



# NATURAL RESOURCES EVALUATION

FLORIDA DEPARTMENT OF TRANSPORTATION  
DISTRICT 4

PROJECT DEVELOPMENT AND ENVIRONMENT STUDY  
COUNTY ROAD 510/85 STREET  
From County Road 512 (M.P. 0.0) to 58 Ave (M.P. 5.283),  
Indian River County, Florida  
ETDM Number: 14233

Financial Management Number: 405606-2-22-02  
Federal Aid Project No.: 4984-004-S

*The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated December 14, 2016, and executed by the Federal Highway Administration and FDOT.*

Prepared for  
Florida Department of Transportation  
District Four  
3400 West Commercial Boulevard  
Fort Lauderdale, FL 33309-3421

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## EXECUTIVE SUMMARY

1  
2 The Florida Department of Transportation (FDOT) is conducting a Project Development and  
3 Environment (PD&E) Study to investigate widening a segment of County Road (C.R.) 510 from  
4 two to four lanes, extending from C.R. 512 (Sebastian Boulevard/85 Street) to 58 Avenue, in  
5 Indian River County, Florida. The project corridor stretches 5.27 miles, is generally rural in  
6 nature and includes a mixture of agricultural, educational, commercial, industrial and  
7 residential facilities.

8 This project consists of improving capacity on C.R. 510 from C.R. 512 to 58 Avenue, in Indian  
9 River County (IRC), Florida, in order to achieve an acceptable Level of Service (LOS) on the  
10 facility in the future condition. While the roadway currently operates at a LOS D or better,  
11 conditions will deteriorate below acceptable standards if no improvement occurs by 2040, as  
12 the roadway will have insufficient capacity to accommodate the project travel demand.

13 This Natural Resources Evaluation describes existing environmental conditions and potential  
14 impacts to protected species and wildlife, wetlands, and Essential Fish Habitat (EFH). This  
15 document was prepared in accordance with the FDOT's *PD&E Manual, Part 2, Chapter 16*  
16 *(Protected Species and Habitat) (Updated June 14, 2017)*, *Chapter 9 (Wetlands and Other*  
17 *Surface Waters) (Updated June 14, 2017)*, and *Chapter 17 (Essential Fish Habitat) (Updated June*  
18 *14, 2017)*, which incorporates the requirements of the National Environmental Policy Act  
19 (NEPA) and related federal and state laws.

20 The No Build, TSM&O, and the recommended alternative were evaluated for impacts to listed  
21 species and habitats using a review of existing project literature and data, GIS resources and  
22 field surveys. Federally listed species that may be affected but would not be adversely affected  
23 by the proposed project are Audubon's crested caracara (*Polyborus plancus audubonii*), eastern  
24 diamondback rattlesnake (*Drymarchon corais couperi*)(candidate for listing), eastern indigo  
25 snake (*Crotalus adamanteus*, Florida scrub-jay (*Aphelocoma coerulescens*), gopher tortoise  
26 (*Gopherus polyphemus*)(candidate for listing and state listed), and wood stork (*Mycteria*  
27 *americana*). State listed species that may be affected but would not be adversely affected by  
28 the proposed project are burrowing owl (*Athene cunicularia*), Florida pine snake (*Pituophis*  
29 *melanoleucus mugitus*), Florida sandhill crane (*Grus canadensis pratensis*), little blue heron  
30 (*Egretta caerulea*), roseate spoonbill (*Platalea ajaja*), Sherman's fox squirrel (*Sciurus niger*  
31 *shermani*), Southeastern American kestrel (*Falco sparverius paulus*), and tricolored heron  
32 (*Egretta tricolor*).

33 Five types of wetlands or Other Surface Waters (OSW) are mapped by Saint Johns River Water  
34 Management District in the project area and were confirmed during field investigations. They  
35 are Streams and Waterways (Florida Land Use Cover and Forms Classification System [FLUCCS]  
36 5100), Reservoirs (FLUCCS 5300), Mixed Wetland Hardwoods (FLUCCS 6170), Freshwater  
37 Marshes (FLUCCS 6410), and Wet Prairies (FLUCCS 6430). Roadside ditches and swales occur  
38 along C.R. 510 and adjacent lands and are classified as OSWs. Three major canals drain the  
39 project area and are also considered OSWs.

1 The “No-Build” and Transportation Systems Management and Operations (TSM&O) alternatives  
2 would have no impacts on listed species, wetlands, or EFH. However, the “No-Build” and  
3 TSM&O alternatives would not address the needs of the proposed project and would not  
4 improve existing conditions at the south prong of the Saint Sebastian River because there  
5 would be no replacement of the culvert underneath C.R. 510 with a bridge. The recommended  
6 alternative is a build alternative and impacts were avoided and minimized by locating the  
7 project on an existing transportation corridor. Under the recommended alternative 0.65 acres  
8 of direct impacts to Mixed Wetland Hardwoods (FLUCCS 6170) are anticipated. These Mixed  
9 Wetland Hardwoods are also considered to be EFH for white shrimp. Under the recommended  
10 alternative 2.983 acres of direct impacts to wood stork Suitable Foraging Habitat (SFH) are  
11 anticipated. The replacement of a culvert under C.R. 510 at the south prong of the Saint  
12 Sebastian River with a bridge will improve existing conditions by enhancing the flow of water  
13 and movement of wildlife.

14 Potential long-term indirect wetland impacts include reduced cover of vegetation due to  
15 shading beneath the bridge at the south prong of the Saint Sebastian River and associated  
16 reduction of wetland functions for water quality and wildlife at that location. Impacts to wildlife  
17 are partially offset by the potential for improved movement of wildlife upstream of the culvert  
18 under C.R. 510 at the south prong of the Saint Sebastian River. Additionally, runoff from the  
19 roadway will be treated before being discharged into canals or waterways and will receive 50  
20 percent greater treatment due to outfall into the Indian River Lagoon, an Outstanding Florida  
21 Water. No significant cumulative impacts to wildlife, wetlands, or EFH are anticipated as a  
22 result of this project.

23 A Saint Johns River Water Management District (SJRWMD) Environmental Resource Permit  
24 (ERP) will be necessary and a SJRWMD Dewatering Permit is anticipated for any dewatering  
25 operations during construction. A SJRWMD right-of-way occupancy permit is required for work  
26 in canals and a National Pollution Discharge Elimination System Permit will be necessary. A  
27 USACE Dredge and Fill Permit is anticipated for unavoidable impacts to wetlands.  
28 Environmental and right-of-way permits will be needed from the Sebastian River Improvement  
29 District and the Indian River Farms Water Control District. Because the project area drains into  
30 an OFW, the Indian River Lagoon, the stormwater management system in applicable areas will  
31 be designed to achieve 50 percent greater treatment of water than under standard  
32 specifications, reducing impacts to downstream habitats. FDOT commits to the following:

- 33 • Minimize adverse impacts to the eastern indigo snake, during construction, the FDOT  
34 will adhere to the U.S. Fish and Wildlife Service (USFWS) *Standard Protection Measures*  
35 *for the Eastern Indigo Snake* (USFWS 2004);
- 36 • Actions during the Construction phase, such as implementation of BMPs, to minimize  
37 potential impacts on resources;
- 38 • Mitigate for impacts to wood stork SFH at a USFWS approved mitigation bank.  
39 Mitigation will follow current USFWS protocols such as the USFWS Wood Stork Effect  
40 Determination Key for South Florida;



- 1       • If potential impacts to gopher tortoise exist, prior to construction a gopher tortoise  
2       burrow survey of potential gopher tortoise habitat in the impact area will be conducted  
3       in accordance with Florida Fish and Wildlife Conservation Commission (FWC) guidelines;
- 4       • Restrictions on construction adjacent to Wabasso Scrub Conservation Area (WSCA)  
5       during Florida scrub-jay breeding season (March 1 through June 30)
- 6       • To minimize impacts to Florida scrub-jay, signage indicating “No Food Trash” to be  
7       installed near dumpsters between 61 Drive and 58 Avenue (Stations 348+67.07 to  
8       373+80.08)
- 9       • Prohibition on staging of equipment or materials in scrub habitat and wetlands
- 10      • Installation of signs warning motorists of sensitive wildlife
- 11      • Restriction on planting palms or oaks near the WSCA because they may attract scrub-  
12      jays in search of nesting material or acorns
- 13
- 14

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## 1.0 INTRODUCTION

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to evaluate alternatives for mobility and safety improvements to County Road (C.R.) 510 in Indian River County, Florida. The project extends 5.27 miles along C.R. 510 from its intersection with C.R. 512/Sebastian Boulevard to 58 Avenue. A project location map is provided as **Figure 1-1**. C.R. 510 is primarily a two-lane roadway that is functionally classified as an Urban Principal Arterial for east-west traffic movements. There are three bridge structures along C.R. 510 and an open drainage system.

This Natural Resources Evaluation describes existing environmental conditions and potential impacts to protected species and wildlife habitats, wetlands, and Essential Fish Habitat (EFH). This document was prepared in accordance with the FDOT's *PD&E Manual, Part 2, Chapter 16 (Protected Species and Habitat) (Updated June 14, 2017)*, *Chapter 9 (Wetlands and Other Surface Waters) (Updated June 14, 2017)*, and *Chapter 17 (Essential Fish Habitat) (Updated June 14, 2017)*, which incorporates the requirements of the National Environmental Policy Act (NEPA) and related federal and state laws.

## PROJECT BACKGROUND

The subject project is located just west and south of Sebastian, a city in Indian River County, Florida. This area is within the northern part of Florida's Treasure Coast, so named after the discovery of treasure from the 1715 Spanish Treasure Fleet, lost in a hurricane near the Sebastian Inlet.

The project entails the investigation of widening a segment of County Road (C.R.) 510 from two to four lanes extending from C.R. 512 (Sebastian Boulevard) to 58 Avenue for a total distance of 5.27 miles (**Figure 1-1**). C.R. 510 links the local community of Wabasso to C.R. 512 (Sebastian Boulevard), the main east-west arterial serving Sebastian. The project corridor is generally rural in nature and includes a mixture of agricultural, educational, commercial, industrial and residential facilities.

C.R. 510 is owned and maintained by Indian River County and is functionally classified as an urban principal arterial. The proposed project will provide additional capacity to meet the future traffic needs resulting from projected population and employment growth within the projected area expected as a result of various residential development. The Indian River County Metropolitan Planning Organization (MPO) has identified C.R. 510 in their 2040 Long Range Transportation Plan (LRTP) initial roadway needs plan alternative projects, cost feasible plan as a "Core Project" and in their Transportation Improvement Program (TIP).



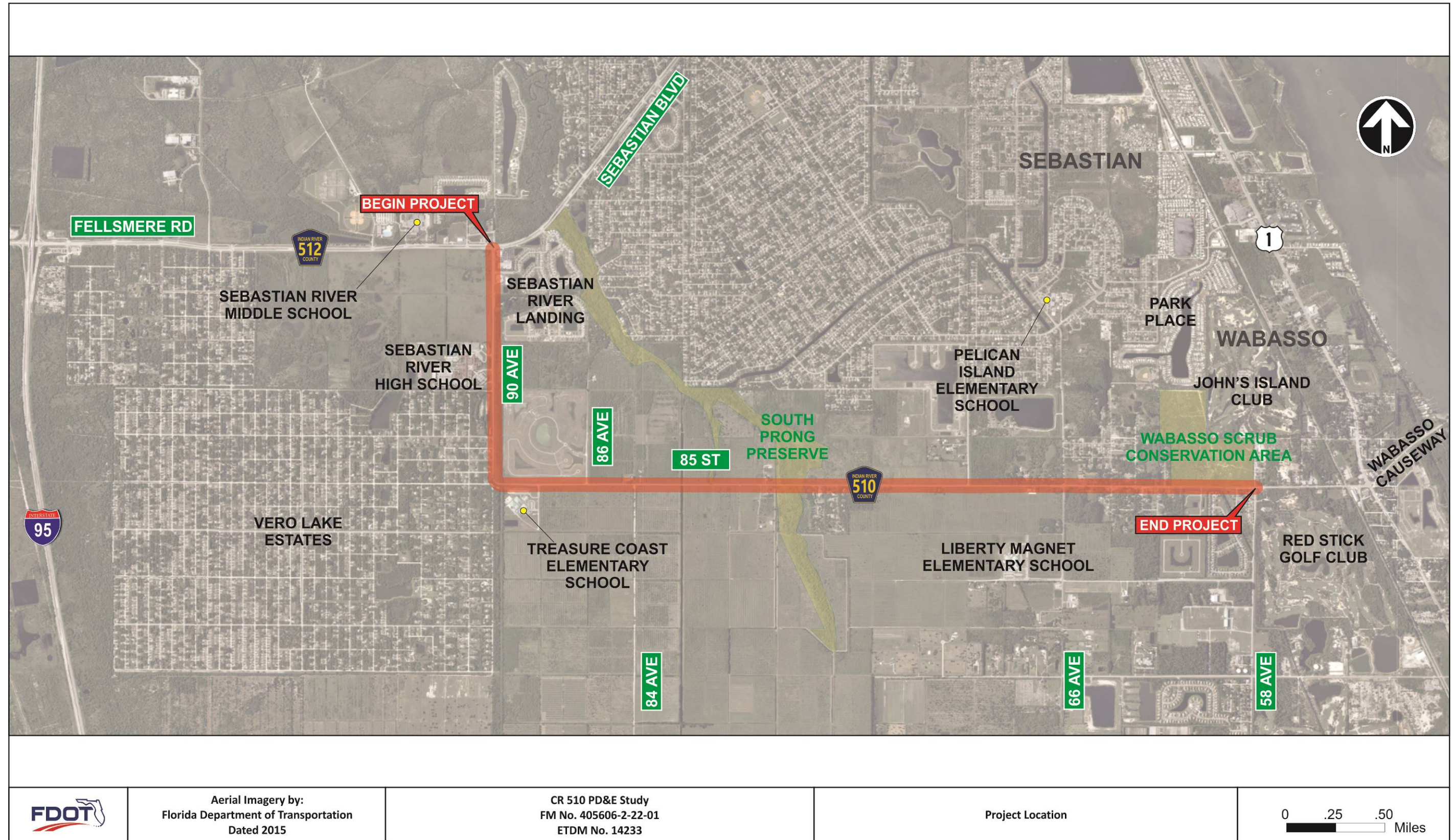


Figure 1-1 Project Location



**2.0 PROJECT PURPOSE AND NEED**

**PROJECT OBJECTIVE**

This project consists of improving capacity on C.R. 510 from C.R. 512 to 58 Avenue, in Indian River County (IRC), Florida, in order to achieve an acceptable Level of Service (LOS) on the facility in the future condition. While the roadway generally operates at an acceptable LOS (LOS D or better), conditions will deteriorate below acceptable standards if no improvement occurs by 2040, as the roadway will have insufficient capacity to accommodate the project travel demand.

