	30.01	1016.0

6/12/2020

National Weather Service : Observed Weather for past 3 Days : Kissimmee Gateway Airport

Day	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air Temperature (°F)	Dwpt (°F)	Max. 6 hour Temperature (°F)	Min. 6 hour Temperature (°F)	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.)	sea level (mb)	1 hr Precipitation (in.)	3 hr Precipitation (in.)	6 hr Precipitation (in.)
09	18:56	S 9	10.00	Partly Cloudy	SCT040	86	77			75%	NA	97	29.98	1015.2			
09	17:56	NW 3	10.00	Partly Cloudy	FEW030 SCT070	89	74			61%	NA	98	29.97	1014.8			
09	16:56	W 9	10.00	Rain	FEW043 BKN070 OVC085	85	79			82%	NA	98	29.97	1014.8			
09	15:56	S 5	10.00	Partly Cloudy	SCT050	90	73			58%	NA	99	29.99	1015.3			

National Weather Service
 Southern Region Headquarters
 Fort Worth, Texas
[Disclaimer](#)

[Back to previous page](#)

Last Modified: Febuary, 7 2012
[Privacy Policy](#)



Weather observations for the past three days



Kissimmee Gateway Airport

Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)				Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt	6 hour					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
								Max.	Min.								
10	08:56	S 3	10.00	Fair	CLR	82	77			85%	NA	90	30.06	1017.9			
10	07:56	Calm	10.00	Fair	CLR	79	76	79	75	90%	NA	83	30.04	1017.2			
10	06:56	E 3	10.00	Fair	CLR	76	75			97%	NA	75	30.03	1016.7			
10	05:56	Calm	10.00	A Few Clouds	FEW048	75	74			96%	NA	NA	30.01	1016.3			
10	04:56	Calm	10.00	Fair	CLR	76	74			94%	NA	76	30.00	1015.8			
10	03:56	Calm	10.00	Fair	CLR	76	74			94%	NA	76	30.00	1015.8			
10	02:56	Calm	10.00	Fair	CLR	76	74			94%	NA	76	30.01	1016.1			
10	01:56	Calm	10.00	Mostly Cloudy	BKN060	76	74	83	76	94%	NA	76	30.03	1016.7			
10	00:56	Calm	10.00	Fair	CLR	77	73			88%	NA	78	30.03	1016.7			
09	23:56	Calm	10.00	Fair	CLR	77	73			88%	NA	78	30.03	1017.0			
09	22:56	Calm	10.00	A Few Clouds	FEW120	79	71			77%	NA	82	30.04	1017.1			
09	21:56	NE 5	10.00	Fair	CLR	79	71			77%	NA	82	30.04	1017.2			
09	20:56	NE 9	10.00	Fair	CLR	80	70			71%	NA	83	30.02	1016.6			
09	19:56	NE 16 G 21	10.00	Partly Cloudy	SCT100	83	75	91	82	77%	NA	90	30.01	1016.0			
09	18:56	S 9	10.00	Partly Cloudy	SCT040	86	77			75%	NA	97	29.98	1015.2			
09	17:56	NW 3	10.00	Partly Cloudy	FEW030 SCT070	89	74			61%	NA	98	29.97	1014.8			
09	16:56	W 9	10.00	Rain	FEW043 BKN070 OVC085	85	79			82%	NA	98	29.97	1014.8			
09	15:56	S 5	10.00	Partly Cloudy	SCT050	90	73			58%	NA	99	29.99	1015.3			
09	14:56	Calm	10.00	Partly Cloudy	SCT060	89	74			61%	NA	98	29.99	1015.6			
09	13:56	Vrbl 5	10.00	A Few Clouds	FEW035	90	74	90	79	59%	NA	99	30.01	1016.1			
09	12:56	SE 5	10.00	Fair	CLR	87	74			65%	NA	95	30.03	1016.7			
09	11:56	SE 5	10.00	Fair	CLR	86	74			67%	NA	94	30.03	1016.7			
09	10:56	S 6	10.00	Fair	CLR	86	76			72%	NA	96	30.03	1016.7			
09	09:56	Calm	10.00	Fair	CLR	82	78			88%	NA	91	30.02	1016.5			
09	08:56	SE 3	10.00	Fair	CLR	80	77			90%	NA	86	30.02	1016.4			
09	07:56	E 5	10.00	Fair	CLR	79	76	79	76	90%	NA	83	30.00	1016.0			
09	06:56	Calm	9.00	Fair	CLR	77	76			96%	NA	78	29.99	1015.5			
09	05:56	Calm	10.00	Fair	CLR	76	75			97%	NA	75	29.98	1015.0			
09	04:56	Calm	10.00	Fair	CLR	78	76			93%	NA	81	29.97	1014.8			

6/10/2020

National Weather Service : Observed Weather for past 3 Days : Kissimmee Gateway Airport

09 03:56	Calm	10.00	Fair	CLR	77	76			96%	NA	78	29.97	1014.7
09 02:56	Calm	10.00	Fair	CLR	78	77			97%	NA	81	29.98	1015.1
09 01:56	Calm	10.00	Fair	CLR	78	77	85	77	97%	NA	81	29.99	1015.5
09 00:56	Calm	10.00	Fair	CLR	78	76			93%	NA	81	30.00	1015.8
08 23:56	Calm	10.00	Fair	CLR	79	76			90%	NA	83	30.01	1016.1
08 22:56	SE 5	10.00	Fair	CLR	79	76			90%	NA	83	30.01	1016.1
08 21:56	E 7	10.00	Fair	CLR	80	76			87%	NA	85	30.00	1015.9
08 20:56	E 7	10.00	Fair	CLR	81	77			88%	NA	88	30.00	1015.7
08 19:56	E 5	10.00	Fair	CLR	84	78	92	84	82%	NA	95	29.98	1015.0
08 18:56	Calm	10.00	Fair	CLR	87	76			70%	NA	98	29.98	1015.0
08 17:56	Calm	10.00	Fair	CLR	86	76			72%	NA	96	29.97	1014.8
08 16:56	Calm	10.00	A Few Clouds	FEW070	85	76			75%	NA	95	29.98	1015.2
08 15:56	N 3	10.00	A Few Clouds	FEW120	84	77			80%	NA	94	30.00	1015.7
08 14:56	NW 12	10.00	Mostly Cloudy	SCT055 BKN095	87	77			72%	NA	99	30.00	1015.7
08 13:56	SW 12 G 21	10.00	Fair	CLR	92	72	92	78	52%	NA	100	29.99	1015.6
08 12:56	S 15	10.00	Mostly Cloudy	BKN040 BKN049	91	74			57%	NA	100	30.00	1015.6
08 11:56	S 13 G 16	10.00	A Few Clouds	FEW026	90	75			62%	NA	101	30.01	1016.1
08 10:56	S 10	10.00	A Few Clouds	FEW014	87	78			75%	NA	100	30.01	1016.2
08 09:56	S 7	10.00	Mostly Cloudy	BKN011	84	80			88%	NA	97	30.01	1016.3
08 08:56	S 7	10.00	A Few Clouds	FEW080	81	79			94%	NA	89	30.01	1016.0
08 07:56	SE 5	7.00	Overcast	OVC060	78	78	78	76	100%	NA	81	30.00	1015.6
08 06:56	E 3	4.00	Fog/Mist	SCT070	77	77			100%	NA	78	29.99	1015.3
08 05:56	SE 3	7.00	Fair	CLR	77	77			100%	NA	78	29.96	1014.4
08 04:56	Calm	9.00	Fair	CLR	77	77			100%	NA	78	29.93	1013.6
08 03:56	S 6	10.00	Fair	CLR	77	76			96%	NA	78	29.94	1013.6
08 02:56	S 6	10.00	Overcast	OVC110	77	76			96%	NA	78	29.93	1013.6
08 01:56	S 6	10.00	Fair	CLR	76	76	78	76	100%	NA	75	29.94	1013.9
08 00:56	SE 5	10.00	Fair	CLR	76	75			97%	NA	75	29.96	1014.3
07 23:56	SE 5	10.00	Partly Cloudy	SCT110	77	76			96%	NA	78	29.97	1014.8
07 22:56	E 5	10.00	Partly Cloudy	FEW055 SCT070	77	76			96%	NA	78	29.98	1015.2
07 21:56	Vrbl 3	10.00	Overcast	BKN050 OVC065	77	76			96%	NA	78	29.98	1015.2
07 20:56	SW 7	3.00	Heavy Rain Fog/Mist	BKN048 BKN060 OVC085	76	75			97%	NA	75	29.97	1014.9
07 19:56	E 5	10.00	Mostly Cloudy	FEW055 SCT075 BKN100	77	76	88	76	96%	NA	78	29.94	1013.9
07 18:56	Calm	10.00	Light Rain	BKN055 OVC075	77	74			90%	NA	78	29.95	1014.1
07 17:56	SE 8	9.00	Light	SCT085	86	76			72%	NA	96	29.93	1013.6

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air Temperature (°F)	Dwpt (°F)	Max. Min. Temperature (°F)		Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.) Pressure	sea level (mb)	Precipitation (in.)			
								6 hour	6 hour						1 hr	3 hr	6 hr	
				Rain														
07	16:56	SE 10	10.00	Partly Cloudy	SCT050	86	77			75%	NA	97	29.93					
07	15:56	SE 8	10.00	Mostly Cloudy	FEW040 BKN120	85	77			77%	NA	96	29.94					
07	14:56	SE 12	10.00	Mostly Cloudy	BKN120	85	78			80%	NA	97	29.96					
07	13:56	SE 7	10.00	A Few Clouds	FEW021	84	79	84	78	85%	NA	96	29.97					
07	12:56	S 9	10.00	A Few Clouds	FEW015	83	78			85%	NA	93	29.98					
07	11:56	S 12	10.00	Fair	CLR	83	78			85%	NA	93	29.97					
07	10:56	S 9	10.00	Partly Cloudy	SCT017 SCT021	81	78			91%	NA	89	29.97					
07	09:56	S 10	9.00	Partly Cloudy	SCT008	81	79			94%	NA	89	29.96					



Weather observations for the past three days



Kissimmee Gateway Airport

Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)				Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt	6 hour					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
05	11:56	SE 8	10.00	Fair	CLR	83	77			82%	NA	92	30.08	1018.5			
05	10:56	Calm	10.00	Fair	CLR	80	75			85%	NA	85	30.09	1018.8			
05	09:56	Vrbl 3	10.00	Partly Cloudy	SCT120	77	75			94%	NA	78	30.07	1018.2			
05	08:56	Calm	10.00	Fair	CLR	76	74			94%	NA	76	30.06	1017.8			
05	07:56	Calm	10.00	NA	NA	74	73	74	72	97%	NA	NA	30.05	1017.5			
05	06:56	NA	10.00	Overcast	OVC110	72	72			100%	NA	NA	30.04	1017.4			
05	05:56	Calm	10.00	Overcast	OVC100	72	72			100%	NA	NA	30.03	1017.1			
05	04:56	Calm	10.00	Light Rain	SCT100 BKN120	72	72			100%	NA	NA	30.03	1017.0			
05	03:56	Calm	10.00	Light Rain	FEW055 BKN110	72	72			100%	NA	NA	30.03	1016.8			
05	02:56	S 5	10.00	Partly Cloudy	SCT110	72	72			100%	NA	NA	30.03	1016.8			
05	01:56	Calm	10.00	Fair	CLR	72	72	73	72	100%	NA	NA	30.02	1016.6			
05	00:56	S 5	10.00	Fair	CLR	72	72			100%	NA	NA	30.02	1016.7			
04	23:56	S 6	10.00	Fair	CLR	72	72			100%	NA	NA	30.02	1016.5			
04	22:56	S 3	10.00	Fair	CLR	72	72			100%	NA	NA	30.01	1016.3			
04	21:56	S 3	10.00	A Few Clouds	FEW004	72	72			100%	NA	NA	30.01	1016.2			
04	20:56	S 3	10.00	Fair	CLR	73	72			96%	NA	NA	30.02	1016.4			
04	19:56	SW 5	10.00	Mostly Cloudy	BKN008	73	72	74	73	96%	NA	NA	30.01	1016.1			
04	18:56	SE 8	10.00	Mostly Cloudy	FEW005 SCT033 BKN070	73	72			96%	NA	NA	30.01	1016.1			
04	17:56	SE 6	10.00	Light Rain	BKN047 OVC065	73	73			100%	NA	NA	30.02	1016.4			
04	16:56	S 6	9.00	Light Rain	FEW003 OVC013	73	72			96%	NA	NA	30.02	1016.4			
04	15:56	S 6	4.00	Heavy Rain Fog/Mist	FEW018 BKN028 OVC033	74	74			100%	NA	NA	30.02	1016.6			
04	14:56	SE 3	2.50	Rain Fog/Mist	OVC055	74	74			100%	NA	NA	30.03	1016.8			
04	13:56	Calm	9.00	Rain	FEW013 SCT031 OVC041	74	73	79	73	97%	NA	NA	30.04	1017.3			
04	12:56	SE 3	9.00	Light Rain	FEW008 BKN049 OVC055	74	73			97%	NA	NA	30.05	1017.6			
04	11:56	SE 9	1.75	Heavy Rain Fog/Mist	FEW007 BKN028 OVC036	73	72			96%	NA	NA	30.04	1017.2			
04	10:56	SE	7.00	Thunderstorm	BKN012	74	73			97%	NA	NA	30.02	1016.5			


		20 G 29	in Vicinity Light Rain		OVC020									
04	09:56	E 9	4.00	Light Rain Fog/Mist	FEW006 SCT010 OVC024	78	75		90%	NA	80	30.02	1016.4	
04	08:56	E 7	10.00	Mostly Cloudy	FEW005 SCT022 BKN060	77	75		94%	NA	78	30.01	1016.3	
04	07:56	Calm	10.00	Mostly Cloudy	SCT005 BKN095	76	75	76	75	97%	NA	75	29.99	1015.6
04	06:56	Calm	10.00	Overcast	FEW065 OVC090	75	75		100%	NA	NA	29.98	1015.2	
04	05:56	Calm	7.00	Light Rain	FEW003 OVC085	75	74		96%	NA	NA	29.97	1014.8	
04	04:56	E 3	10.00	Light Rain	FEW003 OVC090	75	75		100%	NA	NA	29.98	1015.1	
04	03:56	E 3	8.00	Light Rain	SCT055 SCT090 OVC110	75	75		100%	NA	NA	29.98	1015.2	
04	02:56	Calm	10.00	Light Rain	OVC003	75	75		100%	NA	NA	29.98	1015.2	
04	01:56	E 3	8.00	Light Rain	FEW055 SCT075 OVC095	75	75	76	75	100%	NA	NA	30.00	1015.8
04	00:56	Calm	9.00	Light Rain	FEW002 OVC100	75	75		100%	NA	NA	30.02	1016.4	
03	23:56	SE 3	10.00	Light Rain	BKN006 BKN016 OVC026	76	75		97%	NA	75	30.02	1016.6	
03	22:56	Calm	10.00	Light Rain	OVC110	75	75		100%	NA	NA	30.02	1016.4	
03	21:56	E 5	10.00	Mostly Cloudy	BKN120	76	75		97%	NA	75	30.01	1016.3	
03	20:56	SE 3	10.00	Light Rain	SCT090 BKN110	76	75		97%	NA	75	30.01	1016.2	
03	19:56	SE 5	10.00	Light Rain	CLR	76	75	84	76	97%	NA	75	30.02	1016.3
03	18:56	E 6	10.00	Light Rain	FEW050 SCT060	78	73		85%	NA	80	30.00	1015.6	
03	17:56	SE 7	10.00	Mostly Cloudy	BKN042	80	72		76%	NA	84	29.99	1015.6	
03	16:56	E 8	10.00	Fair	CLR	80	72		76%	NA	84	30.00	1015.7	
03	15:56	E 10	10.00	Mostly Cloudy	SCT022 SCT028 BKN039	81	72		74%	NA	85	29.99	1015.6	
03	14:56	SE 13	10.00	Overcast	FEW022 BKN029 OVC070	82	73		74%	NA	87	30.02	1016.5	
03	13:56	SE 9	10.00	Mostly Cloudy	FEW025 SCT041 BKN070	83	71	84	76	67%	NA	88	30.04	1017.2
03	12:56	SE 10 G 18	10.00	A Few Clouds	FEW028	83	72		70%	NA	88	30.06	1017.7	
03	11:56	E 9	10.00	Overcast	FEW024 OVC065	82	73		74%	NA	87	30.07	1018.3	
03	10:56	E 10	10.00	Overcast	SCT025 BKN070 OVC085	80	72		76%	NA	84	30.09	1018.7	
03	09:56	E 9	10.00	Overcast	BKN060	79	72		79%	NA	82	30.08	1018.7	

OVC075

03	08:56	E 6	10.00	Overcast	OVC070	78	72			82%	NA	80	30.10	1019.1
03	07:56	E 7	10.00	Overcast	BKN065	76	72	76	75	88%	NA	76	30.08	1018.7
					OVC085									
03	06:56	NE 3	10.00	Overcast	OVC065	75	72			90%	NA	NA	30.06	1018.0
03	05:56	E 6	10.00	Overcast	BKN065	75	72			90%	NA	NA	30.06	1018.0
					OVC085									
03	04:56	E 6	10.00	Overcast	BKN070	76	72			88%	NA	76	30.06	1017.7
					OVC080									
03	03:56	E 5	10.00	Overcast	OVC070	76	72			88%	NA	76	30.07	1018.0
03	02:56	E 6	10.00	Overcast	OVC070	76	72			88%	NA	76	30.08	1018.4
03	01:56	E 7	10.00	Overcast	OVC075	76	72	77	76	88%	NA	76	30.10	1019.1
03	00:56	E 7	10.00	Overcast	OVC080	76	72			88%	NA	76	30.13	1020.1
02	23:56	E 5	10.00	Overcast	FEW021	76	72			88%	NA	76	30.13	1020.3
					BKN065									
					OVC080									
02	22:56	E 6	10.00	Overcast	FEW055	76	73			91%	NA	76	30.13	1020.3
					OVC070									
02	21:56	E 9	10.00	Overcast	OVC055	77	72			85%	NA	78	30.12	1019.8
02	20:56	E 8	10.00	Overcast	BKN043	77	73			88%	NA	78	30.11	1019.6
					OVC065									
02	19:56	SE 9	10.00	Overcast	FEW030	77	73	81	76	88%	NA	78	30.10	1019.2
					OVC060									
02	18:56	E 13	10.00	Overcast	FEW032	77	73			88%	NA	78	30.09	1018.9
					SCT039									
					OVC060									
02	17:56	E 10 G 20	4.00	Light Rain Fog/Mist	SCT017	77	74			90%	NA	78	30.09	1018.8
					BKN049									
					OVC100									
02	16:56	E 12	10.00	Mostly Cloudy	SCT015	80	74			82%	NA	85	30.10	1019.1
					BKN020									
					BKN090									
02	15:56	SE 10	10.00	Overcast	BKN009	78	74			87%	NA	80	30.12	1019.7
					OVC080									
02	14:56	E 13	10.00	Overcast	FEW010	76	74			94%	NA	76	30.14	1020.4
					OVC080									
02	13:56	E 13	3.00	Light Rain Fog/Mist	FEW016	76	74	79	75	94%	NA	76	30.15	1021.0
					OVC070									
02	12:56	E 17	10.00	Overcast	FEW016	78	73			85%	NA	80	30.16	1021.1
					SCT022									
					OVC080									


Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air	Dwpt	Max. Min.	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.)	sea level (mb)	1	3	6
						Temperature (°F)								hr	hr	hr
													Precipitation (in.)			

weather.gov



Weather observations for the past three days

Kissimmee Gateway Airport



Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)				Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt	6 hour Max. Min.					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
02	10:56	E 13	10.00	Overcast	BKN010 OVC065	77	73			88%	NA	78	30.17	1021.5			
02	09:56	E 13	5.00	Light Rain Fog/Mist	FEW010 BKN029 OVC055	76	74			94%	NA	76	30.17	1021.5			
02	08:56	E 12	10.00	Mostly Cloudy	BKN038 BKN090	76	73			91%	NA	76	30.15	1021.0			
02	07:56	E 8	10.00	Mostly Cloudy	BKN045	75	73	76	75	94%	NA	NA	30.14	1020.4			
02	06:56	E 12	10.00	Overcast	FEW011 OVC024	75	73			94%	NA	NA	30.12	1019.9			
02	05:56	E 9	10.00	Overcast	BKN011 OVC030	75	73			94%	NA	NA	30.10	1019.3			
02	04:56	E 8	10.00	Fair	CLR	76	73			91%	NA	76	30.10	1019.2			
02	03:56	E 7	10.00	Overcast	SCT011 OVC055	75	73			94%	NA	NA	30.10	1019.2			
02	02:56	E 10	10.00	Mostly Cloudy	BKN013 BKN022 BKN032	76	73			91%	NA	76	30.12	1019.8			
02	01:56	NE 10	10.00	Overcast	SCT012 OVC055	76	74	82	76	94%	NA	76	30.14	1020.4			
02	00:56	E 9	10.00	Overcast	FEW012 BKN025 OVC029	77	74			90%	NA	78	30.15	1020.8			
01	23:56	NE 9	10.00	Mostly Cloudy	BKN018	78	75			90%	NA	80	30.15	1021.0			
01	22:56	E 8 G 18	7.00	Light Rain	SCT022 SCT043	78	74			87%	NA	80	30.15	1020.8			
01	21:56	E 10	10.00	Fair	CLR	79	73			82%	NA	82	30.12	1020.0			
01	20:56	E 10	10.00	Fair	CLR	80	73			79%	NA	84	30.10	1019.3			
01	19:56	E 15	10.00	Fair	CLR	82	72	90	82	72%	NA	87	30.09	1019.0			
01	18:56	E 18 G 24	10.00	Partly Cloudy	SCT040	84	72			67%	NA	90	30.07	1018.3			
01	17:56	E 15	10.00	Overcast	FEW035 BKN065 OVC085	86	73			65%	NA	93	30.06	1018.0			
01	16:56	E 16	10.00	Partly Cloudy	SCT040	87	72			61%	NA	93	30.07	1018.1			
01	15:56	E 18 G 22	10.00	A Few Clouds	FEW041	89	71			55%	NA	95	30.07	1018.3			
01	14:56		10.00	Partly Cloudy	SCT038	88	71			57%	NA	94	30.08	1018.6			

		NE 16 G 23												
01	13:56	NE 12 G 21	10.00	Mostly Cloudy	SCT036 BKN048	89	72	89	78	57%	NA	96	30.09	1018.9
01	12:56	E 13	10.00	Partly Cloudy	SCT029	87	73			63%	NA	94	30.10	1019.2
01	11:56	E 13	10.00	Fair	CLR	86	73			65%	NA	93	30.11	1019.5
01	10:56	NE 12	10.00	Fair	CLR	84	71			65%	NA	89	30.10	1019.3
01	09:56	E 8	10.00	Fair	CLR	82	75			79%	NA	89	30.10	1019.1
01	08:56	E 9	10.00	Fair	CLR	80	76			87%	NA	85	30.09	1018.8
01	07:56	E 8	10.00	Fair	CLR	78	75	79	77	90%	NA	80	30.06	1017.9
01	06:56	E 7	10.00	Fair	CLR	77	75			94%	NA	78	30.04	1017.3
01	05:56	NE 7	10.00	Fair	CLR	78	75			90%	NA	80	30.03	1016.9
01	04:56	Calm	10.00	Fair	CLR	78	75			90%	NA	80	30.02	1016.4
01	03:56	E 3	10.00	Fair	CLR	78	75			90%	NA	80	30.02	1016.4
01	02:56	SE 3	10.00	Fair	CLR	78	75			90%	NA	80	30.01	1016.2
01	01:56	SE 5	10.00	Fair	CLR	79	76	87	79	90%	NA	83	30.02	1016.6
01	00:56	SE 6	10.00	Fair	CLR	79	75			88%	NA	83	30.04	1017.2
31	23:56	SE 7	10.00	Partly Cloudy	SCT055 SCT095	81	75			82%	NA	87	30.04	1017.3
31	22:56	SE 6	10.00	Overcast	OVC060	82	75			79%	NA	89	30.05	1017.5
31	21:56	E 8	10.00	Mostly Cloudy	BKN060	83	75			77%	NA	90	30.02	1016.6
31	20:56	E 9	10.00	Overcast	OVC095	83	76			79%	NA	91	30.01	1016.0
31	18:56	W 7	10.00	A Few Clouds	FEW070	91	69			49%	NA	96	29.96	1014.5
31	17:56	NW 7	10.00	Fair	CLR	92	69			47%	NA	97	29.96	1014.4
31	16:56	SW 7	10.00	A Few Clouds	FEW050	93	70			47%	NA	99	29.97	1014.9
31	15:56	W 7	10.00	Mostly Cloudy	BKN060	92	68			46%	NA	96	29.99	1015.5
31	14:56	W 7	10.00	A Few Clouds	FEW047	91	69			49%	NA	96	30.01	1016.1
31	13:56	W 9	10.00	Mostly Cloudy	SCT038 BKN045	90	72	90	73	56%	NA	98	30.03	1016.7
31	12:56	Vrbl 6	10.00	A Few Clouds	FEW025	88	73			61%	NA	96	30.04	1017.2
31	11:56	W 6	10.00	Partly Cloudy	SCT025	86	73			65%	NA	93	30.06	1017.8
31	10:56	NW 6	10.00	Mostly Cloudy	BKN017	84	74			72%	NA	91	30.07	1018.0
31	09:56	NW 5	10.00	Partly Cloudy	SCT013	81	74			79%	NA	86	30.06	1018.0
31	08:56	Calm	10.00	Fair	CLR	78	73			85%	NA	80	30.06	1017.8
31	07:56	Calm	10.00	Fair	CLR	73	72	73	70	96%	NA	NA	30.03	1016.8
31	06:56	Calm	10.00	Fair	CLR	71	70			96%	NA	NA	30.02	1016.4
31	05:56	Calm	10.00	Fair	CLR	71	70			96%	NA	NA	30.02	1016.4
31	04:56	Calm	10.00	Fair	CLR	71	70			96%	NA	NA	30.01	1016.0
31	03:56	Calm	10.00	Fair	CLR	70	69			97%	NA	NA	30.00	1015.9
31	02:56	W 3	10.00	Fair	CLR	70	69			97%	NA	NA	30.01	1016.0
31	01:56	Calm	10.00	Fair	CLR	70	69	81	70	97%	NA	NA	30.03	1016.7

31	00:56	Calm	10.00	Fair	CLR	71	70			96%	NA	NA	30.04	1017.2
30	23:56	Calm	10.00	Fair	CLR	71	69			94%	NA	NA	30.05	1017.5
30	22:56	SW 5	10.00	Fair	CLR	73	71			94%	NA	NA	30.05	1017.6
30	21:56	S 9	10.00	Overcast	FEW044 BKN070 OVC080	71	70			96%	NA	NA	30.04	1017.2
30	20:56	NW 7 G 20	10.00	Thunderstorm Rain	FEW007 BKN020 OVC055	71	70			96%	NA	NA	30.06	1018.0
30	19:56	S 9	10.00	Thunderstorm	CLR	81	75	93	81	82%	NA	87	29.97	1014.9
30	18:56	S 10	10.00	Mostly Cloudy	BKN050	82	75			79%	NA	89	29.95	1014.2
30	17:56	SE 9	10.00	Fair	CLR	85	74			70%	NA	93	29.96	1014.5
30	16:56	N 6	10.00	A Few Clouds	FEW060	92	70			49%	NA	98	29.96	1014.5
30	15:56	NW 5	10.00	Fair	CLR	91	71			52%	NA	98	29.98	1015.1
30	14:56	Vrbl 6	10.00	Fair	CLR	91	72			54%	NA	99	29.99	1015.6
30	13:56	NW 8	10.00	Mostly Cloudy	BKN029	88	75	90	77	66%	NA	98	30.01	1016.3
30	12:56	Vrbl 5	10.00	Mostly Cloudy	BKN029	90	74			59%	NA	99	30.03	1017.0
30	11:56	SW 7	10.00	Mostly Cloudy	BKN019	86	75			70%	NA	95	30.05	1017.4

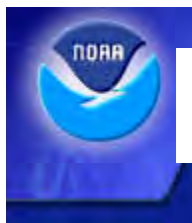
Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air Temperature (°F)	Dwpt	Max. Min. 6 hour		Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.) Pressure	sea level (mb)	Precipitation (in.)		
															1 hr	3 hr	6 hr

National Weather Service
Southern Region Headquarters
Fort Worth, Texas
[Disclaimer](#)

[Back to previous page](#)

Last Modified: Febuary, 7 2012
[Privacy Policy](#)

weather.gov



Weather observations for the past three days



Kissimmee Gateway Airport

Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)		6 hour Max. Min.	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
01	14:56	NE 16 G 23	10.00	Partly Cloudy	SCT038	88	71		57%	NA	94	30.08	1018.6			
01	13:56	NE 12 G 21	10.00	Mostly Cloudy	SCT036 BKN048	89	72	89 78	57%	NA	96	30.09	1018.9			
01	12:56	E 13	10.00	Partly Cloudy	SCT029	87	73		63%	NA	94	30.10	1019.2			
01	11:56	E 13	10.00	Fair	CLR	86	73		65%	NA	93	30.11	1019.5			
01	10:56	NE 12	10.00	Fair	CLR	84	71		65%	NA	89	30.10	1019.3			
01	09:56	E 8	10.00	Fair	CLR	82	75		79%	NA	89	30.10	1019.1			
01	08:56	E 9	10.00	Fair	CLR	80	76		87%	NA	85	30.09	1018.8			
01	07:56	E 8	10.00	Fair	CLR	78	75	79 77	90%	NA	80	30.06	1017.9			
01	06:56	E 7	10.00	Fair	CLR	77	75		94%	NA	78	30.04	1017.3			
01	05:56	NE 7	10.00	Fair	CLR	78	75		90%	NA	80	30.03	1016.9			
01	04:56	Calm	10.00	Fair	CLR	78	75		90%	NA	80	30.02	1016.4			
01	03:56	E 3	10.00	Fair	CLR	78	75		90%	NA	80	30.02	1016.4			
01	02:56	SE 3	10.00	Fair	CLR	78	75		90%	NA	80	30.01	1016.2			
01	01:56	SE 5	10.00	Fair	CLR	79	76	87 79	90%	NA	83	30.02	1016.6			
01	00:56	SE 6	10.00	Fair	CLR	79	75		88%	NA	83	30.04	1017.2			
31	23:56	SE 7	10.00	Partly Cloudy	SCT055 SCT095	81	75		82%	NA	87	30.04	1017.3			
31	22:56	SE 6	10.00	Overcast	OVC060	82	75		79%	NA	89	30.05	1017.5			
31	21:56	E 8	10.00	Mostly Cloudy	BKN060	83	75		77%	NA	90	30.02	1016.6			
31	20:56	E 9	10.00	Overcast	OVC095	83	76		79%	NA	91	30.01	1016.0			
31	18:56	W 7	10.00	A Few Clouds	FEW070	91	69		49%	NA	96	29.96	1014.5			
31	17:56	NW 7	10.00	Fair	CLR	92	69		47%	NA	97	29.96	1014.4			
31	16:56	SW 7	10.00	A Few Clouds	FEW050	93	70		47%	NA	99	29.97	1014.9			
31	15:56	W 7	10.00	Mostly Cloudy	BKN060	92	68		46%	NA	96	29.99	1015.5			
31	14:56	W 7	10.00	A Few Clouds	FEW047	91	69		49%	NA	96	30.01	1016.1			
31	13:56	W 9	10.00	Mostly Cloudy	SCT038 BKN045	90	72	90 73	56%	NA	98	30.03	1016.7			
31	12:56	Vrbl 6	10.00	A Few Clouds	FEW025	88	73		61%	NA	96	30.04	1017.2			
31	11:56	W 6	10.00	Partly Cloudy	SCT025	86	73		65%	NA	93	30.06	1017.8			
31	10:56	NW 6	10.00		BKN017	84	74		72%	NA	91	30.07	1018.0			

29	22:56	E 5	10.00	Mostly Cloudy	BKN065	78	72		82%	NA	80	30.10	1019.1
29	21:56	NE 9	10.00	Partly Cloudy	SCT024	78	72		82%	NA	80	30.08	1018.4
29	20:56	N 7	9.00	Thunderstorm in Vicinity	FEW095	78	73		85%	NA	80	30.08	1018.4
29	19:56	NW 13	10.00	Thunderstorm in Vicinity	FEW060 BKN085	80	72	91 80	76%	NA	84	30.05	1017.5
29	18:56	SE 9	10.00	Fair	CLR	83	74		74%	NA	90	30.02	1016.5
29	17:56	E 10	10.00	Partly Cloudy	SCT050	86	74		67%	NA	94	30.00	1015.9
29	16:56	E 12	10.00	A Few Clouds	FEW001	87	71		59%	NA	93	30.00	1015.7
29	15:56	S 7	10.00	A Few Clouds	FEW041	90	73		58%	NA	99	30.01	1016.1

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air Temperature (°F)	Dwpt	Max. Min. 6 hour		Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.) Pressure	sea level (mb)	Precipitation (in.)		
															1 hr	3 hr	6 hr

National Weather Service
 Southern Region Headquarters
 Fort Worth, Texas
[Disclaimer](#)

[Back to previous page](#)

Last Modified: Febuary, 7 2012
[Privacy Policy](#)

weather.gov



Weather observations for the past three days



Kissimmee Gateway Airport

Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)		6 hour Max. Min.	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
28	16:56	NW 12 G 23	10.00	Thunderstorm	BKN050	83	69		63%	NA	87	30.04	1017.0			
28	15:56	S 7	10.00	Fair	CLR	90	73		58%	NA	99	30.01	1016.0			
28	14:56	S 10	10.00	Fair	CLR	90	75		62%	NA	101	30.02	1016.3			
28	13:56	S 5	10.00	Partly Cloudy	SCT040	89	75	89 75	63%	NA	99	30.06	1017.8			
28	12:56	SE 8	9.00	Partly Cloudy	SCT022 SCT028	85	77		77%	NA	96	30.08	1018.7			
28	11:56	S 6	10.00	Mostly Cloudy	SCT015 BKN022 BKN027	85	77		77%	NA	96	30.10	1019.2			
28	10:56	S 7	10.00	Mostly Cloudy	SCT008 BKN015	82	78		88%	NA	91	30.10	1019.3			
28	09:56	SW 3	9.00	Overcast	OVC006	79	77		94%	NA	83	30.10	1019.3			
28	08:56	S 6	2.00	Fog/Mist	OVC002	76	76		100%	NA	75	30.09	1018.9			
28	07:56	S 3	0.50	Fog	OVC002	75	75	75 72	100%	NA	NA	30.07	1018.1			
28	06:56	S 3	0.50	Fog	OVC004	73	73		100%	NA	NA	30.05	1017.6			
28	05:56	Calm	10.00	Fair	CLR	73	72		96%	NA	NA	30.04	1017.2			
28	04:56	Calm	10.00	A Few Clouds	FEW023	73	72		96%	NA	NA	30.03	1017.0			
28	03:56	Calm	10.00	Fair	CLR	73	72		96%	NA	NA	30.04	1017.2			
28	02:56	SW 5	10.00	Fair	CLR	72	72		100%	NA	NA	30.04	1017.1			
28	01:56	Calm	10.00	Fair	CLR	73	72	76 73	96%	NA	NA	30.04	1017.2			
28	00:56	S 3	10.00	Fair	CLR	73	72		96%	NA	NA	30.05	1017.4			
27	23:56	SE 8	10.00	Fair	CLR	73	72		96%	NA	NA	30.03	1016.9			
27	22:56	S 3	10.00	Fair	CLR	74	73		97%	NA	NA	30.02	1016.3			
27	21:56	S 3	10.00	Fair	CLR	74	73		97%	NA	NA	30.01	1016.0			
27	20:56	S 10	10.00	Fair	CLR	75	73		94%	NA	NA	30.01	1016.1			
27	19:56	S 3	10.00	Light Rain	BKN065 BKN080	75	74	83 75	96%	NA	NA	29.99	1015.4			
27	18:56	N 7	6.00	Thunderstorm in Vicinity Rain Fog/Mist	FEW018 BKN040 OVC055	75	74		96%	NA	NA	30.01	1016.0			
27	17:56	SE 8	10.00	Overcast	FEW026 BKN046 OVC075	81	74		79%	NA	86	29.96	1014.5			
27	16:56	E 9	10.00	Fair	CLR	83	72		70%	NA	88	29.97	1014.7			
27	15:56	SE 10	10.00	Fair	CLR	81	70		69%	NA	84	29.94	1013.8			

27	14:56	Vrbl 3	10.00	Fair	CLR	78	71			79%	NA	80	29.95	1014.2
27	12:56	Calm	10.00	Light Rain	FEW060 BKN075	75	71			88%	NA	NA	29.97	1014.7
27	11:56	SW 12	9.00	Thunderstorm in Vicinity	BKN024 BKN030	85	74			70%	NA	93	29.96	1014.6
27	10:56	S 12 G 18	10.00	Thunderstorm in Vicinity	FEW018 BKN041 OVC090	85	75			72%	NA	93	29.97	1014.7
27	09:56	SW 8	10.00	Mostly Cloudy	SCT014 BKN023	82	76			82%	NA	89	29.98	1015.0
27	08:56	SW 8	10.00	Mostly Cloudy	BKN010	80	76			87%	NA	85	29.97	1014.7
27	07:56	SW 7	10.00	Mostly Cloudy	FEW004 BKN018	77	76	77	74	96%	NA	78	29.95	1014.1
27	06:56	Calm	9.00	Mostly Cloudy	BKN055	75	75			100%	NA	NA	29.94	1013.9
27	05:56	Calm	10.00	Thunderstorm	FEW006 OVC022	76	75			97%	NA	75	29.93	1013.5
27	04:56	S 5	10.00	Overcast	OVC012	76	74			94%	NA	76	29.93	1013.3
27	03:56	Calm	10.00	Overcast	OVC010	74	73			97%	NA	NA	29.91	1012.7
27	02:56	Calm	10.00	A Few Clouds	FEW016	76	73			91%	NA	76	29.89	1012.2
27	01:56	SW 5	10.00	Mostly Cloudy	FEW020 BKN028	76	74	85	76	94%	NA	76	29.91	1012.8
27	00:56	W 7	10.00	A Few Clouds	FEW050	76	73			91%	NA	76	29.92	1013.1
26	23:56	Calm	10.00	Mostly Cloudy	FEW030 SCT036 BKN047	77	74			90%	NA	78	29.91	1012.8
26	22:56	Vrbl 3	10.00	Partly Cloudy	SCT029 SCT043	77	73			88%	NA	78	29.92	1013.2
26	21:56	Calm	10.00	A Few Clouds	FEW036	77	72			85%	NA	78	29.91	1012.7
26	20:56	Calm	10.00	Mostly Cloudy	BKN041	79	71			77%	NA	82	29.89	1012.2
26	19:56	N 5	10.00	Thunderstorm in Vicinity	SCT049 BKN055	84	75	88	84	74%	NA	92	29.88	1011.8
26	18:56	E 5	10.00	Thunderstorm in Vicinity	SCT036 SCT045	86	75			70%	NA	95	29.84	1010.5
26	17:56	SE 5	10.00	A Few Clouds	FEW042	87	74			65%	NA	95	29.84	1010.3
26	16:56	S 6	7.00	A Few Clouds	FEW050	87	74			65%	NA	95	29.83	1010.2
26	15:56	W 9	10.00	Partly Cloudy	SCT030	85	74			70%	NA	93	29.85	1010.7
26	14:56	SW 9	10.00	Mostly Cloudy	BKN033	86	73			65%	NA	93	29.87	1011.2
26	13:56	SW 6	10.00	Overcast	BKN028 OVC038	86	74	86	76	67%	NA	94	29.88	1011.7
26	12:56	W 7	10.00	Mostly Cloudy	BKN024	85	74			70%	NA	93	29.89	1012.1
26	11:56	W 9	10.00	Mostly Cloudy	SCT019 BKN028	84	73			70%	NA	90	29.89	1012.1
26	10:56	W 10	10.00	Mostly Cloudy	BKN017 BKN028	82	74			77%	NA	88	29.88	1011.9
26	09:56	W 7	10.00	Overcast	OVC011	80	74			82%	NA	85	29.88	1011.7
26	08:56	W 5	10.00	Overcast	OVC010	77	75			94%	NA	78	29.87	1011.4

D a t e	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Air Temp	Dwpt Temperature (°F)	Max. 6 hour	Min.	Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.) Pressure	sea level (mb)	1 hr Precipitation (in.)	3 hr	6 hr
26	07:56	NW 5	10.00	Overcast	OVC007	76	75	76	74	97%	NA	75	29.87	1011.4			
26	06:56	Calm	10.00	Overcast	FEW009 BKN016 OVC031	75	74			96%	NA	NA	29.86	1010.9			
26	05:56	E 7	10.00	Overcast	BKN009 OVC013	75	74			96%	NA	NA	29.85	1010.8			
26	04:56	E 6	10.00	Overcast	SCT009 OVC016	74	73			97%	NA	NA	29.85	1010.7			
26	03:56	NE 7	10.00	Mostly Cloudy	BKN009	74	73			97%	NA	NA	29.86	1010.9			
26	02:56	E 8	10.00	Mostly Cloudy	BKN029 BKN090	75	73			94%	NA	NA	29.86	1011.2			
26	01:56	E 9	10.00	Overcast	FEW011 BKN019 OVC090	74	73	74	73	97%	NA	NA	29.89	1012.1			
26	00:56	E 13	10.00	Overcast	SCT009 BKN026 OVC037	74	72			94%	NA	NA	29.90	1012.6			
25	23:56	E 13	10.00	Overcast	BKN011 BKN042 OVC060	74	72			94%	NA	NA	29.92	1013.2			
25	22:56	E 13	10.00	Light Rain	FEW043 OVC055	73	72			96%	NA	NA	29.93	1013.5			
25	21:56	E 13	10.00	Overcast	BKN010 OVC095	73	71			94%	NA	NA	29.92	1013.2			
25	20:56	E 14	10.00	Overcast	OVC010	73	71			94%	NA	NA	29.91	1012.9			
25	19:56	E 14	10.00	Light Rain	OVC010	73	72	76	73	96%	NA	NA	29.90	1012.4			
25	18:56	E 15	10.00	Light Rain	BKN012 OVC016	75	73			94%	NA	NA	29.90	1012.4			
25	17:56	E 14	7.00	Light Rain	OVC012	76	73			91%	NA	76	29.90	1012.5			

National Weather Service
 Southern Region Headquarters
 Fort Worth, Texas
[Disclaimer](#)

[Back to previous page](#)

Last Modified: Febuary, 7 2012
[Privacy Policy](#)



Weather observations for the past three days




Kissimmee Gateway Airport

Enter Your "City, ST" or zip code

metric


Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)				Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt	6 hour					altimeter (in)	sea level (mb)	1 hr	3 hr	6 hr
26	13:56	SW 6	10.00	Overcast	BKN028 OVC038	86	74	86	76	67%	NA	94	29.88	1011.7			
26	12:56	W 7	10.00	Mostly Cloudy	BKN024	85	74			70%	NA	93	29.89	1012.1			
26	11:56	W 9	10.00	Mostly Cloudy	SCT019 BKN028	84	73			70%	NA	90	29.89	1012.1			
26	10:56	W 10	10.00	Mostly Cloudy	BKN017 BKN028	82	74			77%	NA	88	29.88	1011.9			
26	09:56	W 7	10.00	Overcast	OVC011	80	74			82%	NA	85	29.88	1011.7			
26	08:56	W 5	10.00	Overcast	OVC010	77	75			94%	NA	78	29.87	1011.4			
26	07:56	NW 5	10.00	Overcast	OVC007	76	75	76	74	97%	NA	75	29.87	1011.4			
26	06:56	Calm	10.00	Overcast	FEW009 BKN016 OVC031	75	74			96%	NA	NA	29.86	1010.9			
26	05:56	E 7	10.00	Overcast	BKN009 OVC013	75	74			96%	NA	NA	29.85	1010.8			
26	04:56	E 6	10.00	Overcast	SCT009 OVC016	74	73			97%	NA	NA	29.85	1010.7			
26	03:56	NE 7	10.00	Mostly Cloudy	BKN009	74	73			97%	NA	NA	29.86	1010.9			
26	02:56	E 8	10.00	Mostly Cloudy	BKN029 BKN090	75	73			94%	NA	NA	29.86	1011.2			
26	01:56	E 9	10.00	Overcast	FEW011 BKN019 OVC090	74	73	74	73	97%	NA	NA	29.89	1012.1			
26	00:56	E 13	10.00	Overcast	SCT009 BKN026 OVC037	74	72			94%	NA	NA	29.90	1012.6			
25	23:56	E 13	10.00	Overcast	BKN011 BKN042 OVC060	74	72			94%	NA	NA	29.92	1013.2			
25	22:56	E 13	10.00	Light Rain	FEW043 OVC055	73	72			96%	NA	NA	29.93	1013.5			
25	21:56	E 13	10.00	Overcast	BKN010 OVC095	73	71			94%	NA	NA	29.92	1013.2			
25	20:56	E 14	10.00	Overcast	OVC010	73	71			94%	NA	NA	29.91	1012.9			
25	19:56	E 14	10.00	Light Rain	OVC010	73	72	76	73	96%	NA	NA	29.90	1012.4			
25	18:56	E 15	10.00	Light Rain	BKN012 OVC016	75	73			94%	NA	NA	29.90	1012.4			
25	17:56	E 14	7.00		OVC012	76	73			91%	NA	76	29.90	1012.5			

Light Rain														
25	16:56	NE 13	10.00	Overcast	OVC008	75	72			90%	NA	NA	29.91	1012.7
25	15:56	NE 12	10.00	Overcast	OVC010	74	72			94%	NA	NA	29.90	1012.5
25	14:56	NE 14 G 21	10.00	Overcast	BKN012 OVC028	76	72			88%	NA	76	29.93	1013.5
25	13:56	E 16	10.00	Light Rain	OVC010	75	73	76	71	94%	NA	NA	29.96	1014.3
25	12:56	E 16 G 23	10.00	Overcast	BKN010 OVC022	75	73			94%	NA	NA	29.97	1014.8
25	11:56	E 10	9.00	Light Rain	FEW012 BKN034 OVC050	75	74			96%	NA	NA	29.97	1014.8
25	10:56	E 8	10.00	Overcast	SCT012 OVC040	75	73			94%	NA	NA	29.97	1014.7
25	09:56	SE 6	3.00	Rain Fog/Mist	SCT010 BKN016 OVC040	73	73			100%	NA	NA	29.97	1014.9
25	08:56	Calm	3.00	Rain Fog/Mist	FEW014 BKN021 OVC048	72	72			100%	NA	NA	29.97	1014.8
25	07:56	SE 10	2.00	Rain Fog/Mist	SCT005 BKN011 OVC018	71	70	76	71	96%	NA	NA	29.96	1014.4
25	06:56	E 7	3.00	Rain Fog/Mist	SCT025 BKN039 OVC110	75	72			90%	NA	NA	29.94	1013.6
25	05:56	NE 8	10.00	Overcast	BKN025 OVC030	75	71			88%	NA	NA	29.92	1013.2
25	04:56	E 7	10.00	Light Rain	FEW025 OVC100	75	71			88%	NA	NA	29.93	1013.6
25	03:56	E 8	10.00	Overcast	OVC110	76	71			85%	NA	77	29.93	1013.4
25	02:56	E 9	10.00	A Few Clouds	FEW110	76	72			88%	NA	76	29.93	1013.5
25	01:56	E 7	10.00	Mostly Cloudy	BKN110	76	72	77	76	88%	NA	76	29.95	1014.1
25	00:56	E 8	10.00	Light Rain	CLR	76	73			91%	NA	76	29.97	1014.7
24	23:56	E 9	10.00	Partly Cloudy	SCT120	76	73			91%	NA	76	29.98	1015.1
24	22:56	E 10	10.00	Light Rain	OVC110	76	73			91%	NA	76	29.99	1015.4
24	21:56	E 8	10.00	Light Rain	OVC100	76	74			94%	NA	76	29.98	1015.1
24	20:56	E 9	10.00	Partly Cloudy	SCT120	77	74			90%	NA	78	29.97	1014.9
24	19:56	E 9	10.00	Light Rain	BKN021 OVC031	77	74	87	77	90%	NA	78	29.97	1014.9
24	18:56	E 10	10.00	Light Rain	SCT024 BKN120	79	73			82%	NA	82	29.98	1015.0
24	17:56	E 12	10.00	Mostly Cloudy	BKN024	81	72			74%	NA	85	29.98	1015.0
24	16:56	E 16	10.00			82	72			72%	NA	87	29.99	1015.4



Weather observations for the past three days

Kissimmee Gateway Airport



Enter Your "City, ST" or zip code

metric

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)		Relative Humidity	Wind Chill (°F)	Heat Index (°F)	Pressure		Precipitation (in.)		
						Air	Dwpt				6 hour Max.	6 hour Min.	altimeter (in)	sea level (mb)	1 hr
22	10:56	S 6	10.00	Fair	CLR	84	72	67%	NA	90	30.09	1018.9			
22	09:56	S 9	10.00	Fair	CLR	81	70	69%	NA	84	30.10	1019.1			
22	08:56	S 9	10.00	Fair	CLR	79	72	79%	NA	82	30.09	1018.9			
22	07:56	Calm	10.00	Fair	CLR	75	72	75	68	90%	NA	NA	30.08	1018.5	
22	06:56	SE 8	10.00	Fair	CLR	71	70	96%	NA	NA	30.07	1018.3			
22	05:56	SE 3	10.00	Fair	CLR	70	69	97%	NA	NA	30.08	1018.5			
22	04:56	Calm	10.00	Fair	CLR	69	68	96%	NA	NA	30.08	1018.6			
22	03:56	Calm	10.00	Fair	CLR	70	68	93%	NA	NA	30.09	1019.0			
22	02:56	SE 6	10.00	Fair	CLR	70	68	93%	NA	NA	30.11	1019.4			
22	01:56	S 5	10.00	Fair	CLR	71	67	74	70	87%	NA	NA	30.11	1019.4	
22	00:56	E 9	10.00	Fair	CLR	71	67	87%	NA	NA	30.09	1019.0			
21	23:56	N 6	10.00	Partly Cloudy	SCT110	71	68	90%	NA	NA	30.09	1018.7			
21	22:56	NW 3	10.00	Light Rain	SCT070 OVC100	71	67	87%	NA	NA	30.10	1019.3			
21	21:56	SW 10	10.00	Light Rain	SCT050 BKN065 BKN085	72	66	82%	NA	NA	30.11	1019.4			
21	20:56	W 8	10.00	Light Rain	FEW060 OVC085	71	68	90%	NA	NA	30.08	1018.6			
21	19:56	SE 13 G 26	10.00	Light Rain	FEW049 BKN070 OVC085	73	66	96	73	79%	NA	NA	30.06	1017.7	
21	18:56	S 24 G 38	10.00	Thunderstorm and Breezy	FEW065	77	69	77%	NA	79	30.05	1017.7			
21	17:56	N 8	10.00	Thunderstorm in Vicinity	CLR	93	68	44%	NA	97	29.96	1014.6			
21	16:56	Vrbl 3	10.00	Fair	CLR	94	66	40%	NA	97	29.95	1014.1			
21	15:56	SW 8	10.00	Partly Cloudy	SCT060	94	67	41%	NA	98	29.97	1014.9			
21	14:56	Vrbl 7	10.00	A Few Clouds	FEW050	92	68	46%	NA	96	30.00	1015.9			
21	13:56	SW 9	10.00	A Few Clouds	FEW044	91	69	91	74	49%	NA	96	30.02	1016.5	
21	12:56	SW 9	10.00	Mostly Cloudy	BKN040	89	71	55%	NA	95	30.03	1016.9			
21	11:56	W 9	10.00	Partly Cloudy	SCT031	86	73	65%	NA	93	30.05	1017.3			
21	10:56	SW 7	10.00	Mostly Cloudy	BKN020	84	74	72%	NA	91	30.04	1017.1			
21	09:56	W 6	10.00	A Few Clouds	FEW012	82	74	77%	NA	88	30.03	1016.8			
21	08:56	SW 3	10.00	Fair	CLR	79	74	85%	NA	83	30.02	1016.4			