**PROJECT NEED**

It is important to note that this roadway is deemed deficient in the Indian River County 2040 Long Range Transportation Plan (LRTP) based on the projected 2035 Average Annual Daily Traffic (AADT) volumes derived from the Greater Treasure Coast Regional Planning Model for the Grid Densification Roadway Needs Plan Alternative. The results of the analysis revealed that portions of the project segment are expected to have volume to capacity (V/C) ratio of 0.63 – 1.35 and above 1.65. Roadways are deemed deficient if the volume to capacity (V/C) ratio exceeds 0.9. As such, this segment of C.R. 510 will experience congestion by 2035 if additional improvements are not made. Overall, the proposed improvement is anticipated to allow C.R. 510 to continue to serve as a critical arterial in facilitating the west-east movement of local and regional traffic (including truck traffic) as it traverses Indian River County connecting C.R. 512 to S.R. A1A on the barrier island. The increased capacity on C.R. 510 is intended to improve traffic operations along the corridor and enhance access to targeted areas of growth within the county.

There are three bridge structures (880047, 880063, 880044), one at M.P. 1.276 - 1.284, one at M.P. 2.226 - M.P. 2.240, and one at M.P. 2.726 - M.P. 2.735. The project is 5.27 miles in length and the acquisition of some right-of-way is anticipated. C.R. 510 is owned and maintained by Indian River County. According to the adopted Indian River County Comprehensive Plan, C.R. 510 is classified as an Urban Principal Arterial and is critical in facilitating the west-east movement of traffic in Indian River County. It connects Interstate 95 (I-95) to S.R. A1A. Additionally this roadway provides access to commercial, educational, residential and agricultural uses. The project is anticipated to cost \$100,000,000, of which the great majority will be Federally-funded dollars. C.R. 510 from C.R. 512/85 Street to 58 Avenue is identified as a cost-feasible project in the Indian River County 2040 LRTP.

C.R. 510 is designated as an emergency evacuation route by both the Florida Division of Emergency Management and Indian River County. By increasing capacity, the improvement on C.R. 510 is anticipated to enhance emergency evacuation and response times by:

- Improving access to other emergency evacuation routes designated by the Florida Division of Emergency Management (C.R. 510, C.R. 512, and I-95); and
- Increasing the number of residents from the coastal communities of eastern Indian River County that can be evacuated during an emergency event.

1 The project is also identified within the Indian River County Metropolitan Planning  
2 Organization's (MPO) FY 2016/2017 -FY 2020/21 Transportation Improvement Program (TIP). It  
3 should additionally be noted that \$4,433,546 is programmed for the Project Development and  
4 Environment (PD&E) Study and \$4,207,416 is programmed for the Right of Way phase in 2020  
5 within the FY 2016/2017- FY2020/2021 Indian River County MPO TIP.

6 As the Indian River County 2040 LRTP Infill Alternative Land Use scenario matures along the C.R.  
7 510 corridor encouraging higher densities and mixed-use development, premium transit service  
8 will be considered on C.R. 510 to serve and connect the transit-supportive land uses. Sidewalks  
9 and bicycle lanes are additionally anticipated as part of the widening as the corridor is intended  
10 to provide for adequate multi-modal facilities. While paved shoulders are currently present,  
11 they are also anticipated to be maintained as part of the project. Overall, the project is  
12 expected to accommodate multi-modal facilities and enhance corridor access for transit users,  
13 bicyclists, and pedestrians.

14 The logical termini begins at the signalized intersection of C.R. 512/85 Street and terminates at  
15 the signalized intersection of 58 Avenue. C.R. 510 is designated as an emergency evacuation  
16 route by both the Florida Division of Emergency Management and Indian River County. By  
17 increasing capacity, the improvement on C.R. 510 is anticipated to enhance emergency  
18 evacuation and response times.

19 The primary need for additional capacity on of C.R. 510 from C.R. 512/85 Street to 58 Avenue is  
20 in order to achieve an acceptable Level of Service (LOS) on the facility in the future condition.  
21 While the roadway currently operates at an acceptable LOS, conditions will deteriorate below  
22 acceptable standards if no improvement occurs by 2040, as the roadway will have insufficient  
23 capacity to accommodate the project travel demand. The need for the project is based on the  
24 following primary and secondary criteria.

25

26 **PRIMARY CRITERIA**

27 ***CAPACITY/TRANSPORTATION DEMAND: Improve Traffic Operations (LOS and Volume to***  
28 ***Capacity Ratio)***

29 This project is anticipated to improve traffic operations along C.R. 510 by increasing operational  
30 capacity to meet the future travel demand projected as a result of Indian River County  
31 population and employment growth. The existing and future traffic conditions for the project  
32 corridor are as follows (**Tables 2-1 and 2-2**):

33

34 It is important to note that this roadway is deemed deficient in the Indian River County 2040  
35 Long Range Transportation Plan (LRTP) based on the projected 2040 AADT volumes derived  
36 from the Greater Treasure Coast Regional Planning Model for the Grid Densification Roadway  
37 Needs Plan Alternative. The results of the analysis revealed that portions of the project  
38 segment are expected to have volume to capacity ratio (V/C) of 0.63 – 1.35 and above 1.65.  
39 Roadways are deemed deficient if the volume to capacity (V/C) ratio exceeds 0.9. As such, this  
40 segment of C.R. 510 will experience congestion by 2040 if additional improvements are not  
41 made.

42

1

**Table 2-1 Existing (2015) Conditions**

Limits		# of Lanes	LOS D	AADT Existing	
From	To	(speed limit)	SV	2015	V/C
CR 512	Mako Way	3 Lanes Divided (>40 MPH)	26,280	13,000	0.49
Mako Way	800' West Of Treasure Coast Elementary	2 Lanes Divided (>40 MPH) with LT lanes	16,730	12,800	0.77
800' West Of Treasure Coast Elementary	500' East Of Treasure Coast Elementary	2 Lane Undivided (<35 MPH) with LT lanes	13,320	12,000	0.90
500' East Of Treasure Coast Elementary	66 Avenue	2 Lane Undivided (>40 MPH)	12,740	13,000	1.02
66 Avenue	58 Avenue	2 Lane Undivided (<35 MPH) with LT lanes	13,320	11,000	0.83

2

3

4

**Table 2-2 Future (2040) Conditions**

Limits		# of Lanes	LOS D	AADT NO BUILD		# of Lanes	LOS D	AADT BUILD	
From	To	(speed limit)	SV	2040	V/C	(speed limit)	SV	2040	V/C
CR 512	Mako Way	3 Lanes Divided (>40 MPH)	26,280	16,500	0.63	4 Lanes Divided (>40 MPH)	35,820	18,500	0.52
Mako Way	800' West Of Treasure Coast Elementary	2 Lanes Divided (>40 MPH) with LT lanes	16,730	17,400	1.04	4 Lanes Divided (>40 MPH)	35,820	19,200	0.54
800' West Of Treasure Coast Elementary	500' East Of Treasure Coast Elementary	2 Lanes Undivided (<35 MPH) with LT lanes	13,320	18,000	1.35	4 Lanes Divided (<35 MPH)	29,160	19,000	0.65
500' East Of Treasure Coast Elementary	66 Avenue	2 Lanes Undivided (>40 MPH)	12,740	21,000	1.65	4 Lanes Divided (>40 MPH)	35,820	23,250	0.65
66 Avenue	58 Avenue	2 Lanes Undivided (<35 MPH) with LT lanes	13,320	17,000	1.28	4 Lanes Divided (<35 MPH)	29,160	21,000	0.72

5

6



1 Overall, the proposed improvement is anticipated to allow C.R. 510 to continue to serve as a  
2 critical arterial in facilitating the west-east movement of local and regional traffic (including  
3 truck traffic) as it traverses Indian River County connecting C.R. 512 to S.R. A1A on the barrier  
4 island. The increased capacity on C.R. 510 is intended to improve traffic operations along the  
5 corridor and enhance access to targeted areas of growth within the county.  
6

## 7 **SECONDARY CRITERIA**

### 8 ***MODAL INTERRELATIONSHIPS: Enhance Transit, Pedestrian, and Bicycle Access***

9 As the Indian River County 2040 LRTP Infill Alternative Land Use scenario matures along the C.R.  
10 510 corridor encouraging higher densities and mixed-use development, premium transit service  
11 will be considered on C.R. 510 to serve and connect the transit-supportive land uses. Sidewalks  
12 and bicycle lanes are additionally anticipated as part of the widening as the corridor is intended  
13 to provide for adequate multi-modal facilities. While paved shoulders are currently present,  
14 they are also anticipated to be maintained as part of the project. Overall, the project is  
15 expected to accommodate multi-modal facilities and enhance corridor access for transit users,  
16 bicyclists, and pedestrians.

### 17 Transportation Demand

18 The population of Indian River County is projected to increase from 138,028 in year 2010 to  
19 202,295 in year 2040, with a 47% 30-year growth rate (Source: Indian River County 2040 LRTP).  
20 As the population of the county increases, developments in the county will continue to grow  
21 thereby increasing the amount of traffic on the roads.  
22

23 Employment is projected to grow from 65,244 in 2010 to 90,968 in 2040. Based on the  
24 socioeconomic characteristics of the Indian River County 2040 LRTP Infill Alternative Land Use  
25 scenario,

- 26 • Population within the proximate Traffic Analysis Zones (TAZs) 2-mile buffer is projected  
27 to grow from 21,096 in 2010 to 34,434 in 2040 (1.65% annual growth rate).
- 28 • Employment within the proximate TAZs 2-mile buffer is projected to increase from  
29 3,421 in 2010 to 5,588 in 2040 (1.65% annual growth rate).

30 Further, 2 Planned Unit Developments and 0 approved Developments of Regional Impact are  
31 present along the corridor.

### 32 System Linkage

33 The proposed capacity improvements to C.R. 510 will help improve connectivity within the  
34 roadway network by enhancing mobility to the C.R. 510 corridor. Enhancing mobility in this  
35 area will provide an additional route and improve the movement of people, goods and services  
36 to and from Indian River County.  
37

### 38 Plan Consistency

39 C.R. 510 from C.R. 512/85 Street to 58 Avenue is identified as a cost-feasible project, not  
40 currently funded for construction in the Indian River County 2040 LRTP. The project is also  
41 identified within the Indian River County Metropolitan Planning Organization's (MPO) FY

1 2016/2017 -FY 2020/21 Transportation Improvement Program (TIP). It should additionally be  
2 noted that \$4,433,546 is programmed for the Project Development and Environment (PD&E)  
3 Study and \$4,207,416 is programmed for the Right of Way phase in 2020 within the FY  
4 2016/2017- FY2020/2021 Indian River County MPO TIP.

#### 6 Social Demands & Economic Development

##### 7 *Enhance Emergency Evacuation and Response Times*

8 C.R. 510 is designated as an emergency evacuation route by both the Florida Division of  
9 Emergency Management and Indian River County. By increasing capacity, the improvement on  
10 C.R. 510 is anticipated to enhance emergency evacuation and response times by:

- 11 • Improving access to other emergency evacuation routes designated by the Florida  
12 Division of Emergency Management (C.R. 510, C.R. 512, and I-95); and
- 13 • Increasing the number of residents from the coastal communities of eastern Indian  
14 River County that can be evacuated during an emergency event.

15 The population of Indian River County is projected to increase from 138,028 in year 2010 to  
16 202,295 in year 2040, with a 47% 30-year growth rate (Source: Indian River County 2040 LRTP).  
17 As the population of the county increases, developments in the county will continue to grow  
18 thereby increasing the amount of traffic on the roads. Employment is projected to grow from  
19 65,244 in 2010 to 90,968 in 2040.

20 Economic Development: Currently, the land around the proposed project is mainly agricultural  
21 and industrial. A review on satellite view illustrated green space and undisturbed land with a  
22 low density residential land use area in the northern part of the proposed project. Within the  
23 proposed project are two major employers; i.e., a Publix Supermarket and a Winn-Dixie. There  
24 are also two churches and five (5) parks. The North Indian River County Library is identified as a  
25 cultural facility. The median household income of the Sebastian South community is \$53,750,  
26 above the countywide median household income of \$47,341.

27  
28 The 2040 Indian River County LRTP Public Process and Land Use Vision Plan identified land uses  
29 centered on an "infill and clustered" development pattern. The future land use plan included  
30 the following focus growth areas:

- 31 • Downtown districts
- 32 • Neighborhood commercial districts
- 33 • Neighborhood infill development districts
- 34 • US 1 development corridor
- 35 • Regional workplace districts
- 36 • Airport workplace districts
- 37 • Fellsmere Annex

### 3.0 PROJECT ALTERNATIVES

The alternatives considered include the No Build Alternative, Transportation Systems Management and Operations Alternatives, and Build Alternatives. A multi-phase alternative development, evaluation and selection process was employed to properly assess all Alternatives considered for the proposed improvements of C.R. 510 within the project limits.

#### No Build

The “No Build” alternative assumes the retainment of existing conditions. It is used as a benchmark condition in order to compare the costs and benefits of implementing the proposed improvements to those incurred by continuing to use the existing facility. In this case, the “No Build” alternative would entail the retainage of the existing conditions within the project limits with its present geometric, operational and access deficiencies. The existing facility within the project confines is inadequate in terms of future capacity. It is evident that adoption of this alternative would not solve any of the existing needs associated with the project. However, the “No Build” alternative will be maintained as a viable option providing an effective yardstick or baseline condition by which other project alternatives will be compared throughout the project alternative selection process.

#### Transportation Systems Management & Operations (TSM&O) Alternatives

The Transportation Systems Management and Operations (TSM&O) alternatives are comprised of minor improvements options that are usually generated to alleviate specific traffic congestion/safety problems, or to obtain maximum utilization out of the existing facility by improving operational efficiency. These alternatives do not serve as a benchmark function but rather they insure that a wide range of realistic alternatives are considered by decision makers. The various TSM&O alternatives that were investigated include the upgrade of the existing facility by means of intersection widening and turning lane storage enhancements, improved/modified signalization, improved signing, markings and delineation.

Even though some beneficial effects can be obtained through the use of low cost improvements, the overall capacity restriction of maintaining the existing roadway section precludes the attainment of any significant improvement in the overall project level of service. It is because of this fact that these alternatives were considered to have minimum value. Therefore, it is recommended that the TSM&O alternatives be rejected and only the major reconstruction options be considered for further study. As stated, several of the proposed intersection improvements previously identified will be incorporated into the design of the major project alternatives.

#### Build Alternatives

Prior to initiating the development of alternatives, the project was broken down into four (4) distinct segments. Each segment has rather unique characteristics as well as potential differences in right-of- way, operational, geometric and environmental features and are shown on **Figure 3-1**. The segmental breakdown methodology ensures that the generated alternatives are more responsive to the needs of each segment rather than to the generalized project’s needs.

1 After a comprehensive alternative generation and evaluation process which includes more than  
2 twelve (12) typical section/alignment combinations, one alternative was selected as being the  
3 most effective option within each segment. **Figures 3-2 to 3-5** depict the Recommended  
4 Alternative Features per segment, and **Figure 3-6** depicts the typical section details.

5  
6 A brief description of the two alternatives per segment are as follows:

7 **Segment 1**

8 **Typical Section G with East Alignment** is a 4-lane urban typical sections with a Design Speed of  
9 45 mph. The total proposed right-of-way for this section is 108-feet. This typical section  
10 features 12-foot travel lanes, 7-foot bicycle lanes, a 22-foot median, and 6-foot sidewalks with a  
11 6-foot utility strip behind the sidewalks. An access class 3 is proposed for this segment. **Figure**  
12 **3-2** shows some of the most distinctive features of this option within Segment 1, including the  
13 proposed median openings.

14  
15 **Segment 2**

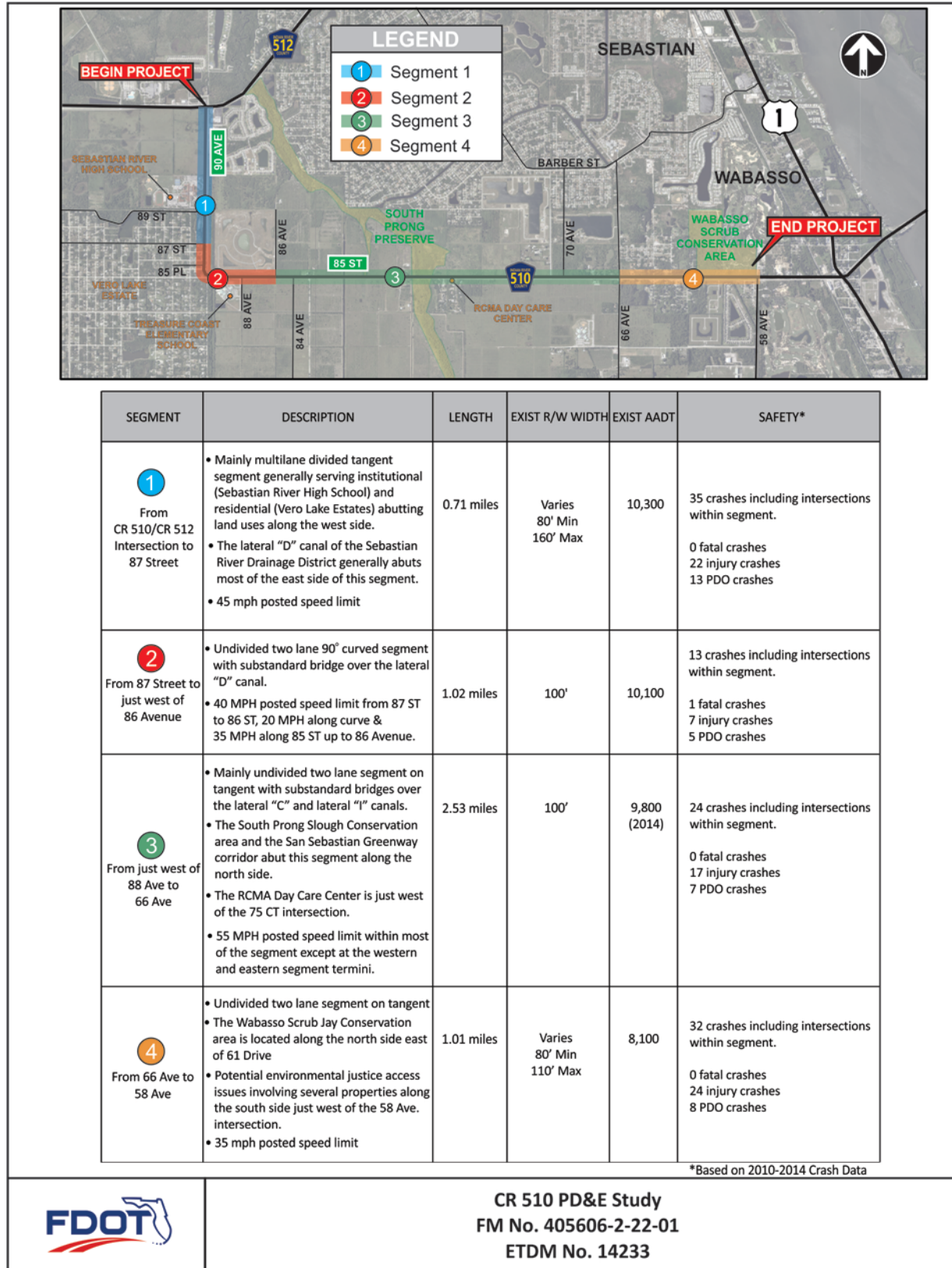
16 **Typical Section G with East/North Alignment** is a 4-lane urban typical sections with a Design  
17 Speed of 45 mph. The total proposed right-of-way for this section is 108-feet. This typical  
18 section features 12-foot travel lanes, 7-foot bicycle lanes, a 22-foot median, and a 6-foot utility  
19 strip behind the sidewalks. The horizontal curve within this segment will be reconstructed to  
20 allow 45 mph design speed and improve safety conditions. The access provided for the Vero  
21 Lake Estate to C.R. 510 has been limited to 87 Street. Also, access to C.R. 510 from 86 Street  
22 and 86 Place has been eliminated. This alternative proposes to close the existing C.R. 510 and  
23 remove the existing bridge over Lateral Canal D. **Figure 3-3** illustrates some of the most  
24 distinctive features of this option within Segment 2.

25  
26 **Segment 3**

27 **Typical Section A with Center Alignment** is a 4-lane sub-urban typical section with a design  
28 speed of 50 mph. The total proposed right-of-way for this section is 168 feet. This typical  
29 section features 12-foot travel lanes, 7-foot bicycle lanes, 4-foot inside shoulders, curb and  
30 gutter on both sides and 5-foot sidewalks with a wide buffer between the roadway and the  
31 sidewalks. Additionally, there is a 32-foot drainage easement along the north side of the  
32 roadway to treat offsite drainage impacted by the project. Median openings have been given  
33 throughout the segment to allow access for the various stakeholders/property owners along  
34 the segment. **Figure 3-4** illustrates some of the most distinctive features of this option within  
35 Segment 3.

36  
37 **Segment 4**

38 **Typical Section E with North Alignment** from 66 Avenue to 61 Drive and **South Alignment** from  
39 61 Drive to 58 Avenue is a 4-lane urban typical section with a Design Speed of 45 mph. The total  
40 proposed right-of-way for this section is 104-feet. This typical section features 11-foot travel  
41 lanes, 7-foot bicycle lanes, 6-foot sidewalks against the curb and a 22-foot median. **Figure 3-5**  
42 illustrates some of the salient characteristics of this alternative within this segment including  
43 the various partial median openings that have been given to the communities along this  
44 segment.