21 07:56	Calm	10.00	Fair	CLR	74	70	74	67	88%	NA	NA	30.00	1015.9
21 06:56	Calm	10.00	Fair	CLR	68	66			93%	NA	NA	29.99	1015.3
21 05:56	Calm	10.00	Fair	CLR	68	66			93%	NA	NA	29.97	1014.7
21 04:56	Calm	10.00	Fair	CLR	69	66			90%	NA	NA	29.96	1014.6
21 02:56	SW 3	10.00	Fair	CLR	71	67			87%	NA	NA	29.95	1014.2
21 01:56	S 3	10.00	Fair	CLR	72	66	87	72	82%	NA	NA	29.96	1014.5
21 00:56	W 3	10.00	Fair	CLR	74	66			76%	NA	NA	29.97	1014.9
20 23:56	W 5	10.00	Fair	CLR	76	65			69%	NA	78	29.97	1014.9
20 22:56	W 7	10.00	Fair	CLR	78	66			67%	NA	80	29.96	1014.5
20 21:56	SW 5	10.00	Fair	CLR	80	66			62%	NA	82	29.94	1013.9
20 20:56	W 6	10.00	Fair	CLR	83	66			57%	NA	85	29.93	1013.4
20 19:56	W 6	10.00	A Few Clouds	FEW090	87	65	92	87	48%	NA	89	29.92	1013.0
20 18:56	SW 7	10.00	A Few Clouds	FEW001	89	64			43%	NA	90	29.89	1012.1
20 17:56	SW 10	10.00	Mostly Cloudy	FEW002 BKN070	90	64			42%	NA	91	29.90	1012.2
20 16:56	SW 7	10.00	A Few Clouds	FEW060	90	64			42%	NA	91	29.91	1012.7
20 15:56	W 10 G 18	10.00	Mostly Cloudy	BKN060	91	63			39%	NA	92	29.91	1012.7
20 14:56	W 12	10.00	A Few Clouds	FEW055	90	64			42%	NA	91	29.93	1013.5
20 13:56	W 6	10.00	Partly Cloudy	SCT048	88	64	88	71	45%	NA	89	29.96	1014.3
20 12:56	W 7 G 16	10.00	A Few Clouds	FEW046	85	64			50%	NA	86	29.96	1014.4
20 11:56	W 10 G 17	10.00	Partly Cloudy	SCT040	84	65			53%	NA	86	29.96	1014.4
20 10:56	W 13	10.00	A Few Clouds	FEW030	82	66			58%	NA	84	29.95	1014.2
20 09:56	SW 10	10.00	Partly Cloudy	SCT035	80	68			67%	NA	83	29.94	1013.9
20 08:56	S 7	10.00	Fair	CLR	76	69			79%	NA	77	29.94	1013.9
20 07:56	W 7	10.00	Fair	CLR	71	67	71	65	87%	NA	NA	29.93	1013.5
20 06:56	SW 5	10.00	Fair	CLR	66	65			96%	NA	NA	29.91	1012.7
20 05:56	Calm	10.00	Fair	CLR	67	66			97%	NA	NA	29.90	1012.3
20 04:56	SW 3	10.00	Fair	CLR	67	66			97%	NA	NA	29.88	1011.8
20 03:56	W 3	10.00	Fair	CLR	67	65			93%	NA	NA	29.88	1011.8
20 02:56	SW 3	10.00	Fair	CLR	68	65			90%	NA	NA	29.90	1012.4
20 01:56	W 7	10.00	Fair	CLR	69	65	82	69	87%	NA	NA	29.91	1012.7
20 00:56	W 6	10.00	Fair	CLR	70	64			82%	NA	NA	29.91	1012.8
19 23:56	W 6	10.00	Fair	CLR	71	63			76%	NA	NA	29.90	1012.6
19 22:56	W 6	10.00	Fair	CLR	71	62			73%	NA	NA	29.91	1012.6
19 21:56	W 6	10.00	Fair	CLR	75	62			64%	NA	NA	29.91	1012.6
19 20:56	W 6	10.00	Fair	CLR	78	61			56%	NA	80	29.88	1011.9
19 19:56	W 8	10.00	Fair	CLR	82	61	92	82	49%	NA	83	29.86	1011.1
19 18:56	W 12	10.00	Fair	CLR	86	55			35%	NA	85	29.83	1010.2
19 17:56	W 13 G 21	10.00	Fair	CLR	89	54			30%	NA	87	29.82	1009.7
19 16:56	W 16	10.00	Fair	CLR	90	56			32%	NA	88	29.81	1009.3
19 15:56	W 13	10.00	Fair	CLR	91	59			34%	NA	90	29.83	1010.0

19	14:56	W 12	10.00	A Few Clouds	FEW065	91	59		34%	NA	90	29.84	1010.4
19	13:56	SW 17 G 24	10.00	A Few Clouds	FEW035	90	65	91 71	44%	NA	92	29.84	1010.5
19	12:56	SW 17 G 23	10.00	A Few Clouds	FEW036	88	70		55%	NA	93	29.86	1011.1
19	11:56	SW 15 G 22	10.00	Partly Cloudy	SCT025 SCT029 SCT036	85	72		65%	NA	91	29.88	1011.9

Date	Time (edt)	Wind (mph)	Vis. (mi.)	Weather	Sky Cond.	Temperature (°F)		Relative Humidity	Wind Chill (°F)	Heat Index (°F)	altimeter (in.) Pressure	sea level (mb)	Precipitation (in.)		
						Air	Dwpt						Max. 6 hour	Min.	1 hr

National Weather Service
Southern Region Headquarters
Fort Worth, Texas
[Disclaimer](#)

[Back to previous page](#)

Last Modified: February, 7 2012
[Privacy Policy](#)

Appendix F
Florida Bonneted Bat Programmatic Key 2019



United States Department of the Interior



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

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

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

Dear Mr. Zinszer:

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

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

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

Roosting habitat

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

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

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

Foraging habitat

The guidelines describe the features of foraging habitat. Data informing the home range size of the Florida bonneted bats is limited. Global Positioning System (GPS) and radio-telemetry data for Florida bonneted bats documents that they move large distances and likely have large home ranges. Data from recovered GPS satellite tags on Florida bonneted bats tagged at Babcock-Webb Wildlife Management Area (BWWMA) found the maximum distance detected from a capture site was 24.2 mi (38.9 km); the greatest path length travelled in a single night was 56.3 mi (90.6 km) (Ober 2016; Webb 2018a-b). At BWWMA, researchers found that most individual locations were within one mile of the roost (point of capture) (Ober 2015). Additional data collected during the month of December documented the mean maximum distance Florida bonneted bats (n=8) with tags traveled from the roost was 9.5 mi (Webb 2018b).

The Service recognizes that the movement information comes from only one site (BWWMA and vicinity), and data are from small numbers (n=20) of tagged individuals for only short periods of time (Webb 2018a-b). We expect that across the Florida bonneted bat's range differences in

habitat quality, prey availability, and other factors will result in variable habitat use and home range sizes between locations. Foraging distances and home range sizes in high quality habitats are expected to be smaller while foraging distances and home range sizes in low quality habitat would be expected to be larger. Regardless, we use these studies as our best available information to evaluate when changes to foraging habitat may have an effect on the species ability to feed, breed, and shelter and subsequently result in incidental take. When considering where most of the nightly activity was observed, we calculate a foraging area centered on a roost with a 1 mile radius would include approximately 2,000 acres, and a foraging area centered on a 9.5 mile radius would encompass approximately 181,000 acres, on any given night.

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

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

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

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

Determinations

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

the species and improve our consultation process. Surveys results and reports should be transmitted to the Service at FBBsurveyreport@fws.gov or mail electronic file to U.S. Fish and Wildlife Service, Attention Florida bonneted bat surveys, 1339 20th Street, Vero Beach, Florida 32960. When formal consultation is requested, survey results and reports should be submitted with the consultation request to verobeach@fws.gov.

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

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

MANLAA-P: If the use of the Key results in a determination of “MANLAA- P,” the Service concurs with this determination based on the rationale provide above, and no further consultation is necessary for the effects of the proposed action on the Florida bonneted bat. The Service recommends that the Corps (or other Federal action agency) documents the pathway used to reach the determination in the project record and proceeds with other species analyses as warranted.

MANLAA-C: If the use of the Key results in a determination of MANLAA-C, further consultation with the Service is required to confirm that the Key has been used properly, and the Service concurs with the evaluation of the survey results. Survey results should be submitted with the consultation request.

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

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

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

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

Sincerely,



Roxanna Hinzman
Field Supervisor
South Florida Ecological Services

Enclosure

Cc: electronic only

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

LITERATURE CITED

- Ober, H. 2015. Annual report to USFWS for calendar year 2015. Permit number TE23583B-1. University of Florida, Department of Wildlife Ecology and Conservation, North Florida Research and Education Center. Quincy, Florida.
- Ober, H. 2016. Annual report to USFWS for calendar year 2016. Permit number TE23583B-1. University of Florida, Department of Wildlife Ecology and Conservation, North Florida Research and Education Center. Quincy, Florida.
- Webb, E.N. 2018a. Email to Paula Halupa *et al.* University of Florida, Department of Wildlife Ecology and Conservation. Gainesville, Florida. April 1, 2018.
- Webb, E.N. 2018b. Presentation given at Florida bonneted bat working group meeting at The Conservancy of Southwest Florida. University of Florida, Department of Wildlife Ecology and Conservation. Gainesville, Florida. May 24, 2016.

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

FLORIDA BONNETED BAT CONSULTATION GUIDELINES

October - 2019

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

Terms in bold are further defined in the Glossary.

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

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

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

Use of Consultation Area, Flowchart, and Key

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

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

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

Using the Key and Consultation Flowchart

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

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

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

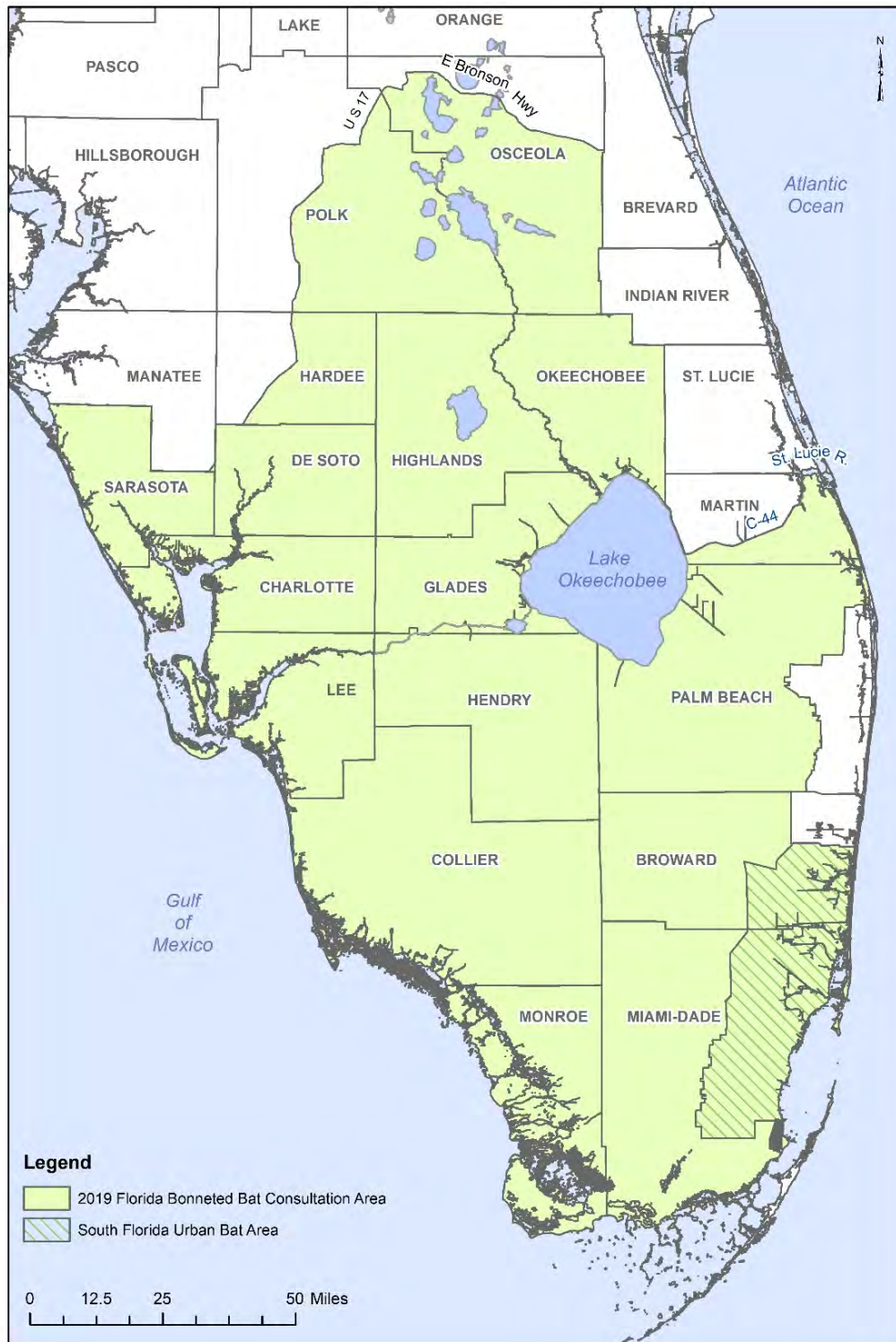


Figure 1. Florida Bonneted Bat Consultation Area. Hatched area (Figure 2) identifies the urban development boundary in Miami-Dade and Broward County. Applicants with projects in this area should contact the Service for specific guidance addressing this area and individual consultation. The Consultation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

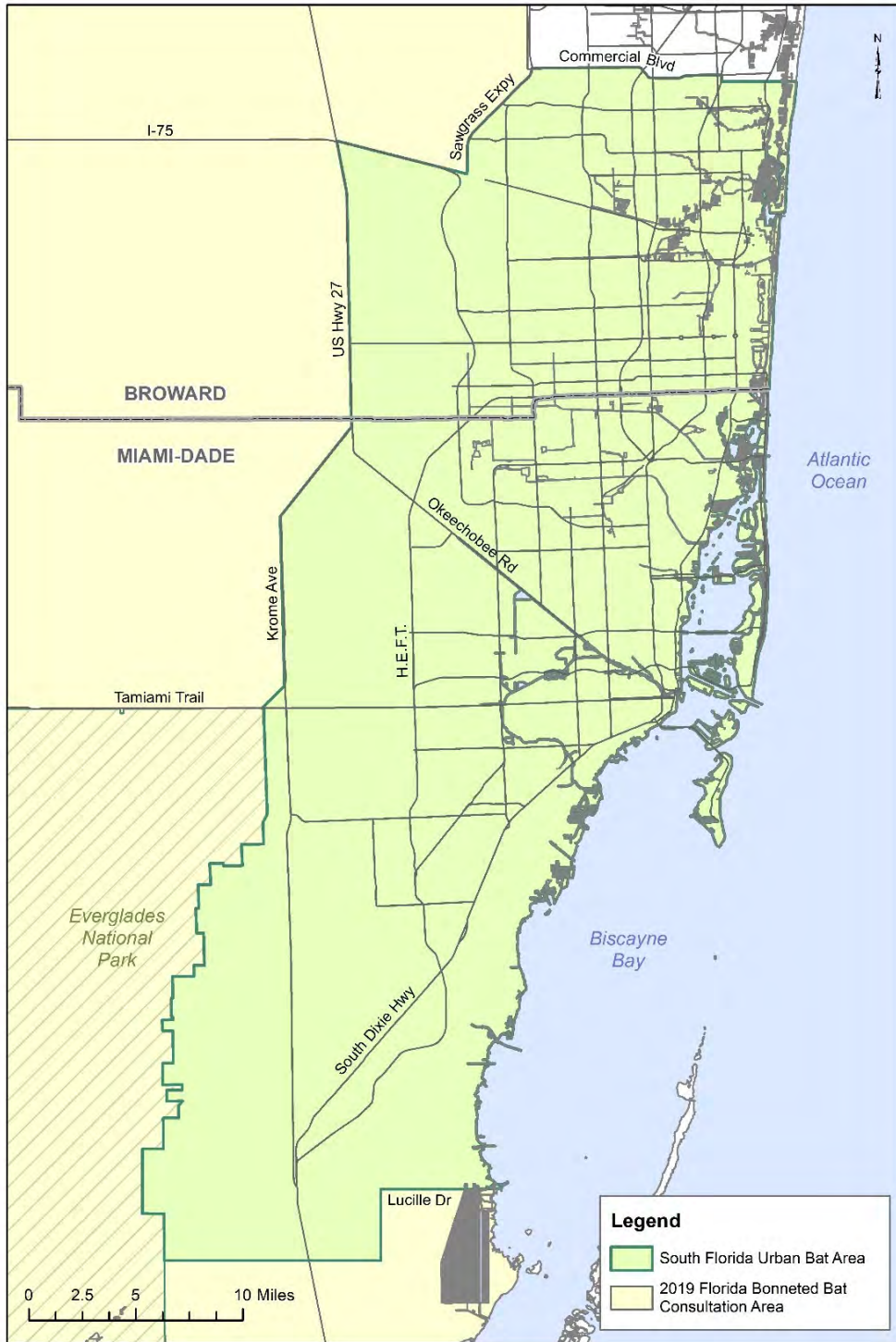


Figure 2. Urban development boundary in Miami-Dade and Broward County. The Consultation Key should not be used for projects in this area. Applicants with projects in this South Florida Urban Bat Area should contact the Service for specific guidance addressing this area and individual consultation.

Florida Bonneted Bat Consultation Key[#]

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

- 1a. Proposed project or land use change is partially or wholly within the Consultation Area (Figure 1).....**Go to 2**
- 1b. Proposed project or land use change is wholly outside of the Consultation Area (Figure 1).....**No Effect**
- 2a. Potential FBB roosting habitat exists within the project area.....**Go to 3**
- 2b. No potential FBB roosting habitat exists within the project area.....**Go to 13**
- 3a. Project size/footprint* \leq 5 acres (2 hectares)..... **Conduct Limited Roost Survey (Appendix C)**
then **Go to 4**
- 3b. Project size/footprint* $>$ 5 acres (2 hectares).....**Conduct Full Acoustic/Roost Surveys (Appendix B)** then
Go to 6
- 4a. Results show FBB roosting is likely**Go to 5**
- 4b. Results do not show FBB roosting is likely.....**MANLAA-P if BMPs (Appendix D) used and survey reports are submitted. Programmatic concurrence.**
- 5a. Project will affect roosting habitat.....**LAA⁺ Further consultation with the Service required.**
- 5b. Project will not affect roosting habitat..... **MANLAA-C with required BMPs (Appendix D). Further consultation with the Service required.**
- 6a. Results show some FBB activity.....**Go to 7**
- 6b. Results show no FBB activity.....**No Effect**
- 7a. Results show FBB roosting is likely.....**Go to 8**
- 7b. Results do not show FBB roosting is likely.....**Go to 10**
- 8a. Project will not affect roosting habitat.....**Go to 9**
- 8b. Project will affect roosting habitat.....**LAA⁺ Further consultation with the Service required.**
- 9a. Project will affect* $>$ 50 acres (20 hectares) (wetlands and uplands) of foraging habitat.....**LAA⁺ Further consultation with the Service required.**
- 9b. Project will affect* \leq 50 acres (20 hectares) (wetlands and uplands) of foraging habitat..... **MANLAA-C with required BMPs (Appendix D). Further consultation with the Service required.**
- 10a. Results show high FBB activity/use.....**Go to 11**
- 10b. Results do not show high FBB activity/use.....**Go to 12**
- 11a. Project will affect* $>$ 50 acres (20 hectares) (wetlands and uplands) of FBB habitat (roosting and/or foraging)..... **LAA⁺ Further consultation with the Service required.**
- 11b. Project will affect* \leq 50 acres (20 hectares) (wetlands and uplands) of FBB habitat (roosting and/or foraging)..... **MANLAA-C with required BMPs (Appendix D). Further consultation with the Service required.**
- 12a. Project will affect* $>$ 50 acres (20 hectares) (wetlands and uplands) of FBB habitat..... **LAA⁺ Further consultation with the Service required.**
- 12b. Project will affect* \leq 50 acres (20 hectares) (wetlands and uplands) of FBB habitat..... **MANLAA-P if BMPs (Appendix D) used and survey reports are submitted. Programmatic concurrence.**

- 13a. FBB foraging habitat exists within the project area and foraging habitat will be affected.....**Go to 14**
- 13b. FBB foraging habitat exists within the project area and foraging habitat will not be affected **OR** no FBB foraging habitat exists within the project area.....**No Effect**
- 14a. Project size* > 50 acres (20 hectares) (wetlands and uplands)**Go to 15**
- 14b. Project size* ≤ 50 acres (20 hectares) (wetlands and uplands) **MANLAA-P if BMPs (Appendix D) used. Programmatic concurrence.**
- 15a. Project is within 8 miles (12.9 kilometers) of high quality potential roosting areas^.....**Conduct Full Acoustic Survey (Appendix B) and Go to 16**
- 15b. Project is not within 8 miles (12.9 kilometers) of high quality potential roosting area^.....**MANLAA-P if BMPs (Appendix D) used. Programmatic concurrence.**
- 16a. Results show some FBB activity.....**Go to 17**
- 16b. Results show no FBB activity.....**No Effect**
- 17a. Results show high FBB activity/use.....**LAA+ Further consultation with the Service required.**
- 17b. Results do not show high FBB activity/use..... **MANLAA-P if BMPs (Appendix D) used and survey reports submitted. Programmatic concurrence.**

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

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

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

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

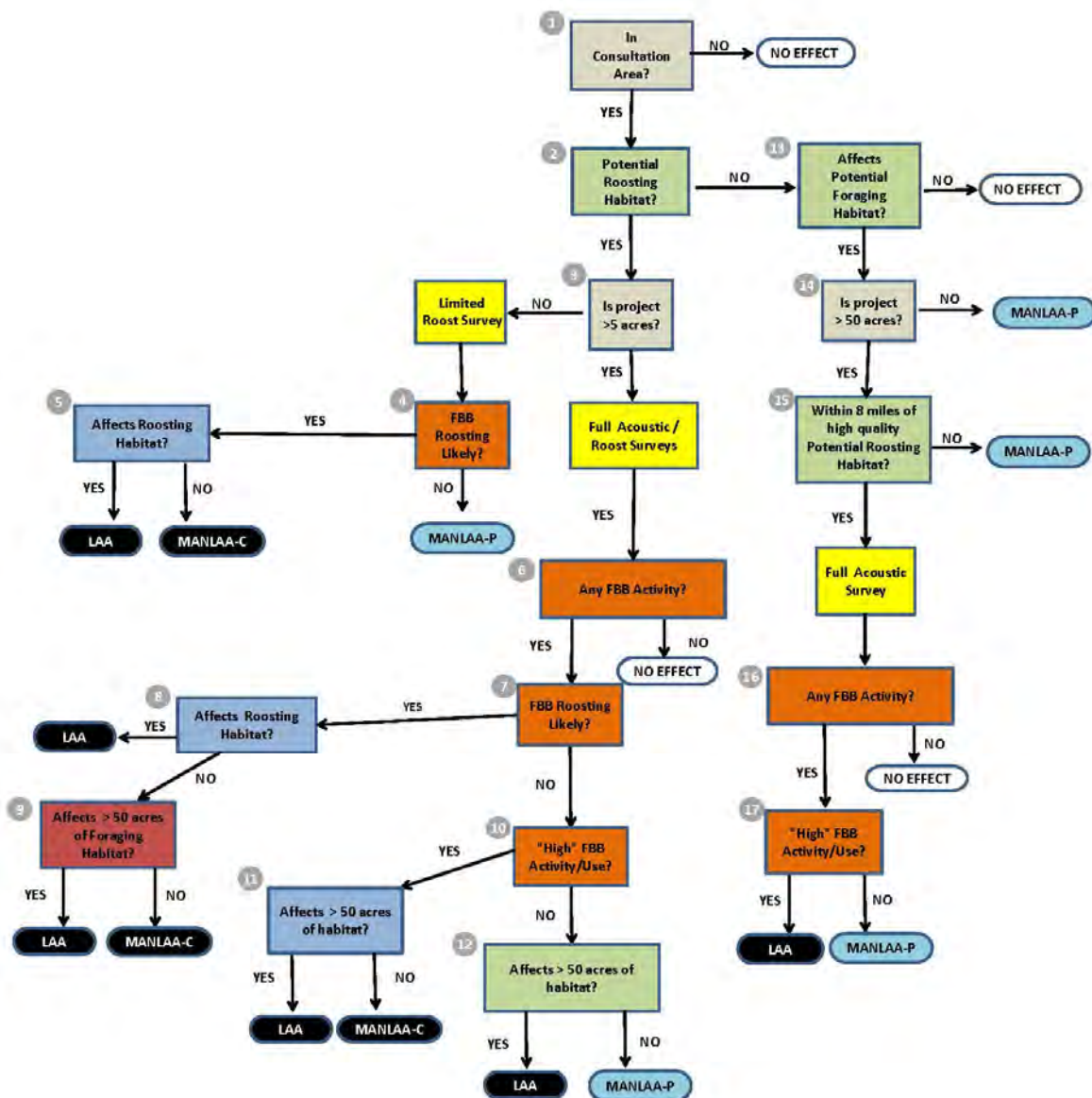


Figure 3. Florida bonneted bat Consultation Flowchart. “No effect” determinations do not need Service concurrence. “May affect, but not likely to adversely affect”, **MANLAA-P**, in blue have programmatic concurrence through the transmittal letter of these Guidelines, and therefore no further consultation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

GLOSSARY

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

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

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

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

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

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

LAA - May Affect, and is Likely to Adversely Affect. The appropriate conclusion if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not: discountable, insignificant, or

beneficial [see definition of “may affect, but is not likely to adversely affect” (**MANLAA**)]. In the event the overall effect of the proposed action is beneficial to the listed species, but also is likely to cause some adverse effects, then the proposed action is “likely to adversely affect” the listed species. If incidental take is anticipated to occur as a result of the proposed action, an “is likely to adversely affect” (**LAA**) determination should be made. An “is likely to adversely affect” determination requires the initiation of formal section 7 consultation.