1  
2  
3

Figure 3-1 Project Segmentation



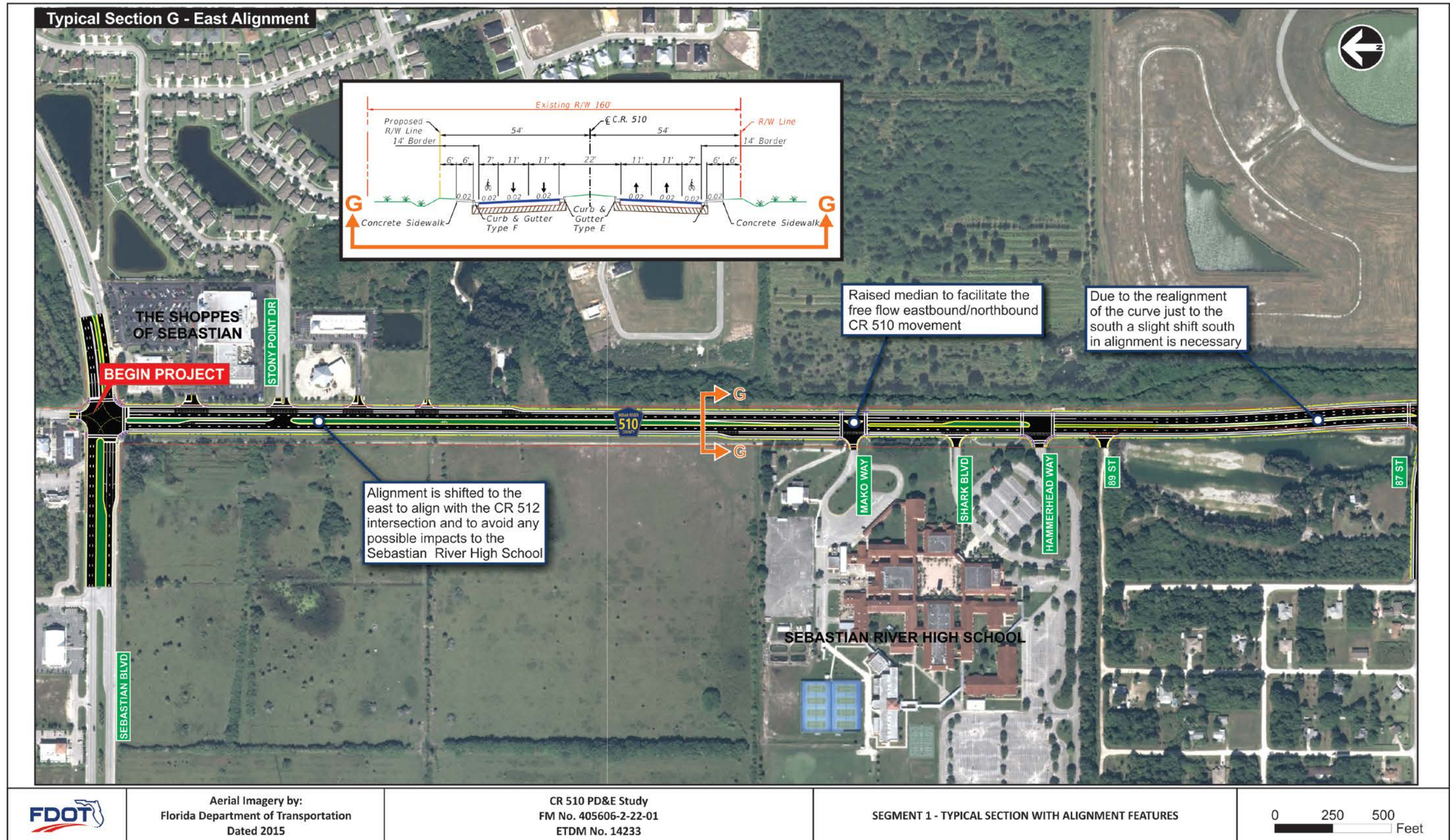


Figure 3-2 Segment 1 Typical Section with Alignment Features



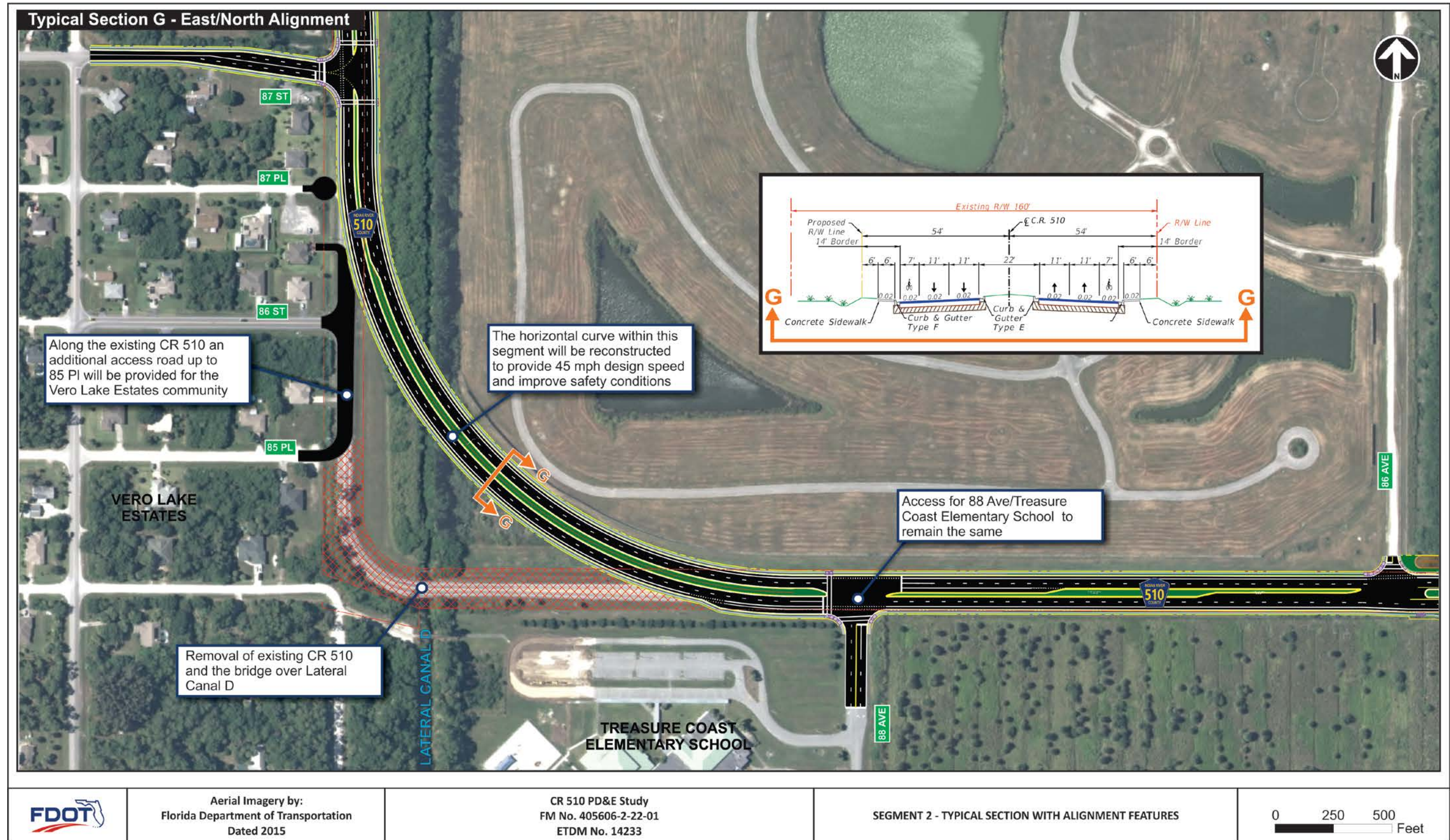


Figure 3-3 Segment 2 Typical Section with Alignment Features



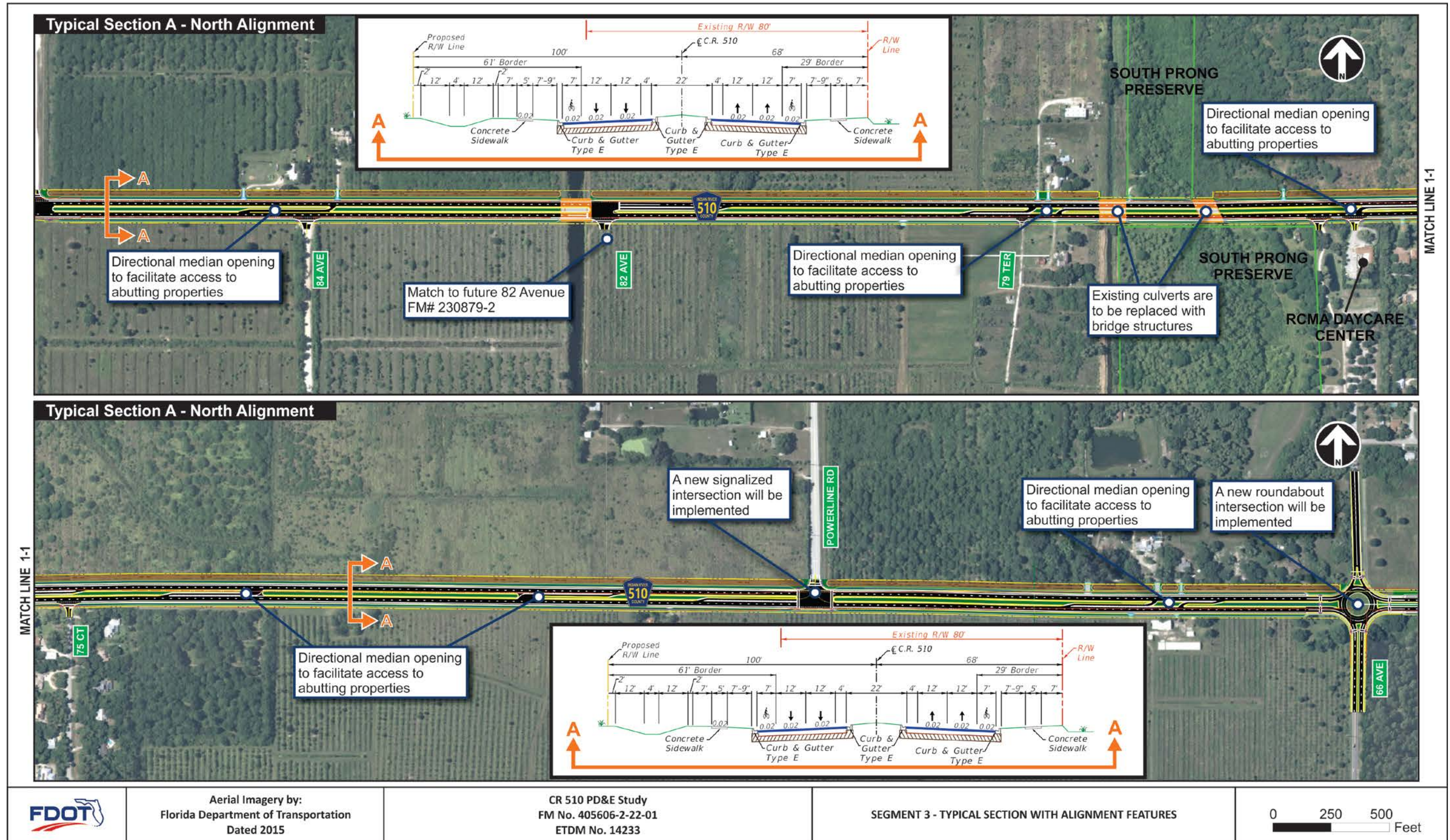


Figure 3-4 Segment 3 Typical Section with Alignment Features



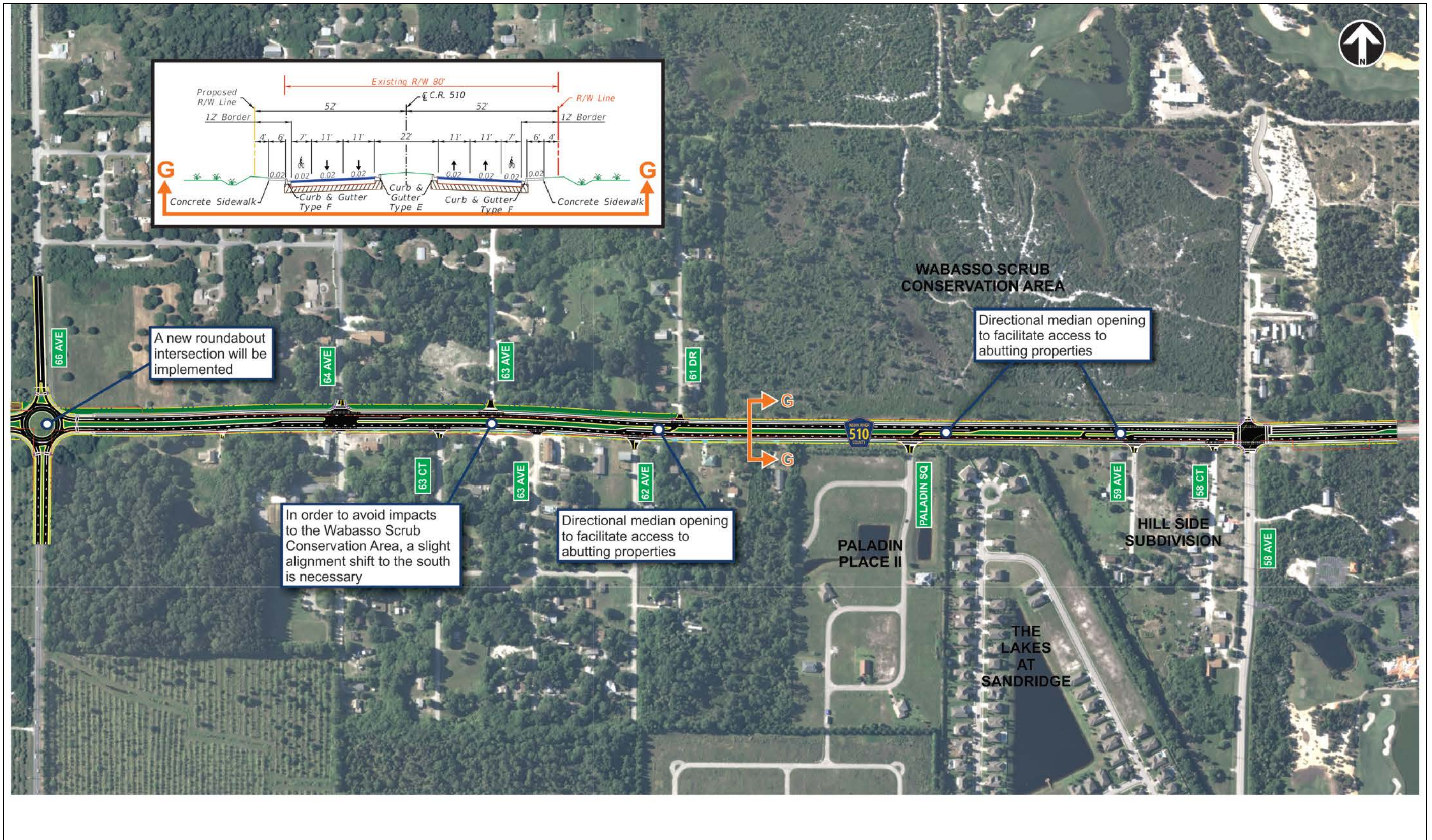
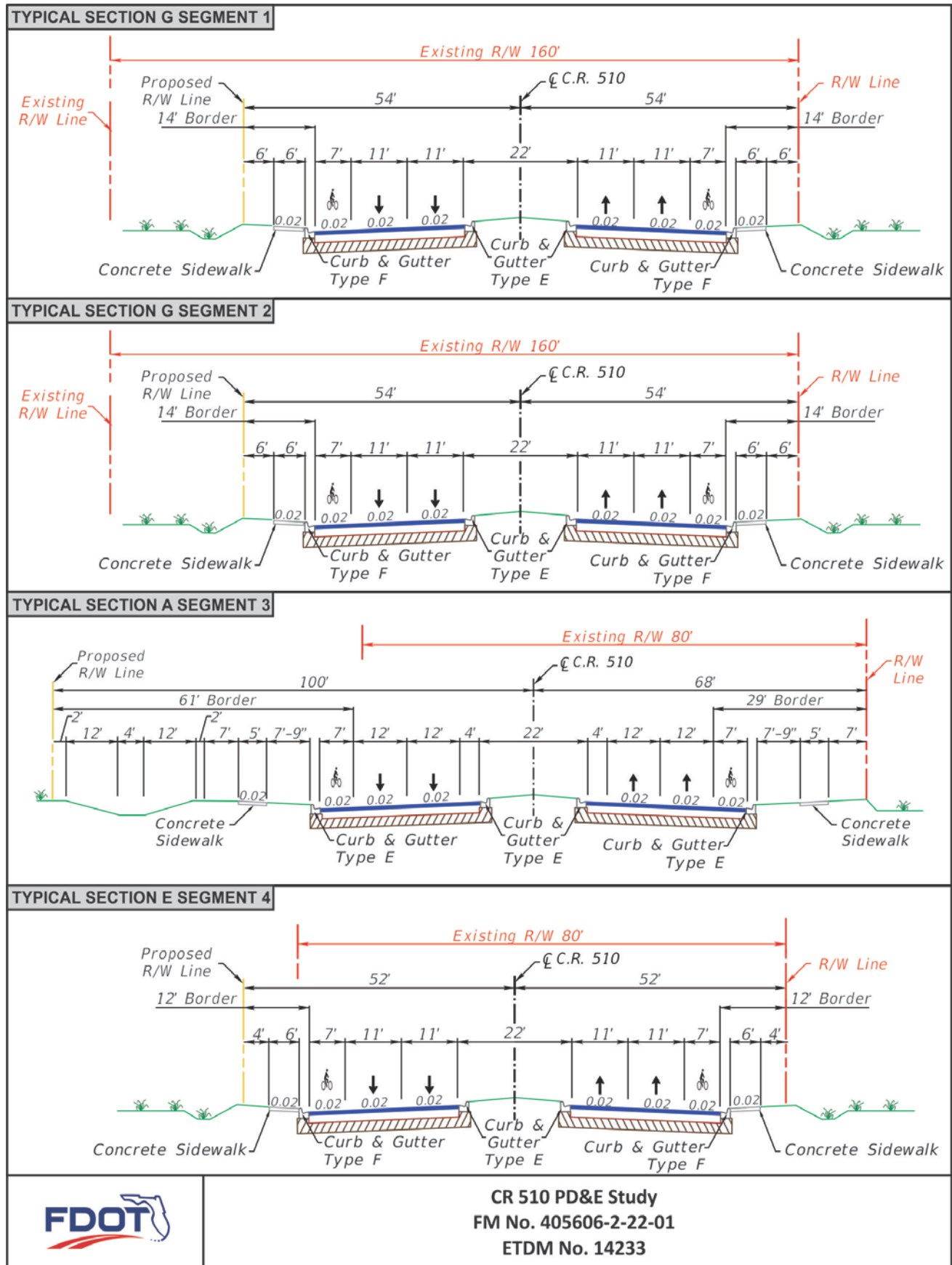


Figure 3-5 Segment 4 Typical Section with Alignment Features





1  
2

Figure 3-6 Typical Section Details

## 4.0 PROJECT AREA DESCRIPTION

The project occurs in Indian River County, southwest of the City of Sebastian. The term “project corridor” is used in this document to represent a smaller area that encompasses the existing C.R. 510 right-of-way and the recommended alternative. The term “project area” represents a larger expanse that encompasses the project corridor as well as all land within 500 feet of the centerline of C.R. 510.

The project area is primarily agricultural, with pastures, citrus groves, and home sites scattered throughout. However, increased residential development is encroaching from the City of Sebastian to the north and from Vero Lake Estates, a housing development that borders the project. A shopping center and two gas stations are located at the intersection of C.R. 510 and C.R. 512 at the project’s western terminus. Approximately one half-mile south of that intersection and immediately west of C.R. 510 is Sebastian River High School. C.R. 510 makes a 90 degree bend approximately 1.25 miles from the project’s western terminus so that the westernmost part of C.R. 510 runs north-south and the more eastern section runs east-west. Treasure Coast Elementary School occurs south of C.R. 510, just east of the 90 degree bend in C.R. 510. Immediately northeast of that bend is a large area that was cleared for residential development. Streets and utilities were installed but no construction of houses has begun.

The majority of the agricultural lands in the project area are abandoned citrus fields. Most of these fields contain standing dead citrus trees on raised rows with furrows between each row. Dead citrus trees in some fields have been cleared and additional clearing is ongoing. East of 66 Avenue residential land use becomes more common. Three canals cross the project corridor, each is oriented north-south.

Indian River County owns three notable conservation properties adjacent to this project. In the northeast quadrant of the intersection of C.R. 510 and C.R. 512 is the Ansin Tract, which contains forested land stretching from that intersection to the Saint Sebastian River. Near the middle of the project, the south prong of the Saint Sebastian River is surrounded by two tracts of land owned by Indian River County and managed as the South Prong Preserve. At the project’s eastern terminus is the Wabasso Scrub Conservation Area (WSCA), which contains scrub habitats and has been used previously for mitigation for federally listed Florida scrub-jays (*Aphelocoma coerulescens*).

### LAND USE

Land use cover descriptions provided for both uplands and wetlands are classified utilizing the *Florida Land Use Cover and Forms Classifications System* (FLUCCS) designations. Existing land use in the project area was initially determined utilizing US Geological Survey (USGS) maps, historical images, aerial photographs, and land use mapping from the St. Johns River Water Management District (SJRWMD) (2009-2012). Land use categories in the project area reported by SJRWMD were verified in the field. Field reviews generally confirmed the SJRWMD land use mapping, with minor updates that are described below. Land use categories in the project area as mapped by SJRWMD are shown in **Figures 4-1** and **4-2** and each land use category in the project area is described below along with its location.

1 **Residential, Low Density (FLUCCS – 1100)**

2 This category is reserved for low density residential areas that have from one half to two acres  
3 per dwelling unit. Residential, Low Density land uses are often located in newly established  
4 sections of large urban areas or on urban-rural fringe. This land use type occurs immediately  
5 east of the project corridor, approximately 0.3 mile south of the intersection of C.R. 510 and  
6 C.R. 512, and also immediately east of the South Prong Preserve, south of C.R. 510. A third area  
7 of this land use type occurs south of C.R. 510 between Power Line Road and Schumann Drive.

8 **Residential, Rural (FLUCCS - 1180)**

9 This residential category is restricted to areas where the density is two to five acres per  
10 dwelling unit. It is used for areas with low dwelling unit densities, but not low enough to be put  
11 into a non-residential category, as with farmsteads. This class may contain a mosaic of small  
12 open areas, natural vegetation, or miscellaneous land covers/uses. This land class is found in  
13 one location in the project area, immediately west of the South Prong Preserve and east of 82  
14 Avenue.

15 **Low Density Under Construction (FLUCCS - 1190)**

16 This category refers to low density residential areas that are in the process of construction.  
17 When completed they will fall into the 1100 class, with more than one half and less than two  
18 acres per dwelling unit. There is no time limit set on completion of the areas under  
19 construction. However, if the in-fill process is indefinitely stalled, the code 1920 is used instead.  
20 This class is found in one location in the project area, on the north and east side of the 90-  
21 degree bend in C.R. 510.

22 **Residential, Medium Density (FLUCCS – 1200)**

23 This category is reserved for medium density residential areas that have from two to five  
24 dwelling units per acre. Rural and recreational types of subdivisions will be included in the  
25 residential category since this land is almost entirely committed to residential use even though  
26 forest or open areas may be present also. This class is found in two locations in the project  
27 area, at the eastern terminus and at the western side of the project corridor near the 90-degree  
28 bend in C.R. 510.

29 **Medium Density Under Construction (FLUCCS – 1290)**

30 This category refers to medium density residential areas that are in the process of construction  
31 and will have between two and five dwelling units per acre when finished. If more than half of  
32 the area is constructed, and work is in progress, these areas should be coded as though  
33 complete, using 1200. There is no time limit set on completion of the areas under construction.  
34 However, if the in-fill process is indefinitely stalled, the FLUCCS code 1920 is used instead.  
35 Medium Density Under Construction land is found in one location of the project area, east of  
36 C.R. 510 approximately 0.4 miles south of the projects' western terminus.

37 **High Density Under Construction (FLUCCS – 1390)**

38 This category refers to high density residential areas that are in the process of construction. If  
39 more than half of the area is constructed, and work is in progress, these areas should be coded  
40 1300, as though complete. There is no time limit set on completion of the areas under  
41 construction. However, if the in-fill process is indefinitely stalled, the code 1920 is used instead.



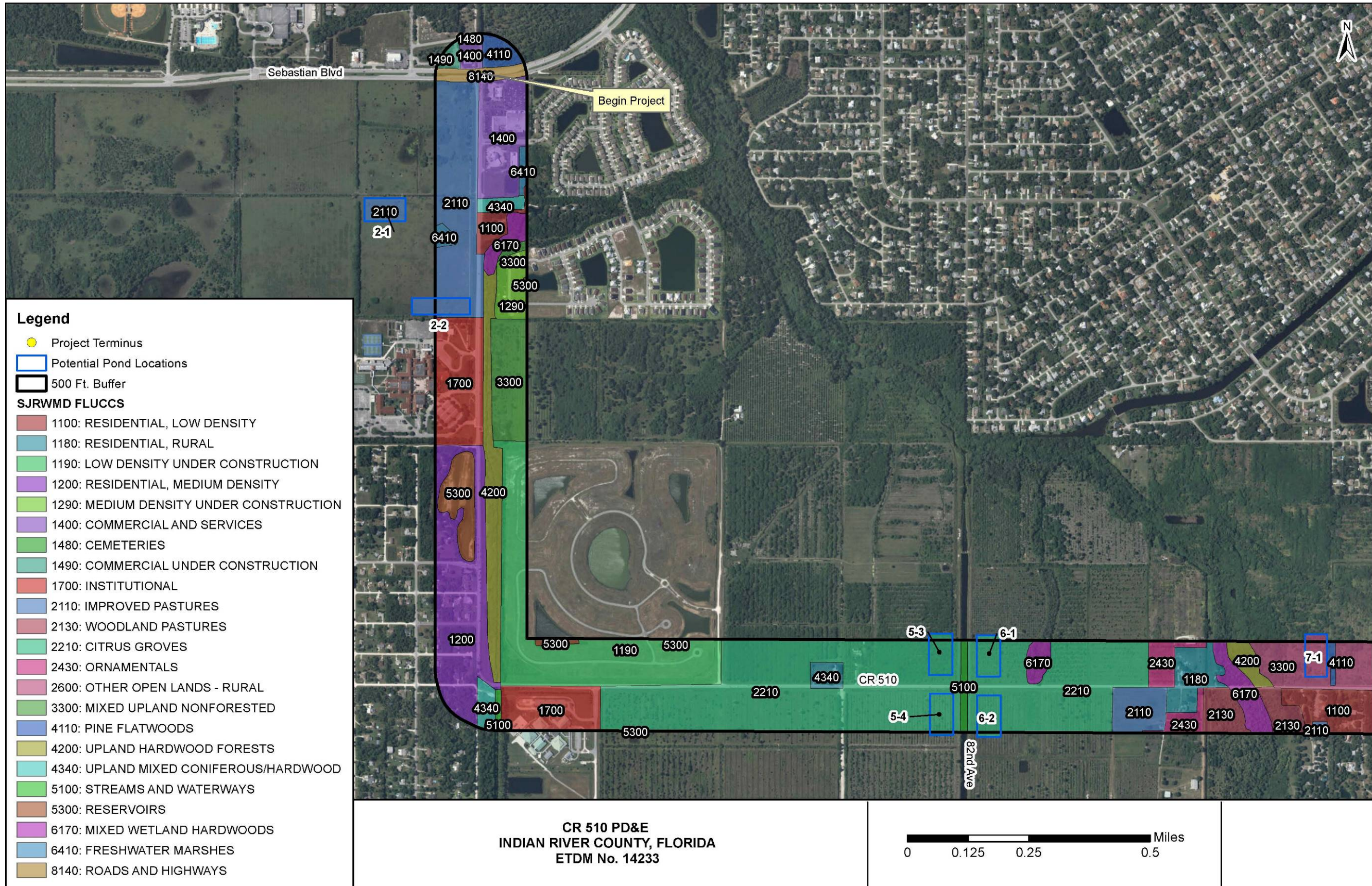


Figure 4-1 Land Use in Western Half of Project Area



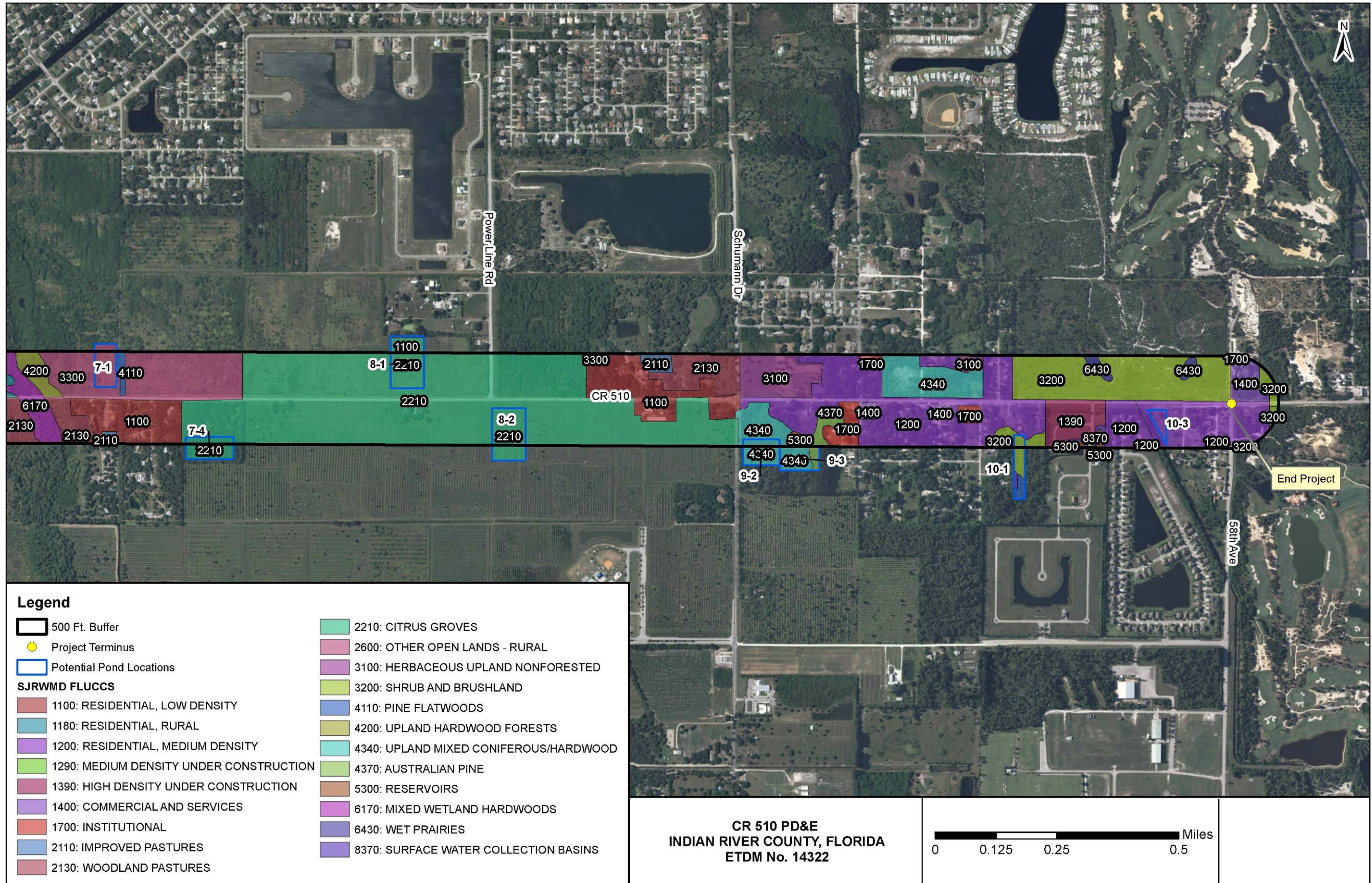


Figure 4-2 Land Use in Eastern Half of Project Area



1 This category occurs in one location, on the south side of the corridor near the eastern  
2 terminus approximately 0.25 mile west of 58 Avenue.