LIMITED ROOST SURVEY - This is a reduced survey that may include the following methods: acoustics, observations at emergence (*e.g.*, looking and listening for bats to come out of tree cavities around sunset), and visual inspection of trees with cavities or loose bark using tree-top cameras (or combination of these methods). Methods are fairly flexible and dependent upon composition and configuration of project site and willingness and ability of applicant and partners to conserve roosting structures on site. See also Appendix C for a full description.

MANLAA - May Affect, but is Not Likely to Adversely Affect. The appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: (1) be able to meaningfully measure, detect, or evaluate insignificant effects; or (2) expect discountable effects to occur. To use these Guidelines and Consultation Key applicants must incorporate the appropriate **BMPs** (Appendix D) to reach a **MANLAA** determination.

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

MANLAA-P: programmatic concurrence is provided through the transmittal letter of these Guidelines, no additional consultation is required with the Service for Florida bonneted bats. All survey results must be submitted to Service.

MANLAA-C: further consultation with the Service is required to confirm that the Consultation Key has been used properly, and the Service concurs with the evaluation of the survey results. Request for consultation must include survey results.

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

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

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

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

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

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

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

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

In addition to the aforementioned events, researchers consider roosting likely in an area when (1) large numbers of Florida bonneted bat calls are recorded throughout the night (*e.g.*, ≥ 25 files per night at a single acoustic station when 5 second file lengths are recorded); (2) large numbers of FBB calls are recorded over multiple nights (*e.g.*, an average of ≥ 20 files per night from a single detector when 5 second file lengths are recorded); or (3) social calls are recorded. Because social calls and large numbers of calls recorded over one or more nights can be indicative of high

FBB activity/use or when roosting is likely, the Service is choosing not to use these as indicators to make the determination that roosting is likely. Instead we are relying on the indicators that are only expected to occur at or very close to a roost location [(a)-(e) above].

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

Literature Cited

- Bailey, A.M., H.K. Ober, A.R. Sovie, and R.A. McCleery. 2017. Impact of land use and climate on the distribution of the endangered Florida bonneted bat. *Journal of Mammalogy*. 98:1586-1593.
- Braun de Torrez, E. 2019. Email from biologist E. Braun de Torrez, Florida Fish and Wildlife Conservation Commission to biologist, S. Sneckenberger, U.S. Fish and Wildlife Service. July 24, 2019. Gainesville, Florida.
- Keeley, B.W., and M.D. Tuttle. 1999. Bats in American bridges. Bat Conservation International, Inc. Austin, Texas.
- Ober, H.K., E.C. Braun de Torrez, J.A. Gore, A.M. Bailey, J.K. Myers, K.N. Smith, and R.A. McCleery. 2016. Social organization of an endangered subtropical species, *Eumops floridanus*, the Florida bonneted bat. *Mammalia* 2016:1-9.
- U.S. Fish and Wildlife Service. 2013. Endangered and threatened wildlife and plants; endangered species status for the Florida bonneted bat. *Federal Register* 78:61004-61043.

Appendix A. Delineation and Justification for Consultation Area

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Literature Cited -Appendix A

- Bailey, A.M., H.K. Ober, A.R. Sovie, and R.A. McCleery. 2017. Impact of land use and climate on the distribution of the endangered Florida bonneted bat. *Journal of Mammalogy*. 98:1586-1593.
- Belwood, J.J. 1992. Florida mastiff bat *Eumops glaucinus floridanus*. Pages 216-223 in S.R. Humphrey (ed.), *Rare and Endangered Biota of Florida*. Vol. I. Mammals. University Press of Florida. Gainesville, Florida.
- Best, T.L., Kiser, W.M., and P.W. Freeman. 1996. *Eumops perotis*. *Mammalogy Papers: University of Nebraska State Museum*. Lincoln.
- Braun de Torrez, E.C. 2018c. Presentation given at Florida bonneted bat working group meeting at The Conservancy of Southwest Florida. Florida Fish and Wildlife Research Institute, Florida Fish and Wildlife Conservation Commission. Gainesville, Florida. May 23, 2016.
- Findley, J.S., E.H. Studier, and D.E. Wilson. 1972. Morphologic properties of bat wings. *Journal of Mammalogy* 53(3): 429-444.
- Norberg, U.M. and J.M.V. Rayner. 1987. Ecological morphology and flight in bats (Mammalia; Chiroptera): wing adaptations, flight performance, foraging strategy and echolocation. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 316(1179):335-427.
- Ober, H. 2016. Annual report to USFWS for calendar year 2016. Permit number TE23583B-1. University of Florida, Department of Wildlife Ecology and Conservation, North Florida Research and Education Center. Quincy, Florida.
- Ober, H.K., R.A. McCleery, and E.C. Braun de Torrez. 2018. Managing with fire to promote the recently listed Florida bonneted bat, *Eumops floridanus*. Final report. JFSP Project ID: 14-1-05-7. University of Florida, Department of Wildlife Ecology and Conservation. Gainesville, Florida.
- Rainho, A., and J.M. Palmeirim. 2011. The importance of distance to resources in the spatial modelling of bat foraging habitat. *PLoS ONE* 6(4): e19227.
- Siders, M. 2005. *Eumops perotis*, Western mastiff bat. Western Bat Working Group. Species Accounts. Updated at the 2005 Portland Biennial Meeting. http://www.wbwg.org/species_accounts
- Siders, M. S., Rabe, M. J., Snow, T. K., and K. Yasuda. 1999. Long foraging distances in two uncommon bat species (*Euderma maculatum* and *Eumops perotis*) in northern Arizona. In *Proceedings of the Fourth Biennial Conference of Research on the Colorado Plateau*. US Geological Survey, Flagstaff, AZ, Vol. 4.
- Tibbitts, T., A. Pate, Y. Petryszyn, and B. Barns. 2002. Determining foraging and roosting areas

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

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

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

Appendix B: Full Acoustic / Roost Survey Framework

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

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

General Survey Protocol:

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

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

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

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

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

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

Literature Cited – Appendix B

- Bailey, A.M., H.K. Ober, A.R. Sovie, and R.A. McCleery. 2017. Impact of land use and climate on the distribution of the endangered Florida bonneted bat. *Journal of Mammalogy*. 98:1586-1593.
- Braun de Torrez, E.C., H.K. Ober, and R.A. McCleery. 2016. Use of a multi-tactic approach to locate and endangered Florida bonneted bat roost. *Southeastern Naturalist* 15(2):235-242.
- Loeb, S.C., T.J. Rodhouse, L.E. Ellison, C.L. Lausen, J.D. Reichard, K.M. Irvine, T.E. Ingersoll, J.T.H. Coleman, W.E. Thogmartin, J.R. Sauer, C.M. Francis, M.L. Bayless, T.R. Stanley, and D.H. Johnson. 2015. A plan for the North American bat monitoring program (NABat). United States Department of Agriculture. Forest Service. Research & Development, Southern Research Station. General Technical Report SRS-208.
- Ober, H.K., E.C. Braun de Torrez, J.A. Gore, A.M. Bailey, J.K. Myers, K.N. Smith, and R.A. McCleery. 2016. Social organization of an endangered subtropical species, *Eumops floridanus*, the Florida bonneted bat. *Mammalia* 2016:1-9.
- U.S. Fish and Wildlife Service. 2018. Range-wide Indiana bat survey guidelines. <https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2018RangewideIBatSurveyGuidelines.pdf>

Appendix C: Limited Roost Survey Framework

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

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

General Survey Protocol:

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

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

Identification of potential roost structures

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

Visual Inspection of trees and snags with tree-top cameras

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

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

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

Emergence Surveys

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

Acoustic surveys

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

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

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

Reporting

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

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

Literature Cited – Appendix C

- Bailey, A.M., H.K. Ober, A.R. Sovie, and R.A. McCleery. 2017. Impact of land use and climate on the distribution of the endangered Florida bonneted bat. *Journal of Mammalogy*. 98:1586-1593.
- Braun de Torrez, E.C., H.K. Ober, and R.A. McCleery. 2016. Use of a multi-tactic approach to locate and endangered Florida bonneted bat roost. *Southeastern Naturalist* 15(2):235-242.
- Loeb, S.C., T.J. Rodhouse, L.E. Ellison, C.L. Lausen, J.D. Reichard, K.M. Irvine, T.E. Ingersoll, J.T.H. Coleman, W.E. Thogmartin, J.R. Sauer, C.M. Francis, M.L. Bayless, T.R. Stanley, and D.H. Johnson. 2015. A plan for the North American bat monitoring program (NABat). United States Department of Agriculture. Forest Service. Research & Development, Southern Research Station. General Technical Report SRS-208.
- Ober, H.K., E.C. Braun de Torrez, J.A. Gore, A.M. Bailey, J.K. Myers, K.N. Smith, and R.A. McCleery. 2016. Social organization of an endangered subtropical species, *Eumops floridanus*, the Florida bonneted bat. *Mammalia* 2016:1-9.
- U.S. Fish and Wildlife Service. 2004. South Florida Ecological Services Office DRAFT July 12, 2004 Species Conservation Guidelines South Florida Red-cockaded Woodpecker. Appendix A. Red-cockaded Woodpecker South Florida Survey Protocol. July 12, 2004. South Florida Ecological Service Office, Vero Beach Florida. <https://www.fws.gov/verobeach/BirdsPDFs/200407SlopesCompleteRedCockadedWoodpecker.pdf>
- U.S. Fish and Wildlife Service. 2018. Range-wide Indiana bat survey guidelines. <https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2018RangewideIBatSurveyGuidelines.pdf>

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

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

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

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

BMPs for development, construction, and other general activities:

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

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

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

Ecological Land Management

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

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

Ecological Land Management BMPs:

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

Literature Cited – Appendix E

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

APPENDIX I

Crested Caracara Survey Report (May 2019)

AUDUBON'S CRESTED CARACARA
(Polyborus plancus audubonii)

SURVEY REPORT

for

Project Development and Environment (PD&E) Study
Neptune Road Widening from Partin Settlement Road to US 192
Osceola County, Florida

FPID: 445415-1

PS-18-9905-DG

ETDM: 14402

Federal Aid Project Number: N/A

Prepared for:



Osceola County, Florida
Department of Transportation and Transit
1 Courthouse Square, Suite 3100
Kissimmee, FL 34741

May 2019

TABLE OF CONTENTS

Section	Page
1.0 INTRODUCTION	1
2.0 EXISTING ENVIRONMENTAL CHARACTERISTICS	1
2.1 Preliminary Data Collection	1
2.2 Existing Vegetative Communities and Land Uses and Vegetative Descriptions.....	1
3.0 AUDUBON’S CRESTED CARACARA SURVEY	4
3.1 Survey Design and Planning.....	4
4.0 SURVEY RESULTS	4
5.0 CONCLUSIONS	6
6.0 REFERENCES	6

List of Tables

Page

Table 1 – Summary of Land Cover/Land Use within the Study Area	2
Table 2 – Wildlife Species/Signs Observed Within the Study Area	5

List of Figures

Figure 1 – Project Location Map
Figure 2 – Florida Land Use, Cover, and Forms Classification System Maps
Figure 3 – Caracara Survey Stations Map

List of Appendices

Appendix A – Caracara Survey Data Sheets
Appendix B – Photographs of Survey Stations

1.0 INTRODUCTION

As part of the Natural Resource Evaluation Report (NRE) prepared for the Osceola County Project Development and Environment (PD&E) Study for the proposed widening of Neptune Road from Partin Settlement Road to US 192, a survey for the Audubon's crested caracara (caracara) (*Polyborus plancus audubonii*) was conducted.

This project involves a 3.9-mile segment of Neptune Road extending from Partin Settlement Road to US 192 in Osceola County (see **Figure 1 – Location Map**). The section east of the St. Cloud canal (approximately 1.1 miles in length) is within the City of St. Cloud. From Partin Settlement Road to Old Canoe Creek Road, the proposed project improves the existing 2-lane roadway to a 4-lane, divided roadway with a curbed median, with premium bicycle and pedestrian facilities (i.e., bike lanes, multiuse path(s), and/or sidewalks). From Old Canoe Creek Road to US 192, the project widens the existing 2-lane roadway to 4 lanes with sidewalks. Bridge structures are to be replaced and stormwater management facilities will be evaluated.

2.0 EXISTING ENVIRONMENTAL CHARACTERISTICS

2.1 Preliminary Data Collection

Prior to field reconnaissance, a desktop review was performed to identify previously documented caracara nests or suitable habitat within the project corridor. Resources that were utilized include aerial photography of the corridor (Florida Department of Transportation (FDOT) APLUS), NearMap© aerials, Florida Land Use, Cover, and Forms Classification System (FLUCFCS) GIS layer (SFWMD), US Fish and Wildlife Service (USFWS) Caracara Consultation Area GIS Layer, USFWS Information for Planning and Consultation (IPaC), USFWS Conservation Guidelines, US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey of Osceola County, and the Florida Natural Areas Inventory (FNAI) Standard Data Report.

2.2 Existing Vegetative Communities and Land Uses and Vegetative Descriptions

Following the desktop review, field reconnaissance was conducted to verify existing conditions and identify areas of potential habitat. A general site review was conducted on November 30, 2018 to verify existing land use. Land cover was classified according to the FLUCFCS. Land cover within the areas surveyed for caracara consists of a mixture of urban areas (residential, commercial, community facilities), wetlands, agriculture (pastures), and native uplands. **Table 1** provides the FLUCFCS data and acreage for the PD&E study area and **Figure 2** depicts the FLUCFCS map.

Table 1: Summary of Land Cover/Land Use within the Study Area

FLUCFCS Code	FLUCFCS Type	Description	Acres
111	Fixed single family units, low density	This land use consists of low density, rural single-family residences found in the central portion of the study area, south of Neptune Road.	5.2
121	Fixed single family units, medium density	This land use type consists of medium density, single family residences. This category encompasses most of the residential land use found throughout the study area.	111.4
132	Mobile home units	This land use consists of G & H Mobile Home Park, located between Neptune Road and Fish Lake within the study area.	2.6
133	Multiple dwelling units, low rise	This land use consists of apartment buildings and duplexes scattered between Florida's Turnpike and US 192.	21.4
139	High density under construction	This land use consists of Tohoqua, a residential community which is currently under construction. This site is located on the south side of Neptune Road, facing Neptune Middle School.	14.7
141	Retail sales and services	This land use consists of several shopping centers within the study area, with most being located between Old Canoe Creek Road and US 192.	29.2
171	Educational facilities	This land use designation is for Neptune Middle School, located north of Neptune Road and adjacent to and west of Florida's Turnpike	15.5
172	Religious	This land use encompasses various churches and associated facilities. These facilities are found scattered throughout the study area.	12.1
175	Governmental	This land use consists of a St. Cloud Police Department station at the corner of Old Canoe Creek Road and Neptune Road.	4.4
185	Parks and zoos	This category includes two Osceola County parks located within the study area, Partin Triangle Neighborhood Park and Boat Ramp and Neptune Middle School Sports Fields.	15.3
190	Open land	This land use consists of undeveloped, inactive areas within the study area with no structures or indication of intended use. This parcel is located on the eastern end of Neptune Road.	3.9
211	Improved pastures	This land use consists of open prairie utilized by cattle. Vegetation observed was predominated by bahia grass (<i>Paspalum notatum</i>), with scattered cogon grass (<i>Imperata cylindrica</i>) and cabbage palms (<i>Sabal palmetto</i>). This land use occurs throughout the study area.	53.9
245	Floriculture	This land use consists of areas dedicated to the cultivation of decorative flowering plants. Within the study area, this consists of the Tom Ritter Orchids nursery, found adjacent to and south of Neptune Road.	2.2
261	Fallow crop land	This land use type consists of harvested, inactive agricultural fields within the study area.	30.4

FLUCFCS Code	FLUCFCS Type	Description	Acres
434	Hardwood-conifer mixed	This land use consists of various upland forested areas scattered along Florida's Turnpike and Neptune Road. Canopy vegetation included live oak (<i>Quercus virginiana</i>) and slash pine (<i>Pinus elliotti</i>). Other vegetation observed included Brazilian pepper (<i>Schinus terebinthifolius</i>), cabbage palms, and beggarticks (<i>Bidens spp.</i>).	17.8
510	Streams and waterways	This category includes various drainage features that run through the study area, such as roadside ditches and SFWMD canals. Vegetation observed along the banks of these ditches included cattail (<i>Typha spp.</i>), pickerelweed (<i>Pontederia cordata</i>), and torpedograss (<i>Panicum repens</i>).	10.1
534	Reservoirs less than 10 acres	This category includes man-made stormwater pond areas serving various developments along Neptune Road. Vegetation observed included cattail and St. Augustine grass (<i>Stenotaphrum secundatum</i>) along the edges of the ponds.	8.1
617	Mixed wetland hardwoods	This forested wetland community occurs in several areas throughout the study area. The canopy observed included bald cypress (<i>Taxodium distichum</i>) and red maple (<i>Acer rubrum</i>), with a scattered shrub layer consisting of Brazilian pepper, Carolina willow (<i>Salix caroliniana</i>) and elderberry (<i>Sambucus canadensis</i>). The herb stratum includes Virginia chainfern (<i>Woodwardia virginica</i>) and marsh fern (<i>Thelypteris palustris</i>).	18.5
641	Freshwater marshes	This herbaceous wetland community occurs throughout the study area. Vegetation observed included softrush (<i>Juncus spp.</i>), maidencane (<i>Panicum hemitomon</i>), primrose willow (<i>Ludwigia peruviana</i>), elderberry, saltbush (<i>Baccharis hamifolia</i>), and scattered red maple.	26.8
643	Wet prairies	This herbaceous wetland community is located between the Partin canal and Neptune Road. These areas were historically used as cattle pasture. Vegetation observed included maidencane, softrush, torpedograss, and arrowhead (<i>Sagittaria lancifolia</i>).	10.8
814	Roads and highways	This land use consists of roads and associated ROW that are located throughout the study area.	80.1
Grand Total			494.4
Land cover and land uses based on the Florida Land Use, Cover and Forms Classification System (FLUCFCS). Acreage is based on the 500-foot study area boundary.			

3.0 AUDUBON'S CRESTED CARACARA SURVEY

3.1 Survey Design and Planning

Prior to conducting field reconnaissance, crested caracara monitoring stations were mapped within appropriate habitats, such as pastureland or lightly wooded areas. Stations were not placed in unsuitable habitat that would not be utilized for caracaras, such as cypress domes or residential neighborhoods. The monitoring stations were established using GIS data and following the guidelines listed in the *USFWS's Crested Caracara Survey Protocol – Additional Guidance* (December 2016). During the PD&E Study field reconnaissance conducted on November 30, 2018, three observation station locations were selected based on suitable caracara nesting and foraging habitat available, as well as the best viewpoint to observe potential nest trees. Each of these station locations provided for unobstructed views of the project area and could be accessed via existing public roads. Thus, no private property access requests were needed. An email was sent to USFWS on December 18, 2018 coordinating the selected survey stations, however no response was received. Caracara station locations are shown on **Figure 3**.

The following provides the site location information for each station:

Station No.	Latitude	Longitude	Section/Township/Range	County
Station 1	28.275380	-81.358674	Sec. 31, Township 26 S, Range 30 E	Osceola
Station 2	28.257231	-81.333991	Sec. 5, Township 26 S, Range 30 E	
Station 3	28.254853	-81.326500	Sec. 5, Township 26 S, Range 30 E	

Surveys were conducted from January 7, 2019 through April 26, 2019 in general accordance with the USFWS 2016 survey protocol. Each station was monitored two weeks apart beginning 15 minutes before sunrise and concluding late morning (approximately 3 hours after sunrise). No evening surveys were conducted. From a stationary position, the surveyors would search for caracara activity and presence of other birds that might elicit a response from caracara or indicate the presence of carrion that may attract caracaras. All surveys were conducted from inside the field vehicle, and, if applicable, surveyors would move to the truck bed to obtain a clearer view of the area. Surveys were conducted using high-powered binoculars. Standard data forms were used to record weather conditions, general bird activity, caracara observations, and flight patterns. If a caracara was observed, the time, number of individuals, approximate age, and behavior was recorded on the data sheets (**Appendix A**). Other wildlife observations were also recorded.

4.0 SURVEY RESULTS

Caracara were not observed at any of the survey stations on any survey date.

Other bird species documented either foraging in the pastures or roadside swales or flying over the site are included in **Table 2**.

Table 2: Wildlife Species/Signs Observed Within the Study Area

Scientific Name	Common Name
<i>Corvus brachyrhynchos</i>	American Crow
<i>Falco sparverius</i>	American Kestrel
<i>Turdus migratorius</i>	American Robin
<i>Pelecanus erythrorhynchos</i>	American White Pelican
<i>Anhinga anhinga</i>	Anhinga
<i>Megaceryle alcyon</i>	Belted Kingfisher
<i>Dendrocygna autumnalis</i>	Black-bellied Whistling Duck
<i>Coragyps atratus</i>	Black Vulture
<i>Polioptila caerulea</i>	Blue-gray Gnatcatcher
<i>Cyanocitta cristata</i>	Blue Jay
<i>Spatula discors</i>	Blue-winged Teal
<i>Quiscalus major</i>	Boat-tailed Grackle
<i>Molothrus ater</i>	Brown-headed Cowbird
<i>Bubulcus ibis</i>	Cattle Egret
<i>Quiscalus quiscula</i>	Common Grackle
<i>Phalacrocorax auritus</i>	Double-crested Cormorant
<i>Dryobates pubescens</i>	Downy Woodpecker
<i>Sialia sialis</i>	Eastern Bluebird
<i>Sturnella magna</i>	Eastern Meadowlark
<i>Sayornis phoebe</i>	Eastern Phoebe
<i>Streptopelia decaocto</i>	Eurasian Collared Dove
<i>Sturnus vulgaris</i>	European Starling
<i>Corvus ossifragus</i>	Fish Crow
<i>Plegadis falcinellus</i>	Glossy Ibis
<i>Ardea herodias</i>	Great Blue Heron
<i>Ardea alba</i>	Great Egret
<i>Larus argentatus</i>	Herring Gull
<i>Passer domesticus</i>	House Sparrow
<i>Charadrius vociferus</i>	Killdeer
<i>Aramus guarauna</i>	Limpkin
<i>Egretta caerulea</i>	Little Blue Heron
<i>Lanius ludovicianus</i>	Loggerhead Shrike
<i>Zenaida macroura</i>	Mourning Dove
<i>Anas fulvigula</i>	Mottled Duck
<i>Cairina moschata</i>	Muscovy Duck
<i>Cardinalis cardinalis</i>	Northern Cardinal
<i>Mimus polyglottos</i>	Northern Mockingbird
<i>Pandion haliaetus</i>	Osprey
<i>Setophaga palmarum</i>	Palm Warbler
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker
<i>Buteo lineatus</i>	Red-shouldered Hawk

Scientific Name	Common Name
<i>Agelaius phoeniceus</i>	Red-winged Blackbird
<i>Buteo jamaicensis</i>	Redtail Hawk
<i>Larus delawarensis</i>	Ring-billed Gull
<i>Columba livia</i>	Rock Pigeon
<i>Antigone canadensis</i>	Sandhill Crane
<i>Passerculus sandwichensis</i>	Savannah Sparrow
<i>Haliaeetus leucocephalus</i>	Southern Bald Eagle
<i>Tachycineta bicolor</i>	Tree Swallow
<i>Cathartes aura</i>	Turkey Vulture
<i>Eudocimus albus</i>	White Ibis
<i>Mycteria americana</i>	Wood Stork
<i>Setophaga coronata</i>	Yellow-rumped warbler
<i>Sciurus carolinensis</i>	Eastern Gray Squirrel
<i>Didelphis virginiana</i>	Opossum
<i>Sciurus niger niger</i>	Southern Fox Squirrel

5.0 CONCLUSIONS

Although suitable habitat is present north and south of Neptune Road, no caracaras were observed within the study area or within 1,500 meters from the study area. The suitable habitat in this area is being rapidly developed for residential purposes and therefore, there continues to be a loss of potential caracara habitat within the study area. Additionally, Station 2 was adjacent to an area already under development for Tohoqua Development of Regional Impact (DRI). If required by USFWS, an updated caracara survey may be conducted during the design and permitting phase of this project. However, due to the lack of caracara observed within the study area and habitat being converted to residential developments, this project has **no effect** on the Audubon’s crested caracara.