### 3 **Commercial and Services (FLUCCS – 1400)**

4 This is an active land use category that includes a broad range of uses and operations providing  
5 diverse products and services which often occur in complex mixtures. Subclasses include retail  
6 and wholesale, professional, cultural and entertainment, and tourist services, as well as others.  
7 The 1400 class includes shopping centers, commercial strip developments, warehouses, junk  
8 yards, campgrounds and amusement parks. These areas are usually located along main  
9 transportation routes or at the intersections of secondary transportation corridors. This land  
10 use category is found in five separate locations in the project area; two are at the intersection  
11 of C.R. 510 with C.R. 512, two more occur south of C.R. 510 between 64 Avenue and 62 Avenue,  
12 and one area of Commercial and Services land use occurs at the intersection of C.R. 510 and 58  
13 Avenue.

### 14 **Cemeteries (FLUCCS – 1480)**

15 This category includes all burial grounds of any age and type. These are a diverse group, which  
16 includes both human and pet cemeteries; old, in-active cemeteries covered by dense canopy;  
17 brand new facilities with open expanses of lawn that are not yet “populated”; and all  
18 combinations in between. One cemetery is located near the western terminus of the project,  
19 approximately 400 feet north of the C.R. 510 intersection with C.R. 512.

### 20 **Commercial and Services Under Construction (FLUCCS – 1490)**

21 This class includes all 1400 classes that are in the process of construction. It includes  
22 cemeteries, oil and gas storage, and all other land uses in the 1400 group that are under  
23 construction. This class is found in one location in the project area, approximately 250 feet  
24 northwest of the C.R. 510 and C.R. 512 intersection at the western terminus of the project.

### 25 **Institutional (FLUCCS – 1700)**

26 The institutional class is an active, general land use class that includes a broad range of  
27 institutional uses which can be difficult to differentiate individually. It includes uses such as  
28 educational, religious, medical and health care, governmental, correctional, commercial child  
29 care, and others. Educational institutions encompass all levels of public and private schools,  
30 colleges, universities, training centers, etc. The institutional class is found in six locations within  
31 the project area. Two schools are found along the corridor; Sebastian River High School, which  
32 is located 0.5 miles south of C.R. 512, and Treasure Coast Elementary School, which is located  
33 south of C.R. 510 just east of the 90-degree bend. Three locations of Institutional land use occur  
34 between Schumann Drive and 62 Avenue, both north and south of the project corridor. These  
35 include a church and pre-kindergarten facility as well as land the Indian River County Property  
36 Appraiser lists as ‘3300 – Night club/Bar/Lounge’. The last institutional area located within the  
37 project area is a church approximately 500 feet north of C.R. 510 on 58 Avenue.

### 38 **Improved Pastures (FLUCCS – 2110)**

39 Improved pastures are the most intensively managed of the pastureland classes. They are  
40 usually cleared, tilled, reseeded with specific grass types and periodically improved with brush  
41 control and fertilizer application. In most cases, they show some direct evidence of cattle, such

1 as watering ponds, feed bunkers, fencing, corrals, barns or cow trails. This land use category is  
2 present in the project area southwest of the intersection of C.R. 510 and C.R. 512. There are  
3 two other small areas of improved pasture, south of C.R. 510, 0.3 and 0.75 miles east of 82  
4 Avenue, respectively.

#### 5 **Woodland Pastures (FLUCCS – 2130)**

6 Pasturelands that have from 25 percent to 100 percent forest canopy are included in this  
7 category. It does not include open pasturelands with patches of tree canopy large enough to  
8 qualify as upland forest. Woodland pastures are generally unimproved. Evidence of grazing, if  
9 visible, may include cattle trails leading to feed bunkers, salt licks and watering areas.  
10 Woodland Pastures occur south of C.R. 510 on either side of riparian forest on the South Prong  
11 Preserve and north of C.R. 510 immediately west of Schumann Drive.

#### 12 **Citrus Groves (FLUCCS – 2210)**

13 This class is for active citrus groves, such as oranges, grapefruits, and tangerines. Land use  
14 classified as Citrus Groves occurs in two large sections of the project area, north and south of  
15 C.R. 510 from 86 Avenue to approximately 0.1 mile west of 79 Terrace and north and south of  
16 C.R. 510 from 75 Court to 66 Avenue. These areas are not currently used for citrus production  
17 and anecdotal reports from landowners suggest that they began to be abandoned after  
18 infestation with pests and disease following a hurricane in 2004.

#### 19 **Ornamentals (FLUCCS – 2430)**

20 This category is for facilities that raise ornamental plants for off-site use. This category does not  
21 include ornamental trees. There are two areas of Ornamental land use in the project area. They  
22 are located north and south of C.R. 510, approximately 0.35 mile east of 82 Avenue. During  
23 field inspections in 2016 it did not appear that these parcels were currently being used to raise  
24 ornamental plants.

#### 25 **Herbaceous Upland Nonforested (FLUCCS – 3100)**

26 This is one of three land cover classes used for upland nonagricultural, non-forested lands  
27 which contain no evidence of cattle grazing. Specifically, 3100 is used for areas that have over  
28 67 percent herbaceous cover, not counting any forested inclusions, which may be up to 25  
29 percent of the area. Traditional rangelands for the 3100 cover class include prairie grasses  
30 which occur on the upland margins of the wetland zone and may be periodically inundated by  
31 water. Generally, it is the marginal area between marsh and upland forested areas. This land  
32 use type occurs in one place in the project area, northeast of the intersection of C.R. 510 and  
33 Schumann Drive.

#### 34 **Shrub and Brushland (Wax myrtle or Saw palmetto) (FLUCCS – 3200)**

35 This is one of three land cover classes used for upland nonagricultural, non-forested lands  
36 which contain no evidence of cattle grazing. Specifically, 3200 is used for areas that have over  
37 67 percent shrub cover and less than 33 percent herbaceous cover (this proportion ignores any  
38 forested patches, which may cover up to 25 percent of the total area). This cover class includes  
39 areas where tree species are regenerating naturally after clear cutting or fire, but are less than  
40 20 feet tall. Most of the WSCA, northwest of the C.R. 510 and 58 Avenue intersection, is



1 categorized as Shrub and Brushland. Another patch occurs south of C.R. 510 just east of 62  
2 Avenue and three patches of Shrub and Brushland occur in the project area east of 58 Avenue.

### 3 **Mixed Upland Non-Forested (FLUCCS – 3300)**

4 This class is used for upland non-forested landscape in which neither herbaceous nor shrubs  
5 cover over two thirds of the area. This cover class may include areas where tree species are  
6 regenerating naturally after clear cutting or fire, but are less than 20 feet tall. These include  
7 native hardwood and coniferous species, but does not apply to plantations. In the project area,  
8 this land use type occurs in three locations. One is east of C.R. 510, 0.5 mile south of C.R. 512  
9 and the other two are north of C.R. 510, immediately east of the South Prong Preserve.

### 10 **Pine Flatwoods (FLUCCS – 4110)**

11 This class is for naturally generated pine flatwoods. The canopy closure must be 25 percent or  
12 more and the trees must average over 20 feet tall. The pine flatwoods class is dominated by  
13 either slash pine, longleaf pine, or both. Common understory species include saw palmetto,  
14 wax myrtle, gallberry and a wide variety of herbs and brush. Pine flatwoods are the most  
15 prevalent community in natural areas. Most pine flatwoods occur on broad, low, flat areas with  
16 seasonal high water tables but not on hydric soils. They transition into mesic flatwood and  
17 hardwood communities on higher ground and into hydric flatwoods, cypress and other  
18 wetlands on the lower edges. Pine flatwoods are found in two places in the project area. The  
19 Ansin Tract, northeast of the intersection of C.R. 510 and C.R. 512 is classified as Pine  
20 Flatwoods, and a small area north of C.R. 510, approximately 0.8 mile east of 82 Avenue, is also  
21 classified as Pine Flatwoods.

### 22 **Upland Hardwood Forest (FLUCCS – 4200)**

23 Upland Hardwood Forests may include forest communities such as oak-pine-hickory, Brazilian  
24 pepper, live oak, wax myrtle-willow, mixed temperate or tropical hardwoods, and beech-  
25 magnolia. Upland forests are naturally generated, and do not include hardwood plantations, or  
26 planted groves of citrus or pecans. However, almost all forests are subject to human influence  
27 and the composition of the forest is, to a degree, determined by management factors. The  
28 trees must average over 20 feet tall at the time of photography and up to one third of the  
29 canopy may be comprised of coniferous species. Upland Hardwood Forests in Florida are found  
30 wherever hydrology, fire, and management practices permit their establishment and they may  
31 occur as inclusions in most other land cover types. Upland Hardwood Forest occurs in two  
32 locations in the project area. The largest area is a linear strip of land immediately east of C.R.  
33 510 that extends from approximately 0.5 mile south of the intersection of C.R. 510 and C.R. 512  
34 south to the 90-degree bend in C.R. 510. This narrow stand of Upland Hardwood Forest grows  
35 on either side of the canal. Another area of Upland Hardwood Forest is located north of C.R.  
36 510, immediately east of wetlands on the South Prong Preserve.

### 37 **Upland Mixed Coniferous/Hardwood (FLUCCS – 4340)**

38 This category is used for those forested areas in which neither upland conifers nor hardwoods  
39 achieve 67 percent crown canopy dominance. It may include communities such as oak-pine-  
40 hickory, Brazilian pepper, live oak, wax myrtle-willow (not hydric), mixed temperate or tropical  
41 hardwoods, and beech-magnolia. Upland pine communities include slash, longleaf, and sand  
42 pines. Upland Mixed Coniferous/Hardwoods are found in four places in the project area. The

1 first is located east of C.R. 510, approximately 0.25 mile south of the intersection of C.R. 510  
2 and C.R. 512. The second is located south of C.R. 510, directly south of the 90-degree bend.  
3 The third area is located directly southeast of the intersection of C.R. 510 and Schumann Drive.  
4 The fourth area of Upland Mixed Coniferous/Hardwoods is located north of C.R. 510  
5 approximately 0.35 mile east of Schumann Drive.

#### 6 **Australian Pine (FLUCCS – 4370)**

7 This class is used for Australian Pine communities. The canopy closure is 25% or greater, with  
8 at least two thirds dominance by Australian pine trees that average at least 20 feet tall. One  
9 area of Australian Pine is located in the project area, south of C.R. 510, approximately 0.35 mile  
10 east of Schumann Drive. An additional area of Australian Pines that was not mapped by  
11 SJRWMD was found during field surveys. It occurs just east of C.R. 510 and approximately 0.3  
12 miles south of the intersection of C.R. 510 and C.R. 512.

#### 13 **Streams and Waterways (FLUCCS – 5100)**

14 This category includes rivers, creeks, canals and other linear water bodies that are 10 meters or  
15 greater in width. This class includes both natural and modified waterways, as well as man-made  
16 canals and channels. Two areas mapped as Streams and Waterways occur in the project area,  
17 both are man-made canals. The first is mapped south of C.R. 510 immediately east of the 90-  
18 degree bend in C.R. 510. Though this canal is only mapped by SJRWMD south of C.R. 510, the  
19 canal extends under CR 510 and parallels the roadway as it run north. The second canal  
20 mapped by SJRWMD under land use runs parallel to and immediately west of 82 Avenue.  
21 Another canal is located just west of the South Prong Preserve but was not mapped as a distinct  
22 land use type by SJRWMD. The South Prong Preserve contains the south prong of the St.  
23 Sebastian River, but is not mapped as Streams and Waterways by SJRWMD.

#### 24 **Reservoirs- Pits, Retention Ponds, Dams (FLUCCS – 5300)**

25 Reservoirs are artificial impoundments of water, or water bodies that have been significantly  
26 modified from their natural state. They are used for irrigation, flood control, municipal and  
27 rural water supplies, stormwater treatment, recreation and hydro-electric power generation.  
28 One large Reservoir in the project area is located west of C.R. 510, approximately 0.75 mile  
29 south of the intersection of C.R. 510 and C.R. 512. Two Reservoirs associated with the stalled  
30 development of a residential neighborhood immediately northeast of the 90-degree bend in  
31 C.R. 510 are in the project area, and an additional pond occurs in an abandoned citrus field just  
32 east of Treasure Coast Elementary School. Three small reservoirs are mapped south of C.R. 510  
33 and east of Schumann Drive. One area that is mapped as Commercial and Services contains a  
34 stormwater pond. It is approximately 0.2 mile south of C.R. 512, east of C.R. 510.