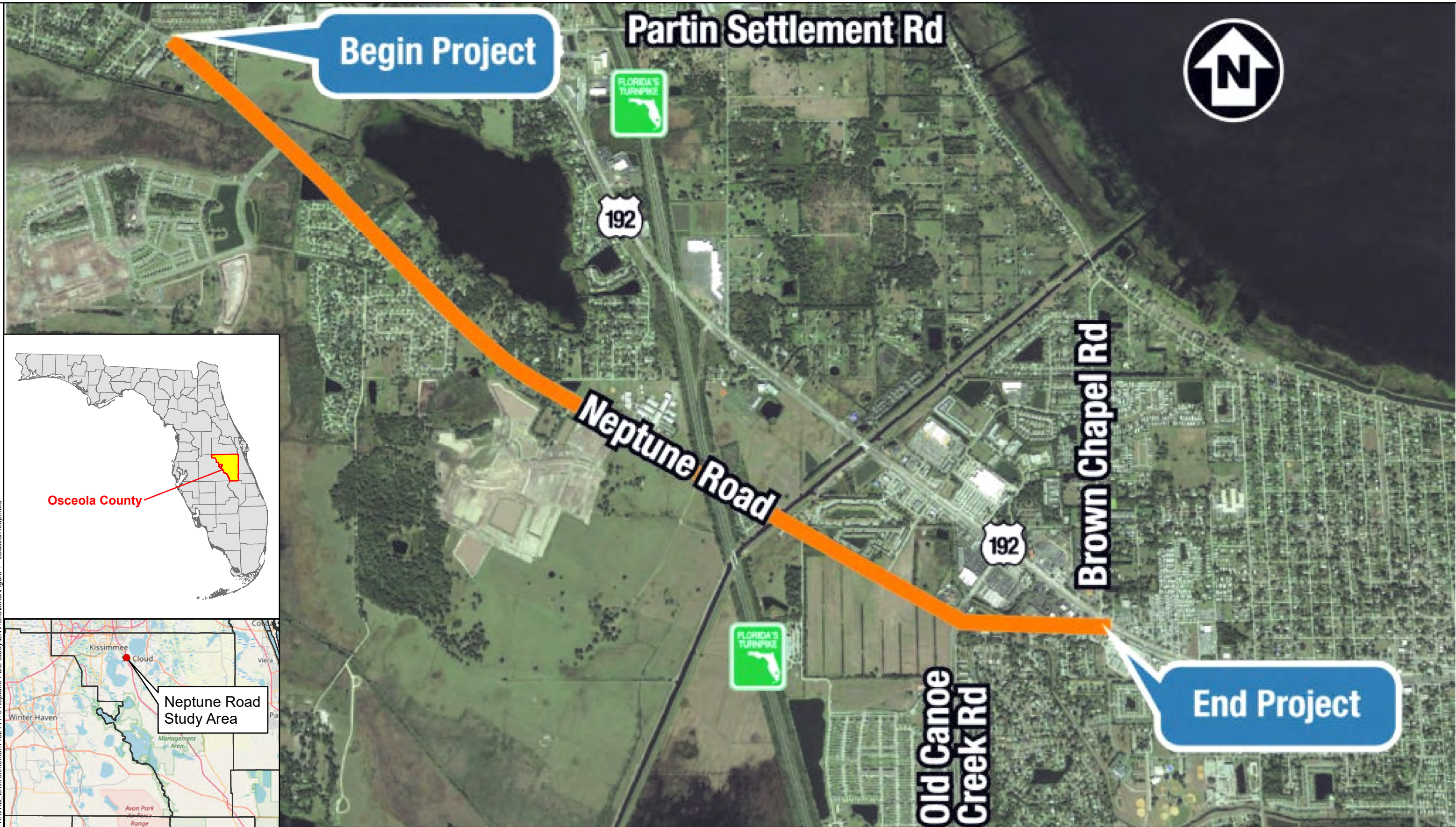
6.0 REFERENCES

Florida Fish and Wildlife Conservation Commission. Selected GIS Layers. Office of Environmental Services Habitat Protection Planning Section. 2002.

Draft Crested Caracara Survey Protocol – Additional Guidance. December 2016. US Fish and Wildlife Service.

Florida Land Use, Cover, and Forms Classification System. January 1999. Department of Transportation. Surveying and Mapping, Geographic Mapping Section.

FIGURE 1
LOCATION MAP



Location Map

Neptune Road from Partin Settlement Road to US 192

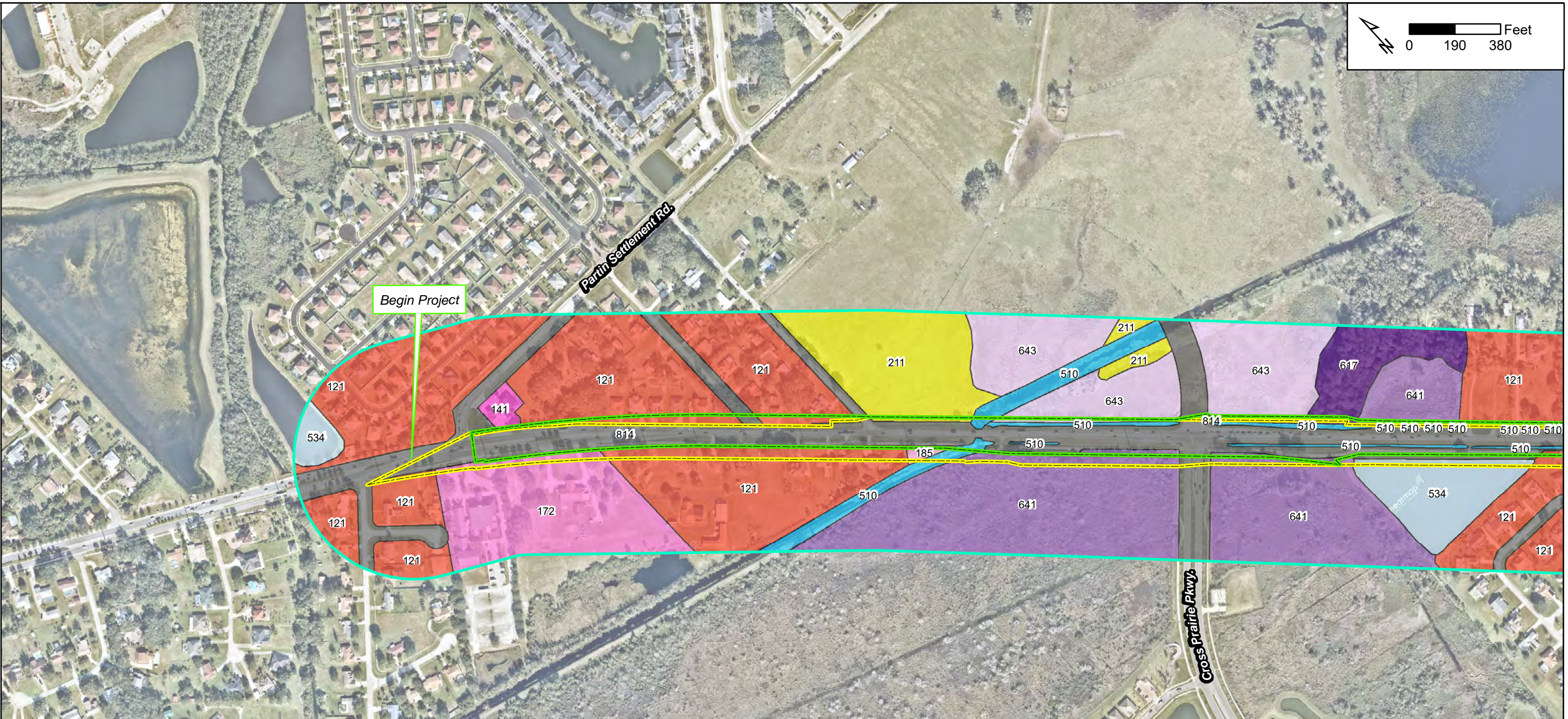
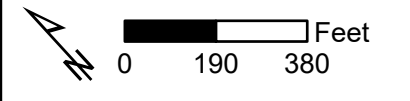
Project Development & Environment Study

FPID: 445415-1

Osceola County, Florida



FIGURE 2
FLUCFCS MAPS



Legend

Alt1 Proposed ROW	FLUCFCS Code: Description	185:Parks and zoos	617:Mixed wetland hardwoods
Alt2 Proposed ROW	121:Fixed single family units, medium density	211:Improved pastures	641:Freshwater marshes
AltA Proposed ROW	141:Retail sales and services	510:Streams and waterways	643:Wet prairies
AltB Proposed ROW	172:Religious	534:Reservoirs - less than 10 ac.	814:Roads and highways
Neptune Road 500-foot buffer			

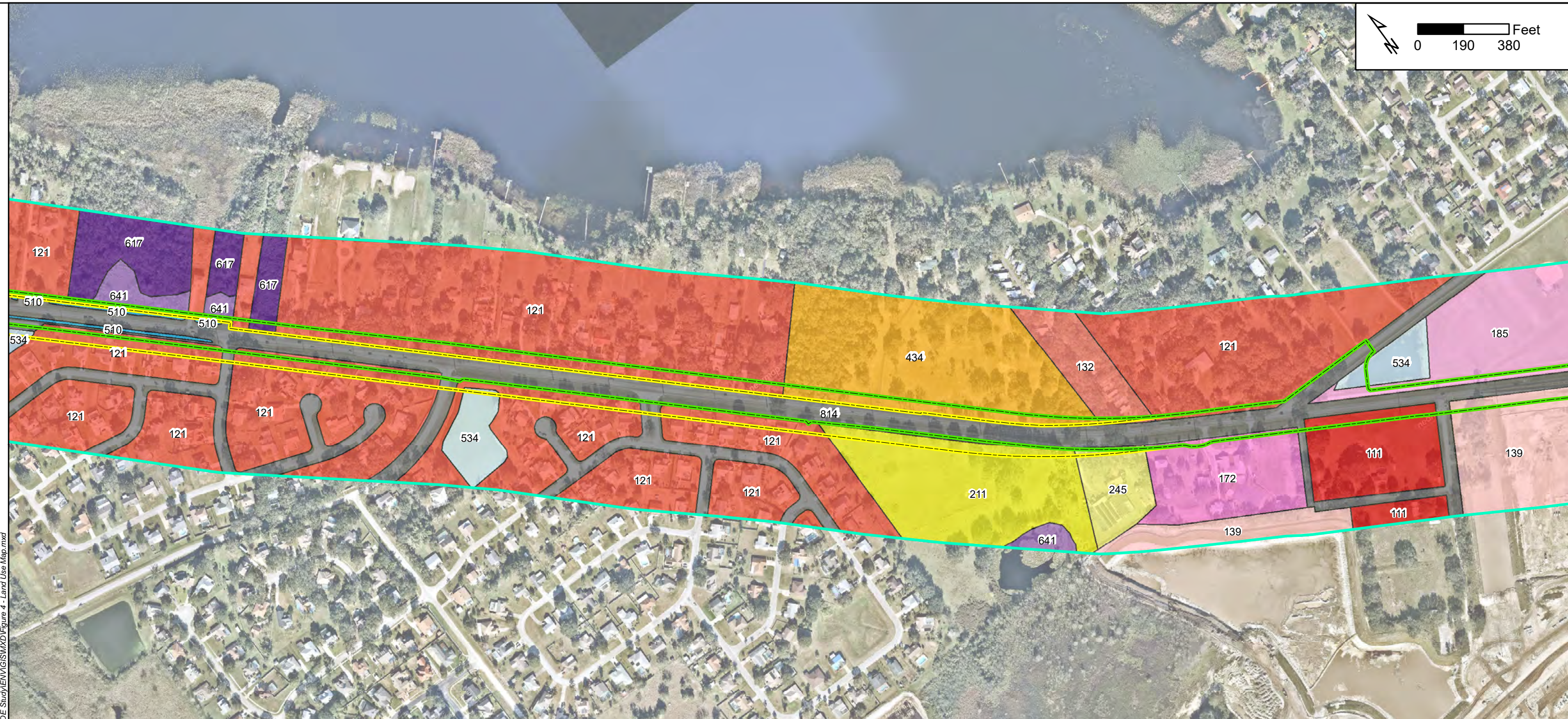
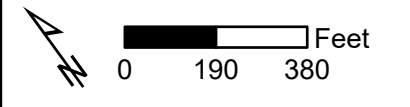
K:\VPRB_Environment\149244410 Neptune PDE Study\ENV\GIS\MXD\Figure 4 - Land Use Map.mxd

Source: ESRI

Florida Land Use, Cover and Forms Classification System (FLUCFCS) Map

**Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida**





K:\V\RB_Environmental\149244410 Neptune PDE Study\ENV\GIS\MXD\Figure 4 - Land Use Map.mxd

Legend

Alt1 Proposed ROW	FLUCFCS Code: Description	172:Religious	510:Streams and waterways
Alt2 Proposed ROW	111:Fixed single family units, low density	185:Parks and zoos	534:Reservoirs - less than 10 ac.
AltA Proposed ROW	121:Fixed single family units, medium density	211:Improved pastures	617:Mixed wetland hardwoods
AltB Proposed ROW	132:Mobile home units	245:Floriculture	641:Freshwater marshes
Neptune Road 500-foot buffer	139:High density under constructuin	434:Hardwood-conifer mixed	814:Roads and highways

Source: ESRI

Florida Land Use, Cover and Forms Classification System (FLUCFCS) Map

**Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida**

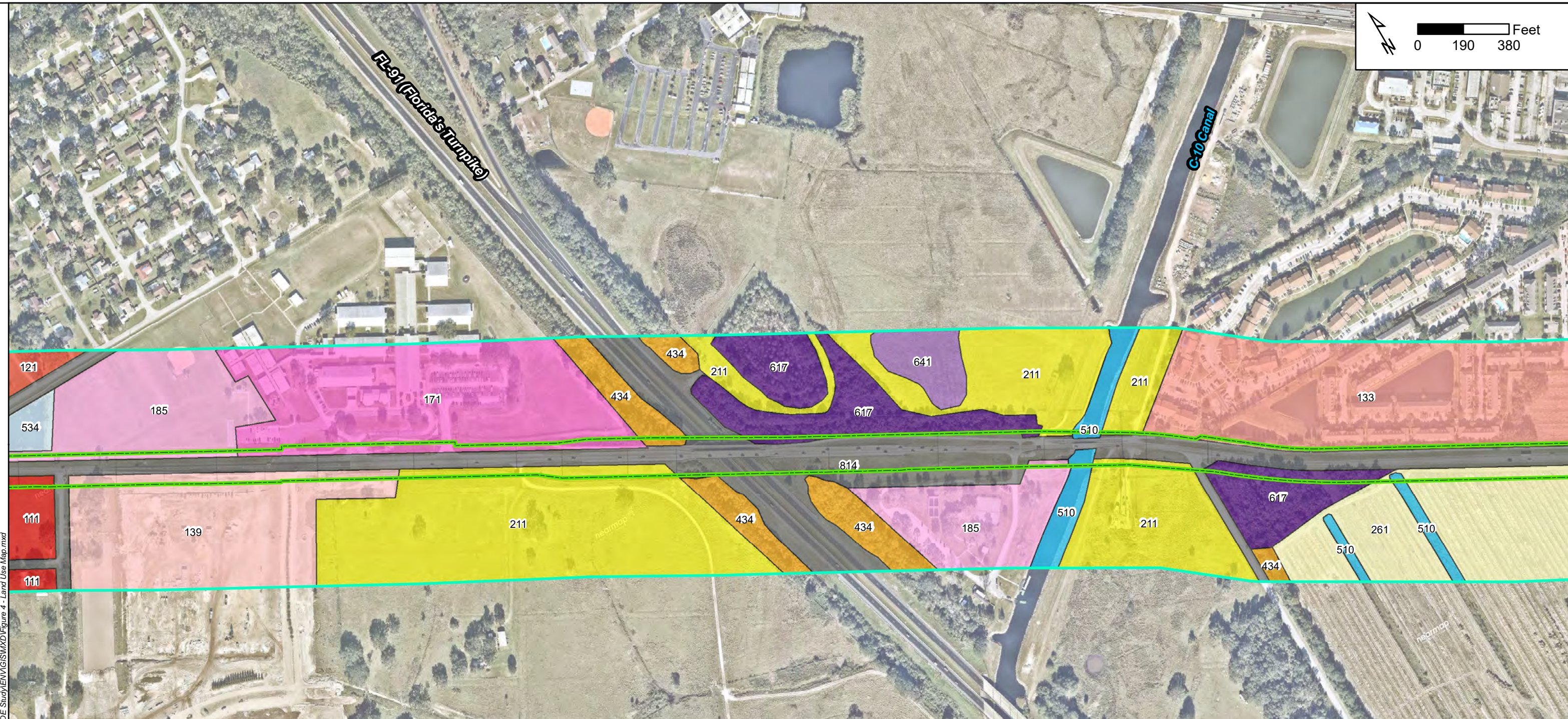
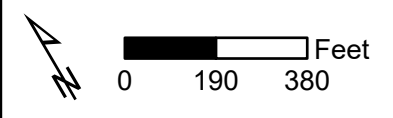


1 inch = 400 feet

MAY 2019

JOB NUMBER: 149244410

FIGURE 2 - Page 2 of 4



K:\VRB_Environment\149244410 Neptune PDE Study\ENV\GIS\MXD\Figure 4 - Land Use Map.mxd

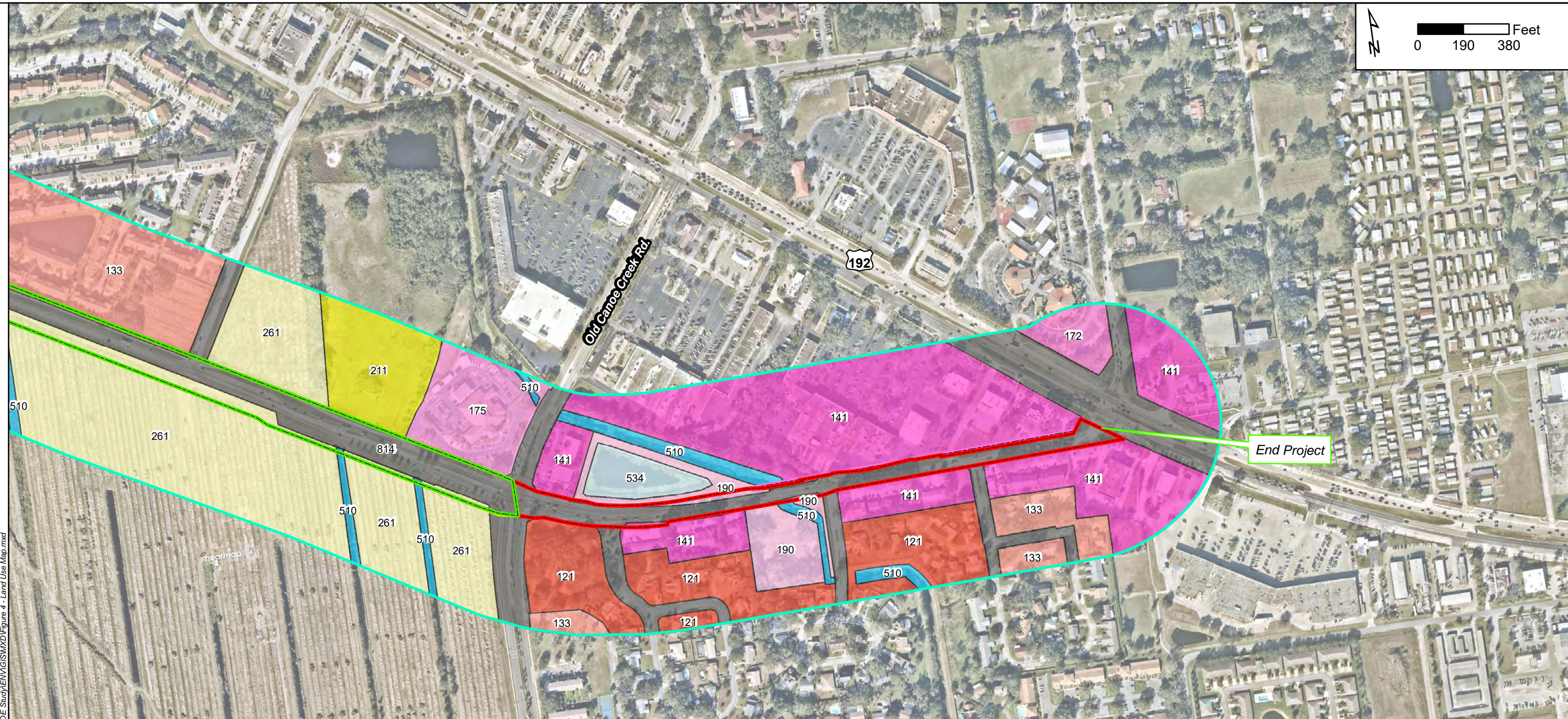
Legend	
	Alt1 Proposed ROW
	Alt2 Proposed ROW
	AltA Proposed ROW
	AltB Proposed ROW
	Neptune Road 500-foot buffer
FLUCFCS Code: Description	
	111:Fixed single family units, low density
	121:Fixed single family units, medium density
	133:Multiple dwelling units, low rise
	139:High density under constructuin
	171:Educational facilities
	185:Parks and zoos
	211:Improved pastures
	261:Fallow crop land
	434:Hardwood-conifer mixed
	510:Streams and waterways
	534:Reservoirs - less than 10 ac.
	617:Mixed wetland hardwoods
	641:Freshwater marshes
	814:Roads and highways

Source: ESRI

Florida Land Use, Cover and Forms Classification System (FLUCFCS) Map

**Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida**





K:\VPRB_Environment\149244410 Neptune PDE Study\ENV\GIS\MXD\Figure 4 - Land Use Map.mxd

Legend

- Alt1 Proposed ROW
- Alt2 Proposed ROW
- AltA Proposed ROW
- AltB Proposed ROW
- Neptune Road 500-foot buffer

FLUCFCS Code: Description

- | | | |
|--|---|--|
| 121:Fixed single family units, medium density | 172:Religious | 261:Fallow crop land |
| 133:Multiple dwelling units, low rise | 175:Governmental | 510:Streams and waterways |
| 141:Retail sales and services | 190:Open land | 534:Reservoirs - less than 10 ac. |
| 211:Improved pastures | 814:Roads and highways | |

Florida Land Use, Cover and Forms Classification System (FLUCFCS) Map

**Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida**



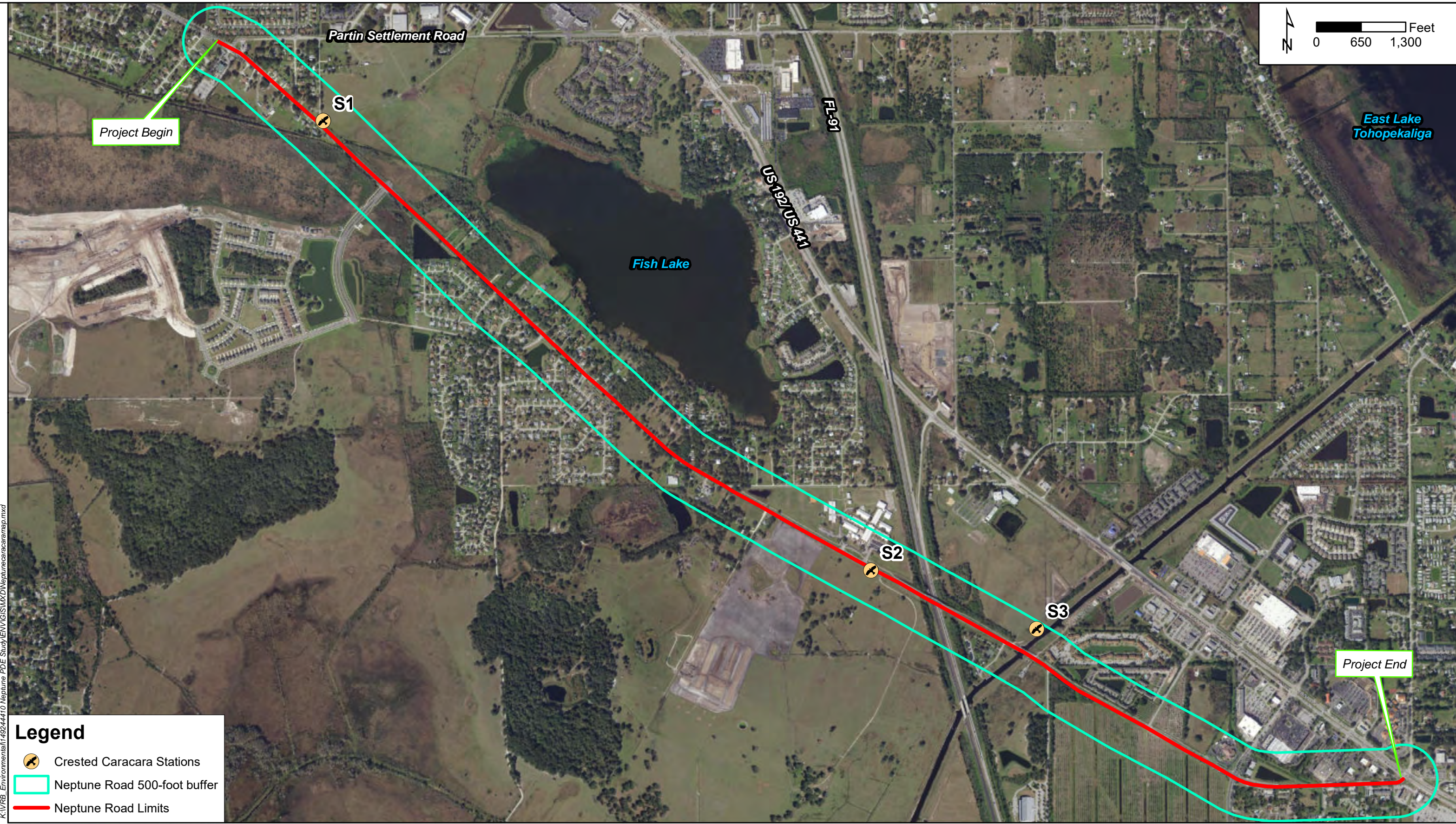
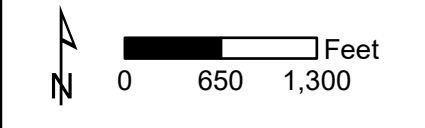
1 inch = 400 feet

MAY 2019

JOB NUMBER: 149244410

FIGURE 2 - Page 4 of 4




FIGURE 3
CARACARA SURVEY STATIONS MAPS



Project Begin

Project End

Legend

-  Crested Caracara Stations
-  Neptune Road 500-foot buffer
-  Neptune Road Limits

K:\VRB_Environment\149244410 Neptune PDE Study\ENV\GIS\MXD\NeptuneCaracaraMap.mxd

Source: ESRI, FLUCFCS courtesy of SFWMD (2016)

Crested Caracara Stations Map
Neptune Road from Partin Settlement Road to US 192
Project Development & Environment Study
FPID: 445415-1
Osceola County, Florida



1 inch = 1,300 feet

MAY 2019

JOB NUMBER: 149244410

FIGURE 3

APPENDIX A
CARACARA SURVEY DATA SHEETS

USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd.

Location/Observation Block/Lat-Long: Station 1

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
1/2/18	7:05a	10:10a	Taylor Mueller

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 7:05a	69°	E 2 mph	95%	altocumulus	∅
Finish: 10:10a	72°	ESE 2 mph	95%	altocumulus	∅

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area
adjacent to roadway, active cattle pasture; appears to be in the process of being developed; a lot of car traffic; new road going through pasture.




Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc
mla			no caracara observed.

wildlife observed: woodstork; cattle egret; cormorant; osprey; common grackle; sandhill crane; pigeon; bald eagle; boat tailed grackle; glossy ibis. king fisher; cardinal; 8 red bellied wood pecker; great egret; mourning dove; ring billed gull; mockingbird; little blue heron; fish crow



- Legend
-  1500m Buffer of Potential Caracara Stations
 -  Potential Caracara Stations
 -  Project Limit



Neptune Rd

From Partin Settlement Road
to US192



**CARACARA SURVEY
STATION LOCATION MAP**

DATE: 1 / 2 / 2018

STATION

1

Aerial Imagery: Source: ESRI, DigitalGlobe, GeoEye, Earthstar, CNES/Airbus, IGN, etc. User: [unreadable]

USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Road

Location/Observation Block/Lat-Long: Station 2

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
1.2.2019	7:05 AM	10:18 AM	JADA Barkorst

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 7:05 AM	67°F	calm	90%	Stratus stratocumulus	light high fog
Finish: 10:18 AM	71°F	0-2mp WNW	90%	stratus stratocumulus	NO

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area
open pasture surrounded by development, middle school campus, heavy traffic on Neptune Rd.

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc
			No Caracara observed

juv. bald eagle, sandhill crane, mourning dove, kestrel, white pelican, cattle egret
eastern meadowlark, Great blue heron, American crow, sparrow, blue jay
red ~~shouldered~~ hawk, tree swallow

USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd
Location/Observation Block/Lat-Long: station 3

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
1/3/19	7:00a	10:10a	Taylor Mueller

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 7:00a	69°	S 1mph	50%	Stratus	light fog
Finish: 10:10a	74°	SSE 7mph	10%	Stratus	∅

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area
Pasture adjacent to roadway and trail; vegetation includes various herbaceous species including: bahia grass; broom sedge; minimal canopy species; oak; cabbage palm;

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc
n/a			no caracara observed

wildlife observed: boat tailed grackle; red shouldered hawk; pigeon; cardinal; killdeer; sandhill crane; yellow rumped warbler; cattle egret; fish crow; muscovy duck; cormorant; blue bird; 8 kestrel; blue jay; red bellied woodpecker; mourning dove; tree swallow; loggerhead shrike; great heron; black vulture;



Service Layer Credits: DigitalGlobe, GeoEye, Earthstar, CNES, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- 1500m Buffer of Potential Caracara Stations
- Potential Caracara Stations
- Project Limit



Neptune Rd
From Partin Settlement Road
to US192



1 inch = 1,000 feet

**CARACARA SURVEY
STATION LOCATION MAP**

DATE: 1/13 / 2018

STATION
3

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Road

Location/Observation Block/Lat-Long: Block 1

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
1/15/19	7:12		B. Shepherd

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 7:12	54	7mph NNW	90	Alto cumu.	☒
Finish: 10:12	53	9mph NNW	100	" "	☒

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area
Block 1 at end of cul-de-sac on Stroupe Rd. Overlook adjacent to staging area for new road extension associated w/ Shady Ln. Overlooks pasture and active cattle operation adjacent to Fish Lake w/in flight path and approach to OLA. Pasture w/ many ruderal species, including dog fernet, <i>Andropogon</i> sp. and bahia

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc

Wildlife obs: bald eagle (flyover), wood stork (flyover), grackle, white ibis, sandhill crane, herring gull, mourning dove, black vulture, turkey vulture, Am. sp. cattle, glossy ibis, American kestrel, boat-tailed grackle

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Road

Location/Observation Block/Lat-Long: Station 2

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
1/15/19	0712	1012	Tison Hawk

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 0712	54°F	NNW 5-10	90%		no
Finish: 1012	53°F	NW 5-10	90%		no

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

kestrel, sand hill crane, crow, grackle, turkey vulture, cattle egret, cardinal, red shoulder hawk, mourning dove, seveninch sparrow, swallow

Observations



(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar
 Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User

Legend

-  1500m Buffer of Potential Caracara Stations
-  Potential Caracara Stations
-  Project Limit



Neptune Rd
 From Partin Settlement Road
 to US192



**CARACARA SURVEY
 STATION LOCATION MAP**

DATE: 1 / 15 / 2019

**STATION
 2**



**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Nepesine Rd

Location/Observation Block/Lat-Long: Station 3

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
1/16/19	7:02a	10:06am	Taylor Mueller

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 7:02a	45°	N 8mph	10%	Cirrus/Cirrostratus	Ø
Finish: 10:06a	54°	N 12mph	80%	Cirrocumulus	Ø

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

--

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc
n/a			no caracara observed

wildlife observed: pigeon; white egret; American Crow; Sandhill crane;
boat tailed grackle; tree swallows; killdeer; mourning dove, cardinal; palm warbler;
little blue heron; cattle egret; black ug ibree;

USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd
Location/Observation Block/Lat-Long: Block 1

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
1/29/19	7:01a		Taylor Mueller

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 7:01a	42°	W 1 mph	0%	nk	none
Finish: 10:03a	56°	WNW 1 mph	0%	nk	none

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area
vehicle traffic

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc

Wildlife observed: American Crow; Pigeon, great blue heron, mourning dove, cattle egret, great egret, white ibis, ring billed gull, sandhill crane, yellow rumped warbler, cattle, turkey vulture, blue jay, boat billed grackle, common grackle, mockingbird, glossy ibis, wood stork, osprey, killdeer, anhinga, red shouldered hawk, cormorant, black vulture;

USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd.

Location/Observation Block/Lat-Long: Station 2

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
1-29-2019	7:08	10:10	Jack Barbust (1°253 hrs) Gary Haddock (2°30 hrs)

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 7:08	42°F	calm	0%	NA	fog
Finish: 10:10	56°F	3-5 NE	0%	NA	NA

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area
heavy traffic/road noise

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc

sandhill cranes, Kildeer, American crows, gull, ^{bank-tailed} ~~common~~ grackle, bald eagle, mourning dove, E. meadowlark, E. Kingbird, starling, cattle egret, N. mockingbird, Eastern bluebird, fox squirrel, blue jay, black vulture, red bellied woodpecker



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, Esri, DeLorme, NAVTEQ, SwireHoke, Swire, GeoEye, Japan Earthstar, DigitalGlobe, GeoEye, Earthstar, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, Esri, DeLorme, NAVTEQ, SwireHoke, Swire

Legend

- 1500m Buffer of Potential Caracara Stations
- Potential Caracara Stations
- Project Limit



Neptune Rd
From Partin Settlement Road
to US192



**CARACARA SURVEY
STATION LOCATION MAP**

DATE: 1/29/2019

**STATION
2**



**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd

Location/Observation Block/Lat-Long: Station 3

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
1/30/17	7:02a	10:05am	T. Mueller / G. Huddle

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start:	52°	N 9 mph	100%	Cumulostretus	Ø
Finish:	54°	N 11	95%	11	NA

Observation Point Information

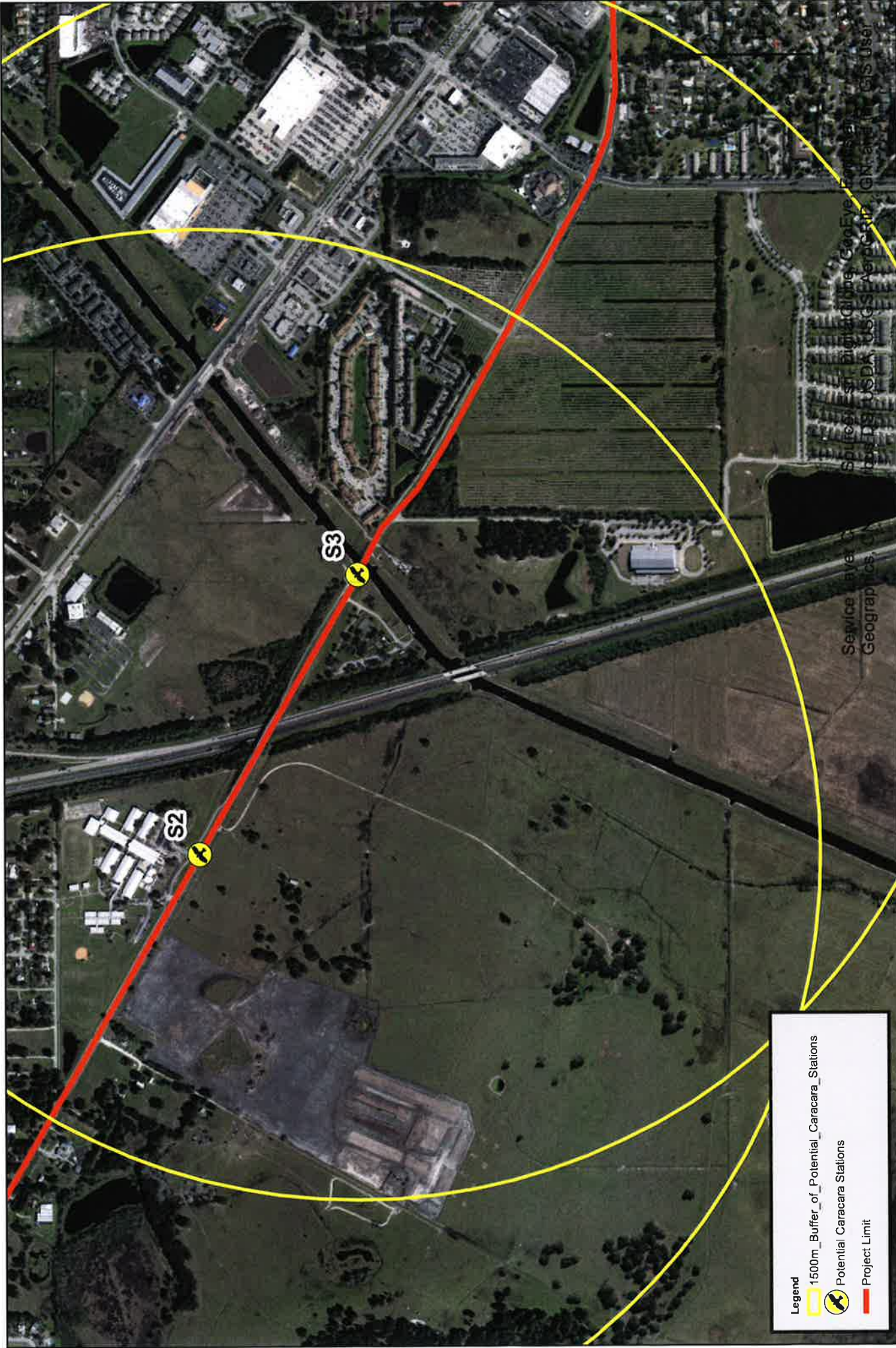
General Site and Habitat Conditions; Other Activities in the Area
heavy traffic; ~ 15 cattle

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc

Wildlife observed: sandhill crane; gulls, cattle egret, rock dove, fish crow, great blue heron, Killdeer, startling, Am. crow, mourning dove, N. cardinal, little blue heron, anhinga, red-tailed hawk, glossy ibis, boat tail grackle, black vulture, red bellied woodpecker, E. meadowlark, bald eagle (adult), American robin, blue jay



Service Layer Credits:
 Imagery: DigitalGlobe, GeoEye, Earthstar, CNES, Airbus, GeoEye, IGN, AerGRID, AIRPHOTON, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

- 1500m Buffer of Potential Caracara Stations
- Potential Caracara Stations
- Project Limit



Neptune Rd
 From Partin Settlement Road
 to US-192

1 inch = 1,000 feet

**CARACARA SURVEY
 STATION LOCATION MAP**

DATE: 1/30/2019

STATION
 3

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd
Location/Observation Block/Lat-Long: Station 1

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
2/12/19	6:55a	9:56p	T. Mueller / G. Heddle

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 6:55a	69°	56 mph	100%	cumulostratus	light fog
Finish: 9:56p	73°	510 mph	100%	cumulostratus	none

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc
			no caracara observed

wildlife observed: American Crow; redbellied woodpecker; sandhill cranes; boat-tailed grackle; mourning dove; glossy ibis; muscovy ducks; white ibis; rock doves; Anhinga; eastern phoebe; fish crow; blue jay; mockingbird; white pelicans; double-crested cormorant; European Starling; ring-bill gull; black-bellied whistling duck; cattle egret; black vulture; red-winged blackbird; turkey vulture; Northern cardinal

USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd

Location/Observation Block/Lat-Long: Station 2

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
2/11/19	6:50 a	9:52 a	T. Mueller

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 6:50 a	48°	NNW 9 mph	0	n/c	none
Finish: 9:52 a	61°	N 11 mph	0	n/c	none

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

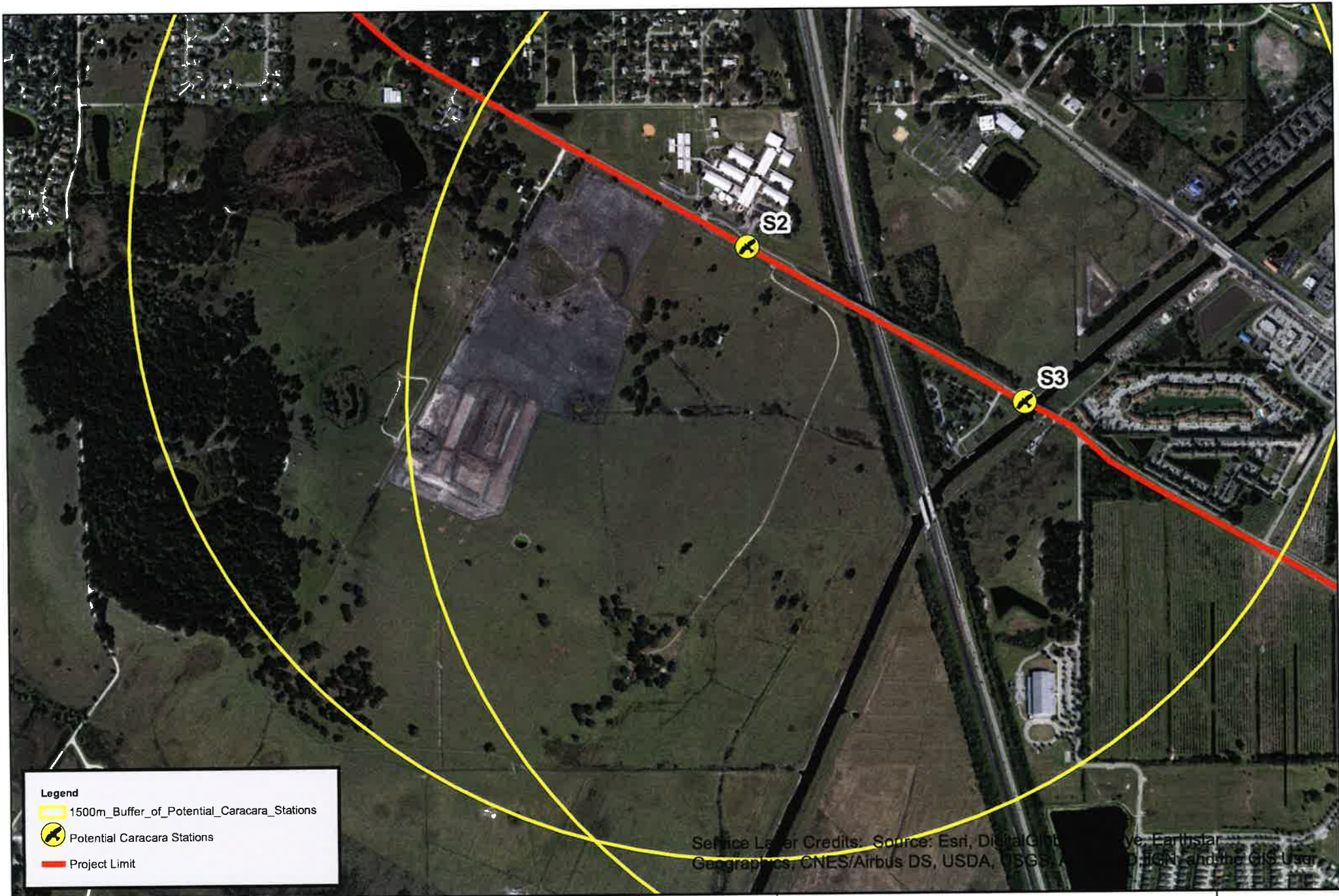
cow carcass in pasture

Observations

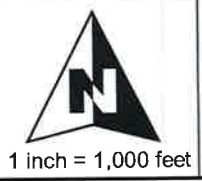
(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc

lark life observed: black vulture; juncos; sandhill crane; meadow lark; mourning dove;
deer tail; grackle; American crow; cardinal; red shouldered hawk; killdeer;
white ibis; white ibis el. cm; red shouldered hawk; osprey; tree sparrows;



Neptune Rd
From Partin Settlement Road
to US192



**CARACARA SURVEY
STATION LOCATION MAP**

DATE: 2 / 14 / 2019

**STATION
2**

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd.

Location/Observation Block/Lat-Long: Station 3

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
2/15/19	6:57a	9:59a	T. Mueller / G. Haddle

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 6:57a	55°	SS E 2mph	10%	Cirrus	none
Finish: 9:59a	70°	ENE 1mph	5%	Cirrus	none

Observation Point Information

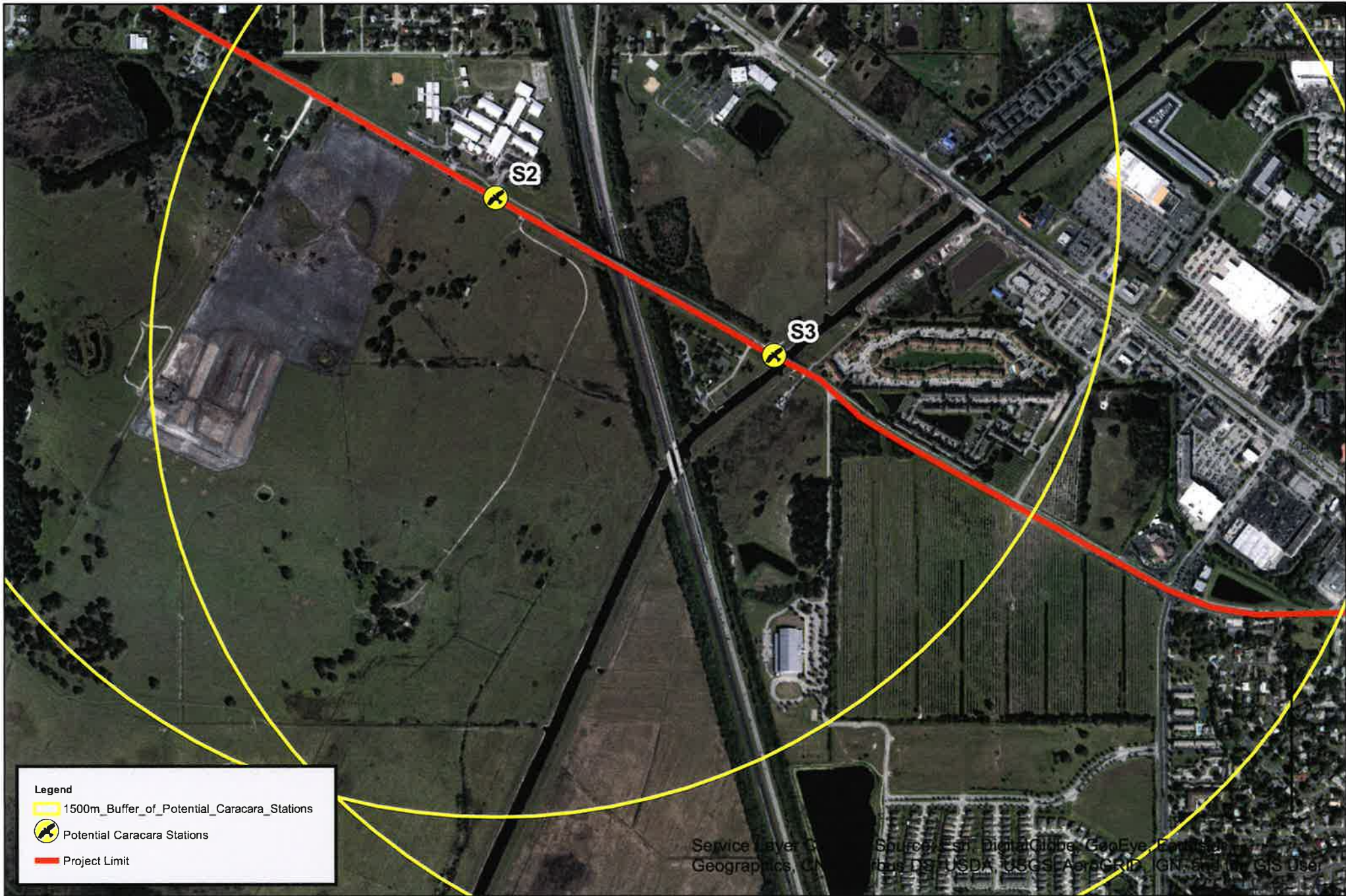
General Site and Habitat Conditions; Other Activities in the Area

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc
			no caracaras observed

Sandhill crane, great egret, Northern cardinal, Eu Starling, Eastern meadowlark, Am. Crow, eastern bluebird, common grackle, white pelican, rock dove, mourning dove, gray squirrel, Kestrel, tree swallow, palm warbler, belted kingfisher, blue jay, cattle egret, red bellied woodpecker, Antelope, robin, boat tail grackle, N. mockingbird, Kildeer, red-tailed hawk, black vulture



Neptune Rd

From Partin Settlement Road
to US192



**CARACARA SURVEY
STATION LOCATION MAP**

DATE: 2 / 15 / 2019

**STATION
3**

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Road
Location/Observation Block/Lat-Long: Block 1

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
2/26/19	6:42	10:00	B. Shepherd

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 6:42	66°F	16mph NE	30	cumul. strat	☉
Finish: 10:00	72°F	8mph ENE	90	" "	☉

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

Observations




(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc

Wildlife obs. Am. crow, osprey, glossy ibis, red-winged blackbird, rock pigeon, eurasian collared-dove, mourning dove, mockingbird, white ibis, cattle egret, brown-headed cowbird, sandhill crane, great egret, palm warbler, boat-tailed grackle, limpkin, vulture, anhinga



Legend

-  1500m Buffer of Potential Caracara Stations
-  Potential Caracara Stations
-  Project Limit



Neptune Rd

From Partin Settlement Road
to US192



**CARACARA SURVEY
STATION LOCATION MAP**

DATE: 2/26/19

STATION

1



Project created by: Survey Station Location Map
 Date: 2/26/19
 User: JCS/CNES/Albion

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd

Location/Observation Block/Lat-Long: Block S2

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
2/28/19	6:40	9:50	B. Shepherd

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 6:40	65°F	6mph NW	100	convect.	☉
Finish: 9:50	69°F	4mph NNE	30	" "	" "

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)




Observer Location	Age A/Im	Time	Description of behavior, flight path, etc

wildlife obs. Am. crow, sandhill crane, yellow-rumped warbler, common grackle
 Am. kestrel, mourning dove, great egret, Am white pelican, Savannah sparrow
 mockingbird, meadowlark, vultures



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, Swayze, Swire, GeoEye, Earthstar, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, Swayze, Swire

Legend

-  1500m Buffer of Potential Caracara Stations
-  Potential Caracara Stations
-  Project Limit



Neptune Rd
 From Partin Settlement Road
 to US192



**CARACARA SURVEY
 STATION LOCATION MAP**

DATE: 2 / 28 / 19

**STATION
 2**

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Nepesun Rd

Location/Observation Block/Lat-Long: Station 3

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
2/28/19	6:40 _a	9:44 _a	T. Mueller

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 6:40 _a	65°	wnw 6mph	100%	cumulus	none
Finish: 9:44 _a	69°	WNW 9mph	50%	cumulus	none

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc
			no caracara observed

observed wildlife: mourning dove; rock dove; cattle egret; blue bird; American crow; Palm warbler; kestrel; fish crow; cardinal; little blue; meadow lark; mocking bird; blue jay; red bellied wood pecker; robin; 8 black vulture; black tailed grackle

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd
Location/Observation Block/Lat-Long: Station 1

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
3/12/19	7:21 a	10:30 a	T. Mueller

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 7:21 a	65°	NW 6 mph	2%	Stratus	none
Finish: 10:30 a	72°	N 11 mph	100%	cumulostratus	none

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

--

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc
			no caracaras observed

Wildlife observed: boat-tailed grackle; white ibis; glossy ibis; sandhill crane; common grackle; mourning dove; American crow; mockingbird; little blue heron; osprey; great egret; black vulture; cardinal; red bellied wood pecker; rock pigeon; red shouldered hawk; killdeer; juvenile bald eagle; cattle egret; wood stork; limpkin;

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd

Location/Observation Block/Lat-Long: Station 2

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
3/13/19	7:22a	10:26am	T. Mueller

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 7:22a	62°	EWE 8mph	10%	Stratus	none
Finish: 10:26am	73°	E 14 mph	90%	cirrus	none

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc
			no caracara observed

Wildlife observed: mourning dove, meadowlark, red shouldered hawk; rock pigeon; eastern phoebe; great egret; cardinal; black unkwere; boat tailed grackle; glossy ibis; white pelican; cormorant; American crow; mockingbird; loggerhead shrike; red tailed hawk; woodstork; cattle egret; osprey;

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Rd

Location/Observation Block/Lat-Long: Station 3

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
3/14/19	7:22a	10:24a	T. Mueller

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 7:22a	69°	E 6mph	5%	Stratus	none
Finish: 10:24a	73°	ESE 11 mph	85%	cumulus	none

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc
			no caracara observed

Wildlife observed: bluegray gnatcatcher; American Crow; sandhill crane; rock pigeon; fish crow; white ibis; black vulture; wood stork; palm warbler; screech owl; meadowlark; blue jay; mourning dove; tree swallow; eastern phoebe; red bellied woodpecker; great egret; green & blue heron;

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Alaptone Rd
Location/Observation Block/Lat-Long: Station 1

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
7/26/19	0720	1020	J. Houck

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 0720	65°F	3-5 NW	10%		no
Finish: 1020	72°F	5-8 NW	0%		no

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area
wood stork, sandhill crane, crow, mourning dove, osprey, E. meadowlark, turkey, white ibis, cattle egret, bald eagle, cardinal, mockingbird, tree swallow, black vulture, great blue heron, glossy ibis, kestrel, killdeer

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

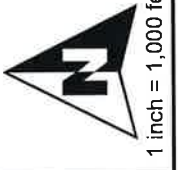
Observer Location	Age A/Im	Time	Description of behavior, flight path, etc



- Legend**
-  1500m Buffer_of_Potential_Caracara_Stations
 -  Potential Caracara Stations
 -  Project Limit



Neptune Rd
 From Partin Settlement Road
 to US192



**CARACARA SURVEY
 STATION LOCATION MAP**

DATE: ___/___/___

**STATION
 1**

Map created using ESRI ArcGIS Desktop. Source: Google Earth, ESRI, and the GIS User.