#### 35 **Mixed Wetland Hardwoods (FLUCCS – 6170)**

36 This class is reserved for those wetland hardwood communities which are composed of a large  
37 variety of hardwood species tolerant of hydric conditions yet exhibit an ill-defined mixture of  
38 species. This land use type is mapped in three locations in the project area. One of those  
39 locations is immediately east of C.R. 510, approximately 0.35 miles south of C.R. 512. Another is  
40 north of C.R. 510 just east of 82 Avenue. Another area of Mixed Wetland Hardwoods occurs in  
41 the South Prong Preserve where riparian forests follow the south prong of the Saint Sebastian  
42 River.

1 **Freshwater Marshes (FLUCCS – 6410)**

2 This class is used for wetland communities having a representative suite of plant species such as  
3 sawgrass, cattail, arrowhead, and the common reed. Freshwater marshes tend to be open  
4 expanses of grasses, sedges, rushes, and other types of herbaceous plants. Periods of  
5 inundation are intermediate between Deep Marshes (emergent 6440) and Wet Prairies (6430).  
6 Sites are usually covered with water at least two months of the year and undergo prolonged  
7 periods of soil saturation. Two areas of Freshwater Marshes are found in the project area. One  
8 is an isolated low lying section of cattle pasture located west of C.R. 510, approximately 0.3  
9 mile south of the intersection of C.R. 510 and C.R. 512. The other is located east of C.R. 510,  
10 approximately 0.25 mile south of the intersection of C.R. 510 and C.R. 512, between a  
11 residential neighborhood and a commercial building. It may no longer meet the definition of  
12 Freshwater Marsh as it is now mostly forested.

13 **Wet Prairies (FLUCCS – 6430)**

14 This classification is composed of dominantly grassy vegetation on wet soils and is usually  
15 distinguished from marshes by having less water and shorter herbage. Wet Prairies occur in  
16 depressions in the landscape within flatwoods and pastures, and are also found at the edges of  
17 cypress domes and marshes. Conditions supporting wet prairies may also support forested  
18 depressions or wetland savannahs under other management and fire regimes.

19 Wet Prairies may also result from alterations of hydrology, such as former marshes that are  
20 drying out from artificial drainage or groundwater drawdowns; or former low flatwoods with a  
21 rising water table due to impoundment or precipitation. Two small areas of Wet Prairie occur in  
22 the project area. Both are on the WSCA, approximately 0.1 and 0.3 mile west of 58 Avenue.

23 **Surface Water Collection Basins (FLUCCS – 8370)**

24 This category is used for holding ponds, impoundments and infiltration ponds, utilized within  
25 residential subdivisions or communities and along freeway corridors, for temporary collection  
26 and holding of surface water runoff. Generally, these are open spaces excavated for temporary  
27 seasonal water collection within the urban context. It is not used for treatment ponds and  
28 other "reservoirs" that generally function as **permanent** water bodies. It is not used for holding  
29 ponds in mining applications. Two Surface Water Collection Basins are mapped in the project  
30 area, south of C.R. 510 approximately 0.3 miles west of 58 Avenue.

31 **ELEVATION AND HYDROLOGY**

32 The project area is located on relatively flat land with a ground elevation ranging between  
33 approximately sea level and 35 feet. There is a slight rise in elevation from west to east with the  
34 most significant rise in elevation near the eastern-most portion of the project area. The  
35 National Resources Conservation Service (NRCS) reports the depth to water table in the project  
36 area is between 0 and 18 inches. **Figure 4-3** shows an elevation map created with data collected  
37 by the National Oceanic and Atmospheric Administration and the U.S. Department of  
38 Commerce in 2007 using Light Detection and Ranging (LIDAR) in North American Datum 1983  
39 (NAD 83).

1 Major canals and hydrologic features in the vicinity of the project are shown in **Figure 4-4** and  
2 **4-5**. There are three unnamed man-made canals abutting the project corridor, all are oriented  
3 north-south. The first intersects C.R. 510 immediately east of the 90-degree bend in C.R. 510  
4 and parallels much the westernmost portion of the project, where C.R. 510 is oriented north to  
5 south. The second canal intersects C.R. 510 immediately west of the intersection of C.R. 510  
6 and 82 Avenue. A third canal runs north-south and crosses C.R. 510 just east of 79 Terrace, next  
7 to the south prong of the Saint Sebastian River.

8 The closest major water feature is the Saint Sebastian River, located approximately one mile  
9 northeast of the project corridor. The south prong of the Saint Sebastian River crosses the  
10 project corridor at the South Prong Preserve. Stormwater run-off within the project corridor  
11 ultimately drains into the central Indian River Lagoon via man-made canals and conveyances  
12 leading to the Indian River County North Canal. This canal discharges water into a portion of the  
13 Indian River Lagoon that is a designated Outstanding Florida Water (OFW).