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Neptune Road

Location/Observation Block/Lat-Long: Station 2

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
7/27/19	0713	1013	J. Houck

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 0713	64°F	3-5 NNE	100%		no
Finish: 1013	65°F	10-20 N	100%		no

Observation Point Information

General Site and Habitat Conditions; Other Activities in the Area

meadowlark, cardinal, mourning dove, kestrel, crow, bald eagle, sandhill crane, glossy ibis, wood stork, pileated woodpecker, loggerhead shrike

Observations

(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc

**USFWS Crested Caracara Draft Survey Protocol –
Additional Guidance (2016-2017 Breeding Season)**

Caracara Survey Form (updated 12/9/2016)

Project Name: Nepton Rd.

Location/Observation Block/Lat-Long: Station 3

Date	Start Time	Stop Time	Observer Name(s) and Experience Level(s)
3/28/19	0712	1012	J. Hovick

Weather

Time	Air Temp	Wind Speed and Direction	% Cloud Cover	Cloud Type	Rain/Fog
Start: 0712	59°F	8-10 NE	0%		no
Finish: 1012	70°F	10-20 NE	0%		no

Observation Point Information

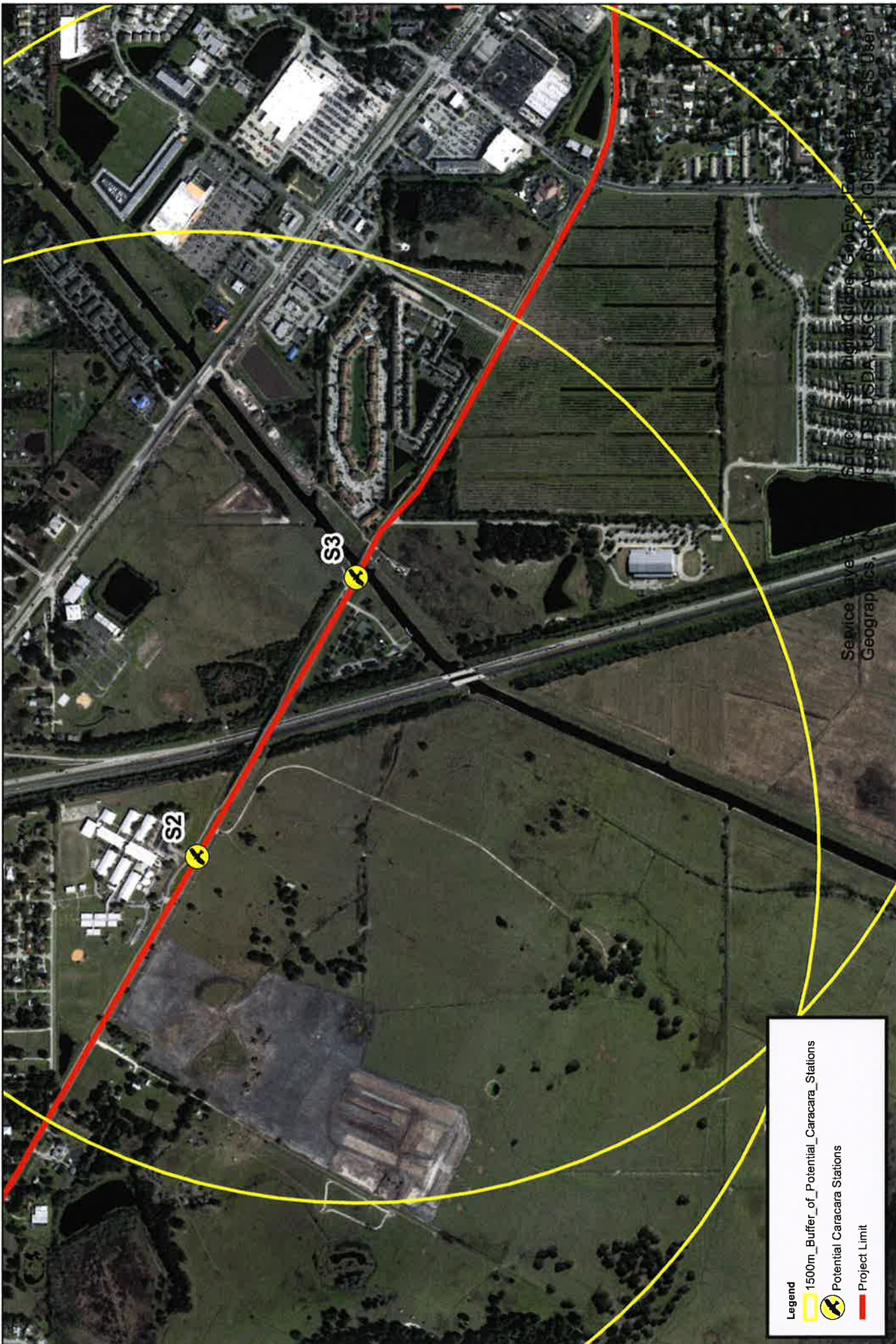
General Site and Habitat Conditions; Other Activities in the Area

sandhill crane, crow, mourning dove, bald eagle, grackle, cowbird, meadowlark, swallowtail kite, savannah sparrow, kestrel, downy woodpecker, red shouldered hawk,

Observations




(flight data, perching, preening, courtship, feeding, nest building, incubation, head throwback, diving, reaction to passing planes/traffic/pedestrians, other bird species, etc)

Observer Location	Age A/Im	Time	Description of behavior, flight path, etc



Service Layer: Google Earth Engine
 Source: Esri, DigitalGlobe, GeoEye, Earthstar, CNES, USDA, USGS, AeroGRID, IGN, and the GIS User

Legend

-  1500m Buffer of Potential Caracara Stations
-  Potential Caracara Stations
-  Project Limit



Neptune Rd
 From Partin Settlement Road
 to US192



1 inch = 1,000 feet

**CARACARA SURVEY
 STATION LOCATION MAP**

DATE: ___ / ___ / ___

**STATION
 3**

APPENDIX B
PHOTOGRAPHS OF SURVEY STATIONS

Station 1



Photographic Log – Caracara Survey Stations

Project Development and Environment (PD&E) Study – Neptune Road Widening
Osceola County, Florida



Station 1



Photographic Log – Caracara Survey Stations

Project Development and Environment (PD&E) Study – Neptune Road Widening
Osceola County, Florida



Station 2



Photographic Log – Caracara Survey Stations

Project Development and Environment (PD&E) Study – Neptune Road Widening
Osceola County, Florida



Station 2



Photographic Log – Caracara Survey Stations

Project Development and Environment (PD&E) Study – Neptune Road Widening
Osceola County, Florida



Station 3



Photographic Log – Caracara Survey Stations

Project Development and Environment (PD&E) Study – Neptune Road Widening
Osceola County, Florida



Station 3



Photographic Log – Caracara Survey Stations

Project Development and Environment (PD&E) Study – Neptune Road Widening
Osceola County, Florida



APPENDIX J

South Florida Wood Stork Effect Determination Key



United States Department of the Interior



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

May 18, 2010

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

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

Dear Mr. Kinard:

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

The Fish and Wildlife Service's (Service) South Florida Ecological Services Office (SFESO) and the U.S. Army Corps of Engineers Jacksonville District (Corps) have been working together to streamline the consultation process for federally listed species associated with the Corps' wetland permitting program. The Service provided letters to the Corps dated March 23, 2007, and October 18, 2007, in response to a request for a multi-county programmatic concurrence with a criteria-based determination of "may affect, not likely to adversely affect" (NLAA) for the threatened eastern indigo snake (*Dryniarchon corais couperi*) and the endangered wood stork (*Mfcteria anlerfcana*) 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 e/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 projects 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'. 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)' of an active colony site' "may affect"

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

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.

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).

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.

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

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”.

B. Project impact to SFH is less than 0.20 hectare (one-half acre)⁶.....NLAA¹”

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 sitego to D

Project impacts to SFH within the CFA of a colony sitego 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 hydroperiod⁷ 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 guidance⁸..... NLAA¹”

Project not as above..... “may affect⁴”

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 hydroperiod⁷ of the wetlands affected, and provides foraging value similar

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

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

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

to, or higher than, that of impacted wetlands. See Enclosure 3 for a detailed discussion of the hydroperiod foraging values, an example, and further guidance⁸.. "NLAA'"

Project does not satisfy these elements "may affect'"

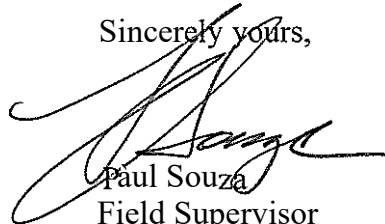
This Key does not apply to Comprehensive Everglades Restoration Plan projects, as they will require project-specific consultations with the Service.

Monitoring and Reporting Effects

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

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

Sincerely yours,



Paul Souza
Field Supervisor
South Florida Ecological Services Office

Enclosures

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

LITERATURE CITED

- Ceilley, D.W. and S.A. Bortone. 2000. A survey of freshwater fishes in the hydric flatwoods of flint pen strand, Lee County, Florida. Proceedings of the 27th Annual Conference on Ecosystems Restoration and Creation, 70-91. Hillsborough Community College; Hillsborough County, Florida.
- Flemming, D.M., W.F. Wolff, and D.L. DeAngelis. 1994. Importance of landscape heterogeneity to wood storks. Florida Everglades Management 18: 743-757.
- Kahl, M.P., Jr. 1964. Food ecology of the wood stork (*Mycteria americana*) in Florida. Ecological Monographs 34:97-117.
- Ogden, J.C. 1991. Nesting by wood storks in natural, altered, and artificial wetlands in central and northern Florida. Colonial Waterbirds 14:39-45.
- Ogden, J.C., J.A. Kushlan, and J.T. Tilmant. 1976. Prey selectivity by the wood stork. Condor 78(3):324-330.
- Ogden, J.C. 1996. Wood Stork in J.A. Rodgers, H. Kale II, and H.T. Smith, eds. Rare and endangered biota of Florida. University Press of Florida; Gainesville, Florida.
- Rodgers, J.A. Jr., A.S. Werner, and S.T. Schwikert. 1987. Population dynamics of wood storks in northern and central Florida, USA. Colonial Waterbirds 10:151-156.
- Rodgers, J.A., Jr., S.T. Schwikert, and A. Shapiro-Wenner. 1996. Nesting habitat of wood storks in north and central Florida, USA. Colonial Waterbirds 19:1-21.
- U.S. Fish and Wildlife Service. 1990. Habitat management guidelines for the wood stork in the southeast region. Prepared by John C. Ogden for the Southeast Region U.S. Fish and Wildlife Service; Atlanta, Georgia.
- U.S. Fish and Wildlife Service. 1999. South Florida multi-species recovery plan. Fish and Wildlife Service; Atlanta, Georgia. Available from: <http://verobeach.fws.gov/Programs/Recovery/vbms5.html>.

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION



HABITAT MANAGEMENT GUIDELINES
FOR THE WOOD STORK IN THE
SOUTHEAST REGION

Prepared by

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

for the

Southeast Region
U. S. Fish and Wildlife Service

Cover design by
Florida Power & Light Company
Miami, Florida

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Introduction

A number of Federal and state laws and/or regulations prohibit, cumulatively, such acts as harassing, disturbing, harming, molesting, pursuing, etc., wood storks, or destroying their nests (see Section V-E). 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 maintain 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 to 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 seasonal 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. Peatng habitat.

A major reason for the wood stork decline has been the loss and degradation 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 Habits.

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 molle*), or to 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 out 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.

m. **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 "leads" 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 to 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 weight 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 to 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

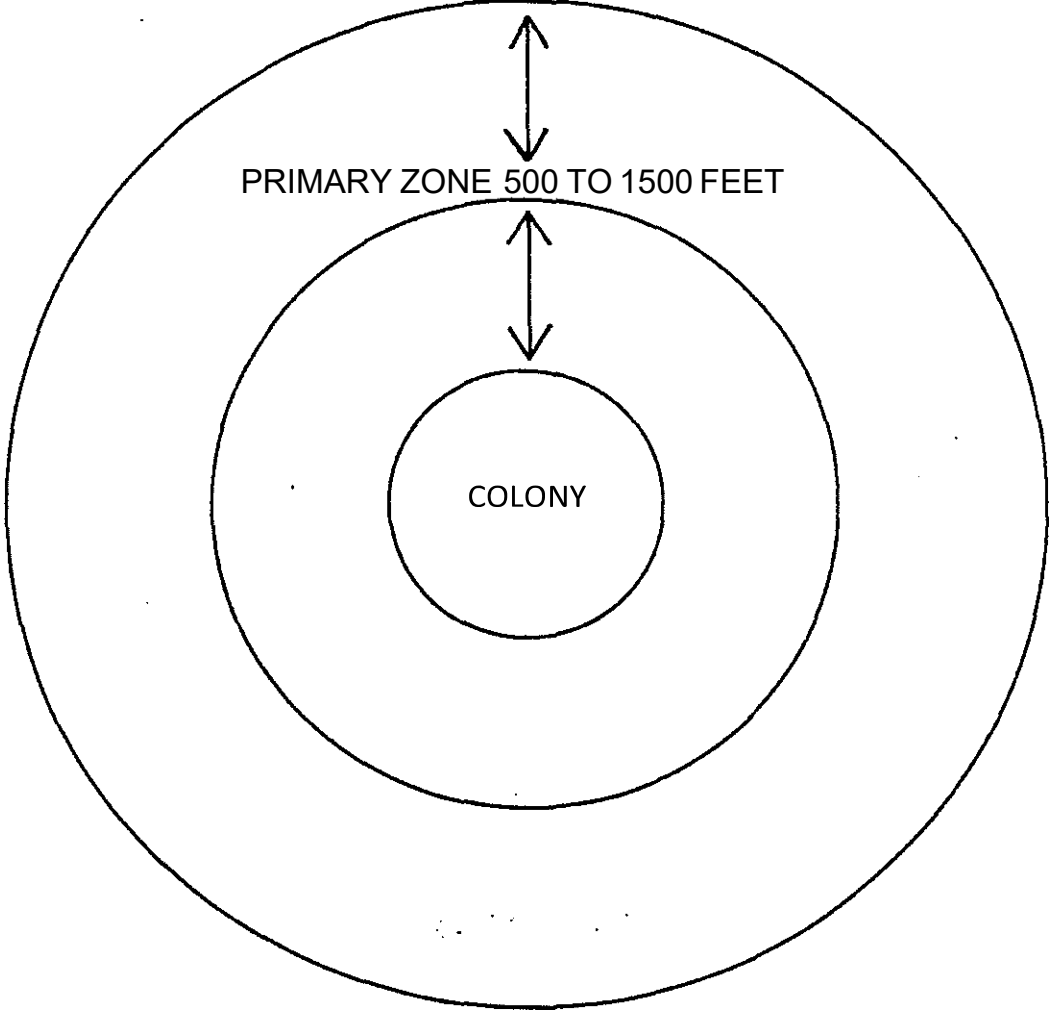
SECONDARY ZONE 2500 FEET



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
 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 **lacked**, 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 transmission 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 100-1000 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, live 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 I 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,

possession, or wantonly or willfully 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..."

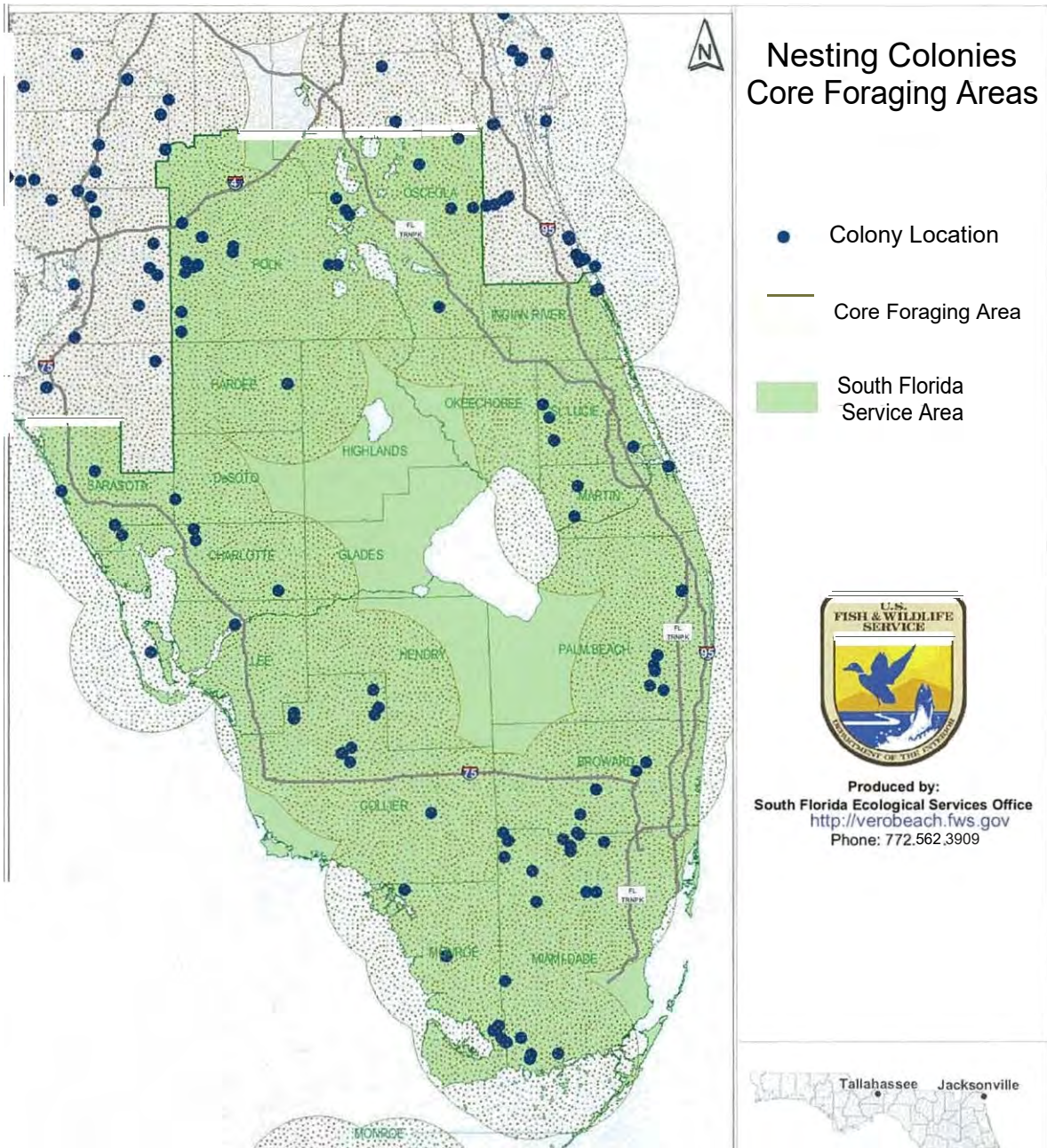
The wood stork is listed as endangered pursuant to the Endangered Wildlife Act of 1973 (Section 27-3-130 of the Code). Section 391-4-13-.06 of the Rules and Regulations of the Georgia Department of Natural Resources prohibits harassment, capture, sale, lolling, or other actions which directly cause the 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 5-15-40 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 shipment, and for any common or contract carrier 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 Plants and Wildlife... (3) the United States' List of Endangered Foreign Fish and Wildlife..."

Wood Stork



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>.

Foi-aging 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/m²) 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 Dalrymple'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 ($12 \times 132 = 1,584$). 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 ($12 \times 132 = 1,584$). The resultant is 0.6389 or 64 percent $11 \times 92 = 1012 / 1584 \times 100 = 63.89$).

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 *ituations 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 than 120 days of the year average ± 4 fish/m²; whereas, those flooded for more than 340 days of the year average $+ 25$ fish/in² (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’* 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 at.’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 at.’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 rev iew s of electrofishing data by Chick et

at. (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 hydroperiod. 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 Goes (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' 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 S. 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	<u>60-120</u>	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/m². In these studies, the data was provided in g/m² dry-weight and was converted to g/m² 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/m² 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/m² and to be composed of 25 fish/m². 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/m², with an average weight of 0.26 grams per fish, the biomass of a Class 3 hydroperiod would be 2.3 grams/m² (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 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	<i>Centrarchidae</i>	14	44
Yellow bulkhead	<i>Italus natalis</i>	2	12
Marsh killifish	<i>Fundulus continentus</i>	18	11
Flagfish	<i>Jordenella floridae</i>	32	7
Sailfin molly	<i>Poecilia latipinna</i>	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 forinosa*), 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).

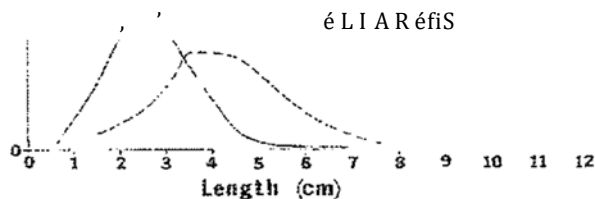


FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

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 ERP 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' 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' ichthyofauna 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/m² 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', 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/m² sample. Using this approach summed over all species in long hydroperiod wetlands, only 3.685 g/m' of the 6.5 g/m² 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' 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' 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 ($3.33\text{ g/m}' / 6.5\text{ g/m}^2 = 0.51$ 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 woodstorks.

As an example, a Class 3 SFWMD model hydroperiod wetland with a biomass of 2.3 grams/m', adjusted by 51 percent for appropriate size and species composition, provides an available biomass of 1.196 grams/m'. 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'
Class 2	60-120	0.52 gram/m'
Class 3	120-180	1.196 grams/m ²
Class 4	180-240	2.184 grams/m''
Class 5	240-300	2.704 grams/m ²
Class 6	300-330	3.12 grams/m'
Class 7	330-365	3.38 grams/m''

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 overemphasize the foraging biomass of long hydroperiod wetlands with a corresponding under valuation of short hydroperiod wetlands. The Service is aware of these questions and is examining alternative ways to assess these concerns. However, until further 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 [$0.26 \times 0.325 = 0.08$]) (Table 10).

Table 10 Actual Biomass Consumed by Wood Storks

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

Sample Project of Biomass Calculations and Corresponding Concurrence Determination

Example I:

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 $(5 * 4,047 * 0.39 \text{ (Table 10)} * 0.37 \text{ (Table 3)}) = 2,919.9 \text{ grams or } 2.92 \text{ kg}$

In the example provided, the 5 acres of wetlands, converted to square-meters (1 acre= 4,047 m²) would provide 2.9 kg of biomass $(5 * 4,047 * 0.39 \text{ (Table 10)} * 0.37 \text{ (Table 3)}) = 2,919.9 \text{ grams or } 2.9 \text{ kg}$, 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: $(3 * 4,047 * 0.39 \text{ (Table 10)} * 0.37 \text{ (Table 3)}) = 1,751.95 \text{ grams or } 1.75 \text{ kg}$

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

Net increase: $4.74 \text{ kg} - 1.75 \text{ kg} = 2.98 \text{ kg Compensation Site}$

Project Site Balance $2.98 \text{ kg} - 2.92 \text{ kg} = 0.07 \text{ kg}$

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 $(3 * 4,047 * 0.39 \text{ (Table 10)} * 0.37 \text{ (Table 3)}) = 1,751.95 \text{ grams or } 1.75 \text{ kg}$ and following restoration provides 4.74 kg $(3 * 4,047 * 0.39 \text{ (Table 10)} * 1 \text{ (Table 3)}) = 4,734.99 \text{ grams or } 4.74 \text{ kg}$, 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 At-ea				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' instead of a class 3 hydroperiod with a 0.39 grams/m' [Table 1 0]), 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: $(5 \times 4,047 \times 0.39 \text{ (Table 1 0)}) \times 0.37 \text{ (Table 3)} = 2,919.9 \text{ grams or } 2.92 \text{ kg}$

The current habitat state of the preserve provides 3.19 kg $(3 \times 4,047 \times 0.71 \text{ (Table 1 0)}) \times 0.37 \text{ (Table 3)} = 3,189.44 \text{ grams or } 3.19 \text{ kg}$ and following restoration the preserve provides 8.62 kg $(3 \times 4,047 \times 0.71 \text{ (Table 10)}) \times 1 \text{ (Table 3)} = 8,620.11 \text{ grams or } 8.62 \text{ kg}$, thus providing a net increase in class 4 hydroperiod biomass of 5.43 kg $(8.62 - 3.19 = 5.43)$.

Biomass Pre: $(3 \times 4,047 \times 0.71 \text{ (Table 10)}) \times 0.37 \text{ (Table 3)} = 3,189.44 \text{ grams or } 3.19 \text{ kg}$

Biomass Post: $(3 \times 4,047 \times 0.71 \text{ (Table 10)}) \times 1 \text{ (Table 3)} = 8,620.11 \text{ grams or } 8.62 \text{ kg}$

Net increase: $8.62 \text{ kg} - 3.19 \text{ kg} = 5.43 \text{ kg}$

Project Site Balance $5.43 \text{ kg} - 2.92 \text{ kg} = 2.51 \text{ kg}$

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

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

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

LITERATURE CITED

- Browder, J.S. 1984. Wood stork feeding areas in southwest Florida. *Florida Field Naturalist* 12:81-96.
- Carlson, J.E., and M.J. Duever. 1979. Seasonal fish population fluctuation in south Florida swamps. *Proceedings of Annual Conference of Southeastern Association of Fish and Wildlife Agencies* 31 :603-611.
- Chick, J. H., C. R. Ruetz III, and J. C. Trexler. 2004. Spatial Scale and abundance patterns of large fish communities in freshwater marshes of the Florida Everglades. *Wetlands*. 24 (3):652-644. *American Journal of Fisheries Management* 19: 957-967.
- Chick, J. H., S. Coync, and J. C. Trexlcr. 1999. Effectiveness of airboat electrofishing for sampling fishes in shallow, vegetated habitats. *North American Journal of Fisheries Management* 19:957-967.
- Coulter, M.C. 1987. Foraging and breeding ecology of wood storks in east-central Georgia. Pages 21-27 in *Proceedings of the Third Southeastern Nongame and Endangered Wildlife Symposium* (R.R. Odom, K.A. Riddleberger, and J.C. Ozier, eds.). Georgia Department of Natural Resources, Atlanta, Georgia.
- Coulter, M.C., and A.L. Bryan, Jr. 1993. Foraging ecology of wood storks (*Mycteria americana*) in east-central Georgia: I. Characteristics of foraging sites. *Colonial Waterbirds* 16(1):59-70.
- Coulter, M.C., J.A. Rodgers, J.C. Ogden, and F.C. Depkin. 1999. Wood stork (*Mycteria americana*). *The Birds of North America*, Issue No. 409 (A. Poole, ed.). Cornell Lab of Ornithology, Ithaca, New York.
- Fleming, D.M., W.F. Wolff, and D.L. DeAngelis. 1994. Importance of landscape heterogeneity to wood storks in Florida Everglades. *Environmental Management* 18(5):743-757.
- Gawlik, D.E. 2002. The effects of prey availability on the numerical response of wading birds. *Ecological Monographs* 72(3):329-346.
- Kushlan, J.A., S.A. Voorhees, W.F. Loftus, and P.C. Frohring. 1986. Length, mass and caloric relationships of Everglades animals. *Florida Scientist* 49(2):65-79.
- Loftus, W.F., and A.M. Eklund. 1994. Long-term dynamics of an Everglades small-fish assemblage. Pages 461-484 in *Everglades: the ecosystem and its restoration* (S.M. Davis and J.C. Ogden, eds.). St. Lucie Press, Delray, Florida.
- O'Hare, N.K., and G.H. Dalrymple. 1997. Wildlife in southern Everglades invaded by melaleuca (*Melaleuca quinquevneria*). *Bulletin of the Florida Museum of Natural History* 41(1):1-68. University of Florida, Gainesville, Florida.

- Ogden, J.C., J.A. Kushlan, and J.T. Tilmant. 1976. Prey selectivity by the wood stork. *The Condor* 78(3):324-330.
- Ogden, J.C., J.A. Kushlan, and J.T. Tilmant. 1978. The food habits and nesting success of wood storks in Everglades National Park in 1974. U.S. Department of the Interior, National Park Service, Natural Resources Report No. 16.
- Trexler, J. C., and C. W. Goss. 2009. Aquatic Fauna as Indicators for Everglades Restoration: Applying Dynamic Targets in Assessments. *Ecological Indicators*. Vol 9: 108-119.
- Trexler, J.C., W.F. Loftus, F. Jordan, J.H. Chick, K.L. Kandler, T.C. McElroy, and O.L. Bass. 2002. Ecological scale and its implications for freshwater fishes in the Florida Everglades. Pages 153-182 in *The Everglades, Florida Bay, and Coral Reefs of the Florida Keys: An ecosystem sourcebook* (J.W. Potter and K.G. Porter, eds.). CRC Press, Boca Raton, Florida.
- Turner, A., and J. C. Trexler. 1997. Sampling invertebrates from the Florida Everglades: a comparison of alternative methods. *Journal of the North American Benthological Society* 16:694-709
- Turner, A.W., J.C. Trexler, C.F. Jordan, S.J. Slack, P. Geddes, J.H. Chick, and W.F. Loftus. 1999. Targeting ecosystem features for conservation: standing crops in the Florida Everglades. *Conservation Biology* 13(4):898-911.
- U.S. Fish and Wildlife Service. 2006. August 31, 2006, Lake Belt Mining Region of Miami-Dade County Biological Opinion. South Florida Ecological Services Office; Vero Beach, Florida
- U.S. Fish and Wildlife Service. 2009. February 12, 2009, Fort Myers Mine No 2 Biological Opinion. South Florida Ecological Services Office, Vero Beach, Florida. <http://we.fws.gov/filedownloads/ftp%5verobeach>

APPENDIX K

Standard Protection Measures for the Eastern Indigo Snake

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE
U.S. Fish and Wildlife Service
August 12, 2013

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

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

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

POSTER INFORMATION

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

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

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

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands

and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

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

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

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

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

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

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

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

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

PRE-CONSTRUCTION ACTIVITIES

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

DURING CONSTRUCTION ACTIVITIES

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

POST CONSTRUCTION ACTIVITIES

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

APPENDIX L

Agency Coordination

From: Wrublik, John <john_wrublik@fws.gov>
Sent: Thursday, March 26, 2020 3:00 PM
To: Walsh, William <William.Walsh@dot.state.fl.us>
Cc: Graeber, David <David.Graeber@dot.state.fl.us>
Subject: Neptune Road from Partin Settlement Road to US Highway 192

EXTERNAL SENDER: Use caution with links and attachments.

Dear Mr. Walsh,

I have reviewed the Florida Department of Transportation's (FDOT) coordination letter dated March 25, 2020, and Natural Resource Evaluation (NRE) for the proposed widening of Neptune Road from Partin Settlement Road to US Highway 192. I offer the following comments.

Florida bonneted bat -The FDOT did not mention the endangered Florida bonneted bat (FBB) in its coordination letter or (NRE), so I am assuming the FDOT finds that the proposed project will not affect the FBB. The Service cannot support this finding based on the Service's October 22, 2019, FBB Consultation Key (Key) (see https://www.fws.gov/verobeach/ProgrammaticPDFs/20191022_letter_ServicetoCorps_FBB-ProgrammaticKey.pdf)

The purpose of the Key is assist action agencies, such as the FDOT, with effect determinations for the FBB pursuant to the Endangered Species Act of 1973. The Key indicates that if a development project is located outside the consultation area, then it will not affect the FBB. That is not the case for the Neptune Road Project, as it falls within the revised consultation area presented in the Key. Looking back in the file for this project, I realize that the Service did not specifically discuss the FBB in our comments submitted to FDOT's Efficient Transportation Decision Making process screening tool on September 5, 2019. Unfortunately, the Key did not become effective until October 22,2019. As such, the FDOT should consult the Key to: 1) determine the survey effort needed to determine the status of the FBB within the project footprint; 2) make the appropriate determination for this project; and 3) determine if the Key can provide concurrence for a may affect, not likely to adversely affect (MANLAA) determination for this project, or if further coordination with the Service is necessary. Please be aware that I cannot complete the consultation for this project until the FDOT addresses the FBB per the guidance provided in the Key, and advises me that FDOT has obtained concurrence for a MANLAA determination for the FBB, or if further coordination (i.e., formal consultation) with the Service is necessary.

Eastern Indigo Snake - The FDOT has determined that this project MANLAA the threatened Eastern indigo snake (EIS). I have queried our database and the Service does not have any records indicating that the EIS occurs on or within several miles of project site. Based on the lack of any credible information that would show that the EIS is reasonably certain to occur or or near the project site, we find that the project will not affect the

EIS. I recommend that the FDOT change its determination for the EIS from MANLAA to no effect. If this is acceptable to the FDOT, please let me know by return email.

Wood stork - The project is located within the Core foraging areas (i.e., all lands within 18.6 miles; CFA) of several active nesting colonies of the wood stork.

The Service believes that the loss of wetlands within a CFA due to an action could result in the loss of foraging habitat for the wood stork. To minimize adverse effects to the wood stork, we recommend that any lost foraging habitat resulting from the project be replaced within the CFA of the affected nesting colony. For projects that impact 5 or more acres of wood stork foraging habitat, the Service requires a functional assessment be conducted using our "Wood Stork Foraging Analysis Methodology" (Methodology) on the foraging habitat to be impacted and the foraging habitat provided as mitigation.

The information provided in the NRE regarding impacts to wetlands, presents what appears to be conflicting information. Consequently, I am not sure of the amount of wetlands that will be affected by the project, and I need clarification. I realize that the total amount of wetlands will depend on the alternative chosen and will include any wetlands impacted by the storm water treatment pond(s) built for the project. Since I need to analyze the maximum amount of wetlands lost, with respect to estimating the loss of wood stork foraging habitat, please provide me with maximum amount of wetlands that could be lost to the project. If this amount exceeds 5 acres, you will also need to provide me with the results of a functional assessment of wood stork forage biomass, based on the Service's Methodology, for the wetlands to be lost due to the project and the wetlands provided as mitigation for the project. The Methodology can be found at https://www.fws.gov/verobeach/BirdsPDFs/20120712_WOST%20Forage%20Assessment%20Methodology_Appendix.pdf

Wood Stork Foraging Habitat Assessment Methodology July 12, 2012

Wood Stork Foraging Habitat Assessment Methodology (July 12, 2012) Page 2 Parameter 1 - Foraging suitability value (Vegetation Density) To determine how the presence of invasive exotic vegetation may affect wood stork foraging, we

www.fws.gov

If you have any questions regarding my comments and information request, please let me know.

John

John M. Wrublik
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960
Office: (772) 469-4282
Fax: (772) 562-4288
email: John.Wrublik@fws.gov

NOTE: This email correspondence and any attachments to and from this sender is subject to the Freedom of Information Act (FOIA) and may be disclosed to third parties.

APPENDIX M

SFWMD Right-of-Way Letter



October 10, 2019

Lynn Kiefer
Kimley-Horn
445 24th Street, Suite 200
Vero Beach, Florida 32960

Lynn:

SUBJECT: Replacement of the Neptune Road Bridge and Pedestrian Bridge crossing C-31.

This letter is in response to your written request seeking information relating to the canal design information for the above referenced project crossing the C-31 (canal). Based on your submittal, the canal design section at this location consists of the following:

Canal Design Information

Canal Section:

Bottom Elevation: 45.6' NGVD
Bottom Width: 20'
Side Slopes: 1V:2H

Hydraulic Information:

Design Water Surface Elevation: 56.2' NGVD
Optimum Water Control Elevation: 55.0' NGVD

Required Vertical Clearance:

The required minimum vertical clearance acceptable at this location is two (2) feet clearance above the design water surface elevation or six (6) feet above the optimum water surface elevation, whichever produces the higher elevation.

Required Horizontal Clearances:

The center span must be centered on the centerline of the channel. The center span must have a minimum clear opening of 25 feet as measured from the faces of the pile bents. Approach spans must have a minimum spacing of 20 feet as measured on centers.

Professional Engineer's Certification Required

Any pedestrian or vehicular bridge crossing must be designed by a professional engineer registered in the State of Florida. The professional engineer is required to affix his/her seal to at least one set of record permit application drawings.

Bridge Hydraulic Report

A bridge hydraulic report must be submitted with application for a Right of Way Occupancy Permit.

Section 408 Review

The U.S. Army Corps of Engineers (USACE) has issued guidance that any work done in, over, under or through a system, right of way, levee, canal or structure built by or acquired for the USACE as part of the Central and South Florida Flood Control System (C&SF) is required to have an engineering review by the USACE (i.e., Section 408 Review pursuant to 33 USC 408). In such case and in accordance with 33 USC 408, the District, as local sponsor of the C&SF Project, is required to submit the applicant's documentation for Section 408 review. Applicants do not work with the USACE directly, but rather work through District staff, which then communicates with the USACE. Work cannot begin until such time as USACE 408 approval has been received which can take up to 4-6 months or longer.

In addition, USACE 404 is needed and needs to be directly applied for by the applicant.

Cross Sections:

For the District to determine if clean-out or excavation of the channel is necessary at the point of a proposed crossing, the applicant must provide cross sections of the canal. For bridge crossings, the applicant is required to provide a minimum of five (5) cross sections: One at the centerline of the crossing, one at each of the proposed upstream and downstream faces of the bridge and one on each side taken at 25 feet upstream and 25 feet downstream of the proposed faces of the bridge (unless otherwise directed by District staff). The cross sections must be taken perpendicular to the centerline of the channel. Soundings for cross sections are to be taken at a maximum of 10-foot intervals, from top of bank to top of bank and tied into the canal right of way lines. The cross sections must be plotted on standard 10 X 10 cross section paper or a similar CAD drawing and have the design canal section superimposed on each section. National Geodetic Vertical Datum (NGVD) must be used as datum.

Excavation:

If excavation is required to achieve the required canal design section, the limits of excavation to the design section shall extend outwardly a minimum distance of 25 feet upstream of the proposed structure to a point 25' downstream from the faces of the proposed crossing with adequate transitions back to the existing channel section at both

ends. The limits of the excavated area and transitions into the existing section must be shown on both the plan and profile view of the application drawings.

Restrictions to Flow during Construction:

The South Florida Water Management District is under no obligation to allow canal flows to be impeded or restricted to facilitate the construction of a crossing. If there is a possibility that the permittee's contractor will request the use of coffer dams or earthen fills that will encroach into the channel, such proposals must be included in the application. Applicants are strongly encouraged to advise potential bidders of the prohibition to blocking or interfering with canal flows so that bid proposals account for this restriction.

In those instances where the District determines that the temporary restriction or blocking of a channel is feasible, the District will dictate the manner and length of time the canal may be impacted. The applicant will be required to prepare a sequence of work, equipment and personnel lists, and a work schedule for review by the District.

District Access:

In designing bridge approaches, consideration must be given to ensure that the District's access along the canal is not be severed or impeded. Guardrails, curbs, sidewalks and medians must be designed so that they do not interfere with the movement of District equipment along the canal or the District's needs for vehicular access. Land acquisition required to provide the District with equal or better access is the applicant's sole responsibility and no permit will be issued until the required property interests have been conveyed to the District. Application drawings are required to demonstrate that District access has been incorporated into the proposed scope of work.

The District will require access to its rights of way at all four bridge quadrants, including a median break to allow for unrestricted access over the bridge in a north-south direction on the east and west sides of the bridge. Specific access details can be discussed with Donald Saunders, Right of Way Field Representative, St. Cloud Field Station at 407-891-3550, Ext. 3561.

Staging Areas

In order to provide adequate areas to set up and operate equipment, particularly for the purpose of removing and temporarily stockpiling storm debris that accumulates on pilings, the District will set aside and preserve staging areas at bridge and pile-supported utility crossings. These staging areas will be 100 feet in length measured perpendicular to the structure or improvement crossing the canal, encompass the entire width of the right of way, and will be located on the upstream and downstream sides of all bridge and utility crossings. No docks or above-ground structures will be allowed within these staging areas. However, this exclusion does not apply to requests for safety features associated with public works projects or installations necessary to support District works, including but not limited to utilities, provided that such features or installations do not interfere with the District's operations and maintenance activities.

Relocations:

It is the applicant's sole responsibility to determine if any existing installations located within the District's right of way will be impacted by the proposed work and for any notification and/or coordination with the owners of existing facilities. Under no circumstances will the District be responsible for any relocation costs or liabilities, either direct or indirect, which are necessitated by the applicant's proposed work.

Piling

Existing bridge piles shall be completely removed from the District's canal

Financial Assurance - Bridges

For construction of a privately-owned bridge, the applicant is required to submit evidence of financial assurance to the District, such as the posting of a bond, to ensure compliance with permit conditions that may be imposed and to cover the cost of bridge removal in the event that the District determines that the bridge is a threat to system operations. The amount of the bond or surety must be equal to the cost of removal and disposal of the bridge and restoration of the right of way based on an itemized estimate from a professional engineer registered in the State of Florida or from a demolition contractor. In addition, said financial assurance must remain in effect for the life of the bridge or until the bridge is removed in its entirety from the right of way and all restoration work is completed to the satisfaction of the District.

As part of the application package, an itemized estimate of the cost of removal of the proposed bridge and restoration of the right of way along with a statement from the owner evidencing consent to provide and maintain a bond or other surety acceptable to the District for the life of the bridge must be provided. No permit will be issued until the financial assurance has been established and approved by the District.

Financial Assurance - Excavation

In cases where the District determines that excavation of the canal section is required in conjunction with a bridge or pile-supported crossing, the applicant is required to submit evidence of financial assurance to the District, such as the posting of a bond. The amount of the bond or surety must be equal to the cost of removal and disposal of the material to be excavated based on an itemized estimate from a professional engineer registered in the State of Florida or from a demolition contractor. In addition, said financial assurance must remain in effect for until certified cross-sections have been submitted to the District, demonstrating that the excavation requirements have been fulfilled and accepted in writing by the District. As part of the application package, an itemized estimate of the cost of removal and disposal of the material to be excavated must be provided. No permit will be issued until the financial assurance has been established and approved by the District.

Requirements are Subject to Change

In managing its canal and levee system, the District must, from time to time, change its criteria and permit requirements based on regional and site-specific conditions. Applicants are cautioned that the information provided in this letter is based on the best available information at the time the letter is written but is subject to change. This is particularly true when applicants delay months or years in submitting an application for permit. Therefore, the rules, criteria and requirements in effect at the time a formal application is received for review will be applied to the permit application.

The Neptune Road Bridge Right of Way Permit Number 667 is issued to FDOT.
The pedestrian bridge Right of Way Permit Number 10747 is issued to Osceola County.

As always, the District's Right of Way staff is available to assist you with completion of your application and to answer questions you may have about the process and requirements. If you have any questions or need assistance, please feel free to contact this office directly.

Sincerely,



Beverly Miller
Right of Way Permitting Specialist-Senior
Right of Way Section
South Field Operations
South Florida Water Management District

ec: Donald Saunders- St. Cloud FS, SFWMD

Duplicate

667
JUN 77 ENT'D

P E R M I T

DATE ISSUED #

EFFECTIVE PERIOD: +

THIS PERMIT granted and is sued the date afore said by the Ce ritra1 and So uthe rn F lofid a F•food Co ntrol D is trict to

, (o wner or appli ca nt)

(íddre s's)

W >suwzm e•u u. am

(pfopos od con strue tio n.or)s e)

OC CCC d

ORANGE
(county)

20
(twp.)

30
(rge.)

5
(section)

This peAmis is iss ued .puisuant to Applic ation for P einn it No. _____ dated _____ 19
filed in che Office o I the Secretary of the G o vefn ing Board o I Ge ntral and South e rn Florida Flood Control District, ah ieb ap-
plication, including all plans and specific ations atia chs d th ereto i is by referenc e ia ade a part héteof.

All work, cons tructioo and use of the fac iliyie s of 'the F lood Control Disti ic t per qiittèd here und er Í hal 1 be pertoi æed in strict
coimpliance æi th cli Je perittit aiid the R equire me nt s and Minint nm Sta nd aid s of Co ri sit néiiö ri herü töfoie ädopted by the F lood
Gontcol D iatricc and as the s ame ma y be h ereafter from titne to time , amen d ed, c haàg ed or rév i s ed; said Re quièsmnt and
bainimutn Stand ards of Co nstruc tiop being eçprese ly made a p art and cõ ndit iori of th i s pe raiiii., and 'any departure there from sh a11
tie ground for revocatio ri of this permit. A copy ofc the curren t, R equire me nt s and latinimum' Stand aròs . of Co nstr uction is here to
attached, The only exceptio ri s a uthoi i ze d are:

(l ist ol exceptions or "reierey ce to li et attoched)

This perm it ahal 1 be effective for the period s hown on the I ace here of and s hall be binding upon the permi Ltee, his ag ente,
succe ssoia and aaa ign s. It may be e st ended upon w ritt en re que st wi thout the filing of a new applicatioa if in the judgement
of the Flood C ontro1 D is trici snc h e xtens ion ia jus tifi ed.

This pérm it shall not conve y to peiizii ttee any property right s nor any right s or pFivile ge s otheF than tho se spe cified horein,
nor rel iev e the pe rmitte e from complying w ith any law, regula tion or re quir eme nt affecting the righ t s of other bodies oc age n-
ciea. All structures and works ins talled by permittee hereunder shal l remain the property of the permittee unles o theiwi se
proeided imuiediately below.

ENGINEERING

DESIGNATION: [Handwritten initials]

MAINT. & OPERATION

REVIEWED:
APPROVED: [Handwritten initials]

NOT RECORDED
11-20-63
CENTRAL AND SOUTH FLORIDA FLOOD CONTROL DISTRICT

By:

[Handwritten signature]

 Executúe Dirett0r



SFWMD NOTICE GENERAL PERMIT NO. MOD 10747

(NON-ASSIGNABLE)

DATE ISSUED: OCTOBER 3, 2000

AUTHORIZING: CONCRETE PILE-SUPPORTED PEDESTRIAN BRIDGE CROSSING C-31 LOCATED ADJACENT TO SR 525 BRIDGE (STATION 134+00).

LOCATED IN: OSCEOLA COUNTY, SECTION 5 TOWNSHIP 26S RANGE 30E

ISSUED TO: OSCEOLA COUNTY
1 COURTHOUSE SQUARE, SUITE 1100
KISSIMMEE, FL 34741

ATTENTION: RAYMOND C. STANGLE II

This permit is issued pursuant to Application No. 00-0818-4M dated AUGUST 18, 2000 and permittee's agreement to hold and save the South Florida Water Management District and its successors harmless from any and all damages, claims or liabilities which may arise by reason of the construction, maintenance or use of the work or structure involved in the Permit. Said application, including all plans and specifications attached thereto, is by reference made a part hereof. The permittee, by acceptance of this permit, hereby agrees that he/she shall promptly comply with all orders of the District and shall alter, repair or remove his/her use solely at his/her expense in a timely fashion. Permittee shall comply with all laws and rules administered by the District. This permit does not convey to permittee any property rights nor any rights or privileges other than those specified herein, nor relieve the permittee from complying with any law, regulation, or requirement affecting the rights of other bodies or agencies. All structures and works installed by permittee hereunder shall remain the property of the permittee.

This permit is issued by the District as a revocable license to use or occupy District works or lands. It does not create any right or entitlement, either legal or equitable, to the continued use of the District works or lands. Since this permit conveys no right to the continued use of the District works or lands, the District is under no obligation to transfer this permit to any subsequent party. By acceptance of this permit, the permittee expressly acknowledges that the permittee bears all risk of loss as a result of revocation of this permit.

2002 lal

WORK PROPOSED MUST BE COMPLETED ON OR BEFORE OCTOBER 31, 2000. Otherwise, this

permit is void and all rights thereunder are automatically canceled unless permittee applies for, in writing, a request for extension to the construction period and such request is received by the District on or before the expiration date and such request is granted, in writing, by the District.

SPECIAL CONDITIONS (SPECIFIC PROJECT CONDITIONS) AND LIMITING CONDITIONS ON ATTACHED SHEETS ARE A PART OF THIS DOCUMENT.

FILED WITH THE CLERK OF THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT,

ON October 3, 2000

BY *Patricia M...*
Deputy Clerk

BY: *Joseph W. Taylor*
Joseph W. Taylor, Deputy Executive Director
Water Resource Operations

Return Receipt Requested/Certified No. 7000 0600 0027 7148 1715

C: PAUL SHAM
KISSIMMEE FIELD STATION
(407) 846-5226 EXTENSION SSOS



Form #0853

SFWMD PERMIT NO. 10747

(NON-ASSIGNABLE)
OCTOBER 9, 1997 DATE ISSUED

AUTHORIZING: RECREATIONAL PATHWAY AND BRIDGE INCLUDING: CHAIN-LINK ENCLOSURE OVER BRIDGE, WOODEN FENCING, GUARDRAILING, CULVERT EXTENSIONS, MINOR DRAINAGE IMPROVEMENTS AND RELOCATION OF THE DISTRICT'S ACCESS ROAD ALL LOCATED WITHIN THE NORTH RIGHT OF WAY OF C-31 ADJACENT TO SR 525 BRIDGE. (STATION: 134+00)

LOCATED IN: OSCEOLA COUNTY, SECTION 5 TOWNSHIP 26S RANGE 30E

ISSUED TO: OSCEOLA COUNTY
17 SOUTH VERNON AVENUE, ROOM 249
KISSIMMEE, FLORIDA 34741

ATTN: MARCO FRANCO

This permit is issued pursuant to Application No. 970521-3 dated MAY 21, 1997 and permittee's agreement to hold and save the South Florida Water Management District and its successors harmless from any and all damages, claims or liabilities which may arise by reason of the construction, maintenance or use of the work or structure involved in the Permit. Said application, including all plans and specifications attached thereto, is by reference made a part hereof. The permittee, by acceptance of this permit, hereby agrees that he shall promptly comply with all orders of the District and shall alter, repair or remove his use solely at his expense in a timely fashion. Permittee shall comply with all laws and rules administered by the District. This permit does not convey to permittee any property rights nor any rights or privileges other than those specified herein, nor relieve the permittee from complying with any law, regulation, or requirement affecting the rights of other bodies or agencies. All structures and works installed by permittee hereunder shall remain the property of the permittee.

This permit is issued by the District as a license to use or occupy District works or lands. It does not create any right or entitlement, either legal or equitable, to the continued use of the District works or lands. Since this permit conveys no right to the continued use of the District works or lands, the District is under no obligation to transfer this permit to any subsequent party. By acceptance of this permit; the permittee expressly acknowledges that the permittee bears all risk of loss as a result of revocation of this permit.

WORK PROPOSED, WILL BE COMPLETED ON OR BEFORE OCTOBER 31, 1999 otherwise, this permit is void and all rights thereunder are automatically canceled unless an extension to the construction period is applied for and granted.

12 LIMITING CONDITIONS - (on reverse side of permit)

SPECIAL CONDITIONS (SPECIFIC LIMITING CONDITIONS) ARE AS FOLLOWS:

SPECIAL CONDITIONS ON THE ATTACHED SHEET ARE PART OF THIS DOCUMENT.

FILED WITH THE CLERK OF THE SOUTH
FLORIDA WATER MANAGEMENT DISTRICT "
ON 10/9/97 ORIGINAL SIGNED BY
BY _____ ONCZEK

Deputy Clerk

" " SOUTH " " FLORIDA WATER " " MANAGEMENT
" DISTRICT, " BY ITS GOVERNING BOARD
ORIGINAL SIGNED BY
BY: _____ TONY BURNS

Assistant Secretary
Acting in absence of Secretary