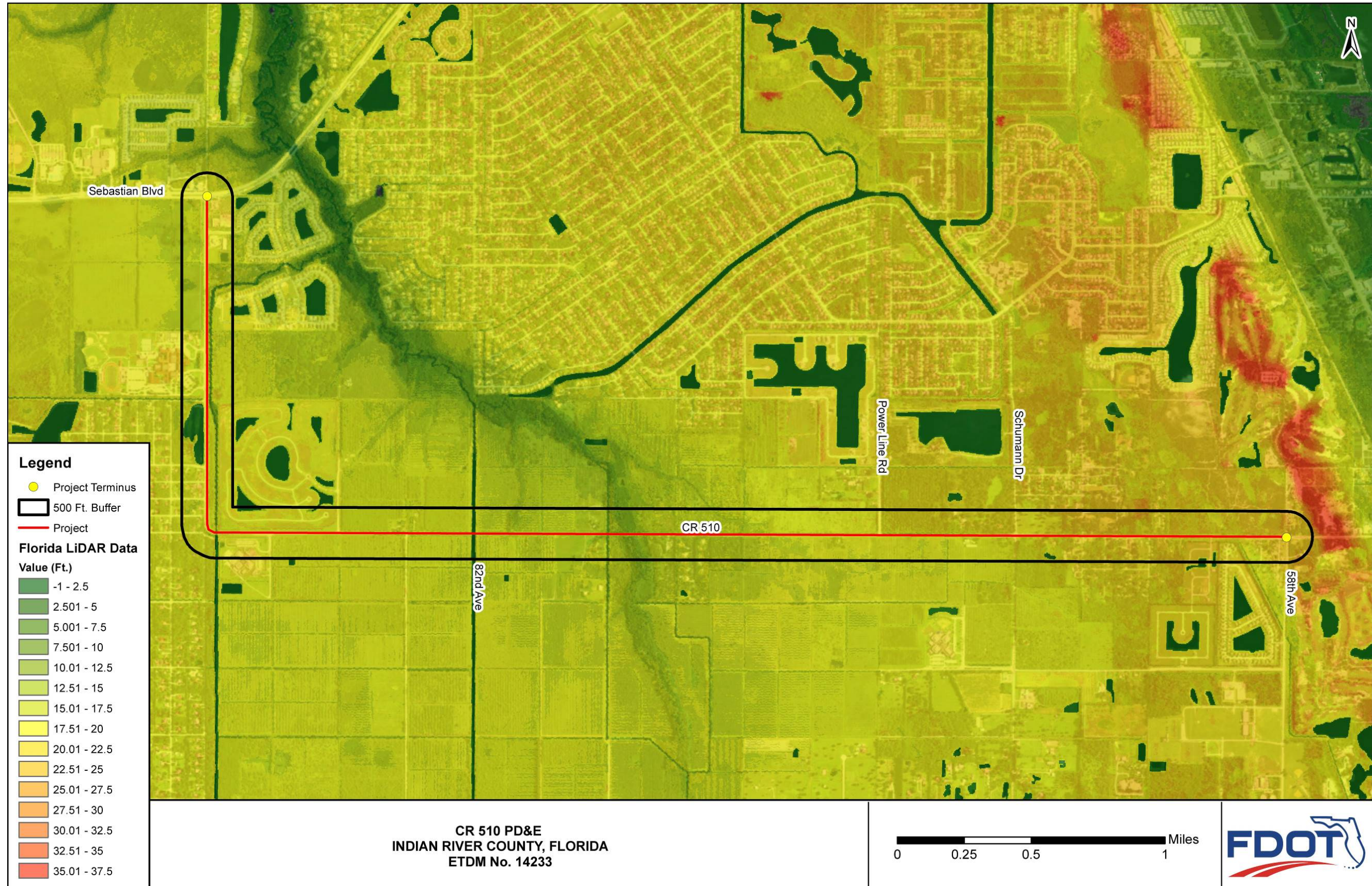


Figure 4-3 Elevation Map



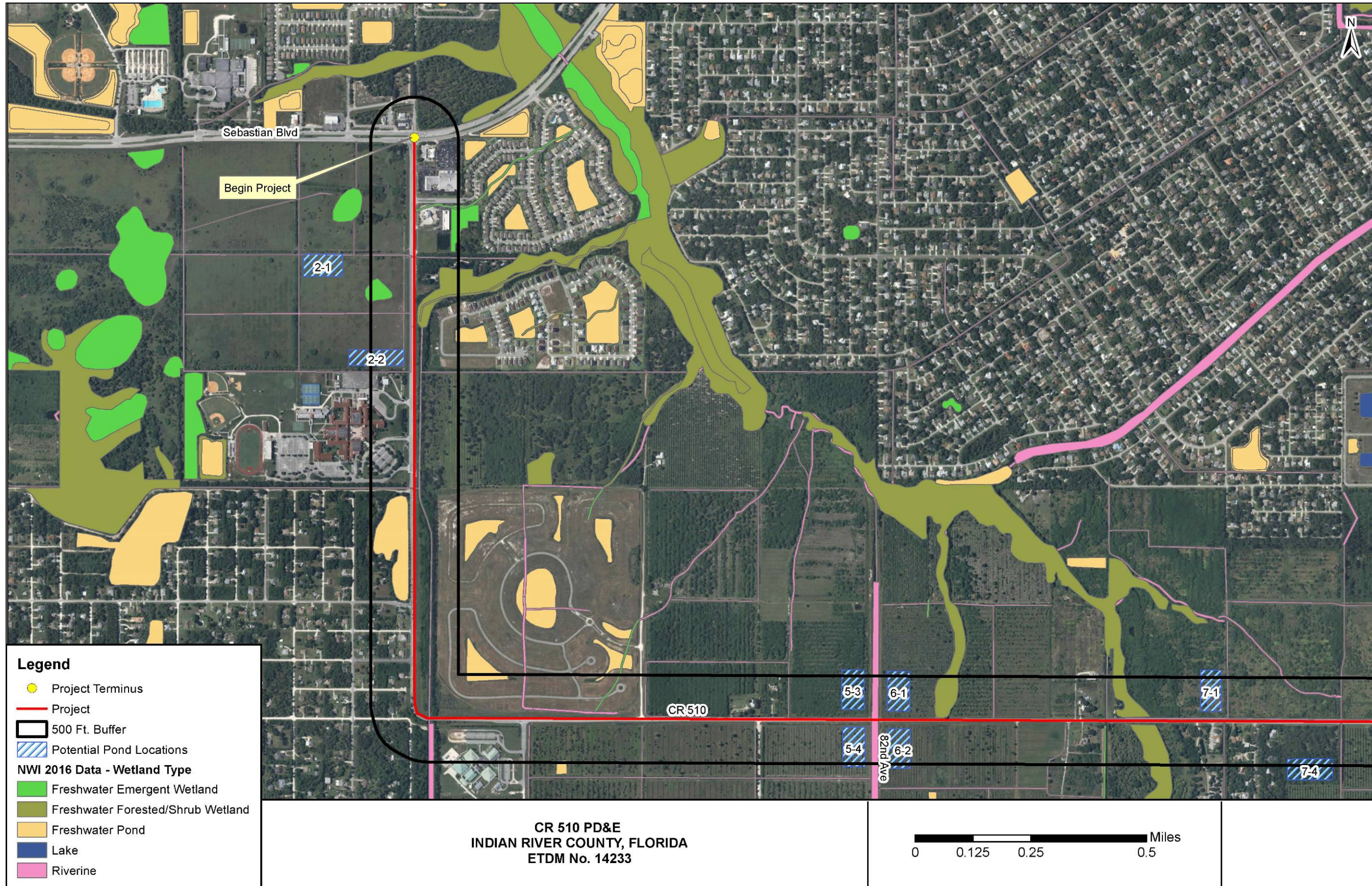


Figure 4-4 Surface Hydrology Western Half of Project Area



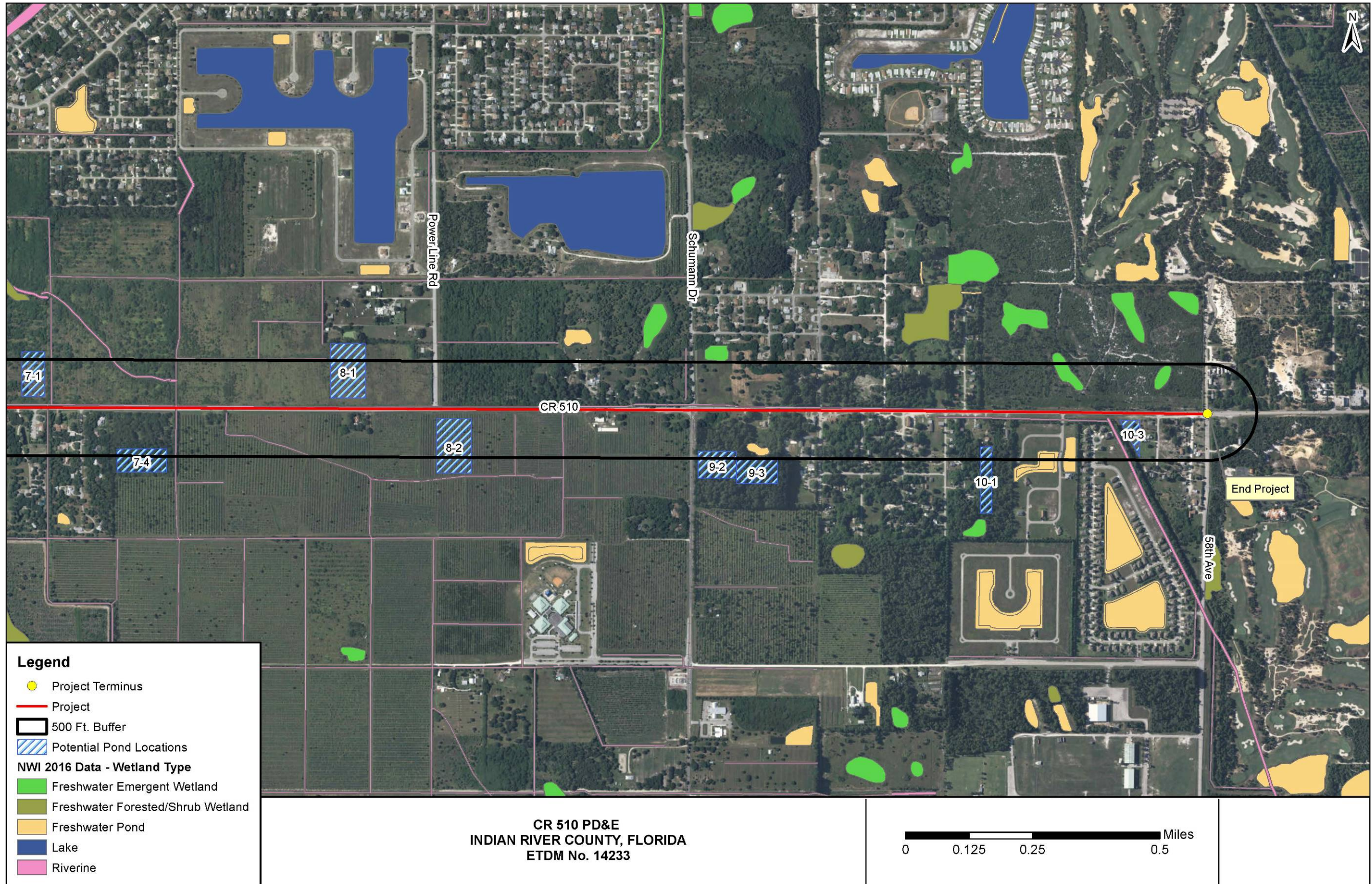


Figure 4-5 Surface Hydrology Eastern Half of Project Area



1 According to the flow pattern map from the SJRWMD, groundwater flow in the project area is  
2 generally to the east-northeast. The project is underlain by a surficial aquifer system that is not  
3 a Sole Source Aquifer as identified by the U.S. Environmental Protection Agency (USEPA).

4 Based on a review of the Florida Department of Health website  
5 (<http://gis.doh.state.fl.us/ehwater/index.html>), 20 potable wells are present adjacent to the  
6 project area. Three wells are located approximately 300 feet northeast of the intersection of  
7 C.R. 510 and 58 Avenue. Three wells are located approximately 200 feet north of C.R. 510, 0.45  
8 mile west of 58 Avenue. Two are located approximately 100 feet south of C.R. 510, 0.45 mile  
9 west of 58 Avenue. One well is located approximately 40 feet south of C.R. 510, 0.4 mile east of  
10 Schumann Drive. Two wells are located approximately 100 and 700 feet south of C.R. 510, 0.25  
11 mile east of Schumann Drive. Two wells are located approximately 40 and 650 feet south of C.R.  
12 510, 0.2 mile east of Schumann Drive. One well is located approximately 350 feet north of C.R.  
13 510, 0.2 mile east of Schumann Drive. A row of five wells is located approximately 300 to 1000  
14 feet south of C.R. 510, 1.1 miles east of 82 Avenue. One well is located approximately 40 feet  
15 northwest of the intersection of C.R. 510 and C.R. 512.

16 This project is located within the SJRWMD's Indian River Lagoon Basin. According to the Federal  
17 Emergency Management Agency (FEMA) Flood Insurance Rate Map (updated December 4,  
18 2012), most of the project area is located outside the 500-year floodplain (Zone X). There are  
19 three small areas within the project area mapped as being within the 500-year floodplain (Zone  
20 A); areas of 100-year flood with average depths of less than one foot or width drainage areas  
21 less than one square mile (Zone B); or areas protected by levees from 100-year flood (Zone  
22 X500). These areas mapped as flood zone A are located 0.3 mile south of the intersection of  
23 C.R. 510 and C.R. 512, 0.15 mile east of 82 Avenue, and 0.5 mile east of 82 Avenue.

## 24 **SOILS**

25 The NRCS (2014) indicates 10 soil types occur in the project area, and nine soil types exist  
26 within the project corridor, where soil disturbance would occur under the recommended  
27 alternative (**Figures 4-6** and **4-7**). The soil types in the project area are listed in **Table 4-1** along  
28 with descriptions and ratings from NRCS. Three hydric soils are known to occur in the project  
29 area: Pineda Fine Sand, Winder Fine Sand, and Riviera Fine Sand. No prime farmland soils occur  
30 in Indian River County. EauGallie Fine Sand, Wabasso Fine Sand, Winder Fine Sand, Oldsmar  
31 Fine Sand, Pineda Fine Sand, and Riviera Fine Sand are considered farmland soils of unique  
32 importance.

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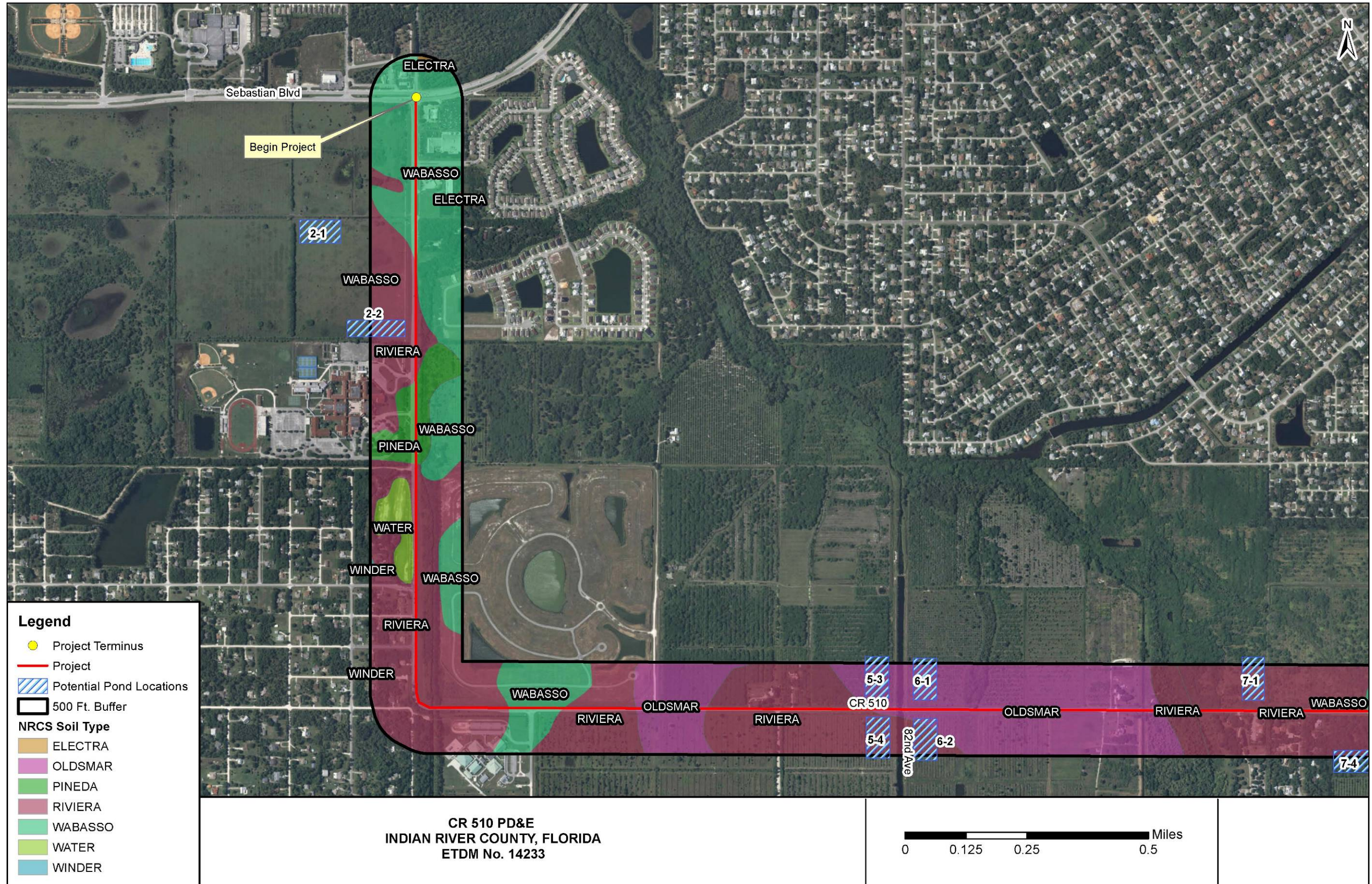
**Table 4-1 Soils in Project Area**

Soil Type	Environmental Association	Approximate Percent of Project Area
Archbold	This soil type consists of nearly level to sloping soils on the Atlantic Coastal Ridge and other elevated knolls on flatwoods. This is not a hydric soil.	3.6%
Astatula	This soil type consists of excessively drained, very rapidly permeable soils that formed in thin deposits of marine or eolian sand. These nearly level to gently sloping soils are on the Atlantic Coastal Ridge. This is not a hydric soil.	2.3%
EauGallie fine sand	This soil type consists of nearly level sandy soils, mainly on broad, low ridges. Permeability is rapid to moderately rapid in soils formed in beds of loamy marine sediments. Typical natural vegetation consists of slash pine, saw palmetto, cabbage palm, wax myrtle, wiregrass, bluestems, and panicums. This is rated as a farmland soil of unique importance. This is not a hydric soil.	1.7%
Electra	This soil type consists of deep, somewhat poorly drained, slowly permeable or very slowly permeable soils that formed in thick beds of sandy and loamy marine sediment. These nearly level to gently sloping soils are on knolls and in adjacent drainageways. This is not a hydric soil.	1.3%
Oldsmar fine sand	This soil type consists of nearly level, sandy soils on low and on low knolls in floodplains. Permeability is rapid to moderately rapid. Typical natural vegetation includes slash pine, saw palmetto, inkberry, rusty lyonia, blackroot, pennyroyal, pineland threeawn, chalky bluestem, and panicums. This is not hydric soil.	13.0%
Pineda fine sand	This soil type consists of soils that formed beds of sandy and loamy sediments influenced by underlying alkaline material. These soils are on broad low flats and in low areas bordering swamps and lakes. Permeability is slow to very slow. Typical natural vegetation is scattered slash pine, cabbage palm, wax myrtle, saw palmetto, blue maidencane, pineland threeawn, and panicums. <b>This is a hydric soil.</b>	1.9%
Wabasso fine sand	This soil type consists of nearly level sandy soils formed in sandy and loamy marine sediments. These soils are on broad flatlands. Permeability is rapid to moderately rapid. Typical natural vegetation consists of slash pine, cabbage palm, saw palmetto, wax myrtle, fetterbush, inkberry, pineland threeawn, bluestems, and panicums. This is not hydric soil.	25.3%
Winder fine sand	This soil type consists of nearly level soils formed in unconsolidated marine sands and clays that are influenced by underlying alkaline material. Soils are located on low hammocks and in poorly defined drainageways. Permeability is slow to very slow. Typical natural vegetation includes cabbage palm, laurel oak, slash pine, wax myrtle, blue maidencane, chalky bluestem, sand cordgrass, sawgrass, sedges, and water tolerant grasses. <b>This is a hydric soil.</b>	6.5%
Myakka	This soil type consists of poorly drained, moderately permeable to moderately rapidly permeable soils that formed in beds of sandy marine sediment. These nearly level soils are on broad flatwoods and in depressions. This is not a hydric soil.	4.3%
Riviera Fine Sand	This soil type consists of nearly level soil and is poorly drained. Typical natural vegetation consists of blue maidencane, pineland threeawn, cabbage palmetto, sand cordgrass, toothache grass, broomsedge bluestem, creeping bluestem, Florida paspalum, and saw palmetto. Permeability is moderately low to moderately high. <b>This is a hydric soil.</b>	30.2%
Water	-	9.9%
<b>TOTAL</b>		<b>100%</b>

Source: NRCS 2014; USDA 1987: 22–23, 25, 28, 31–34, 36, 45, 55

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Figure 4-6 Soils Map Western Half of Project



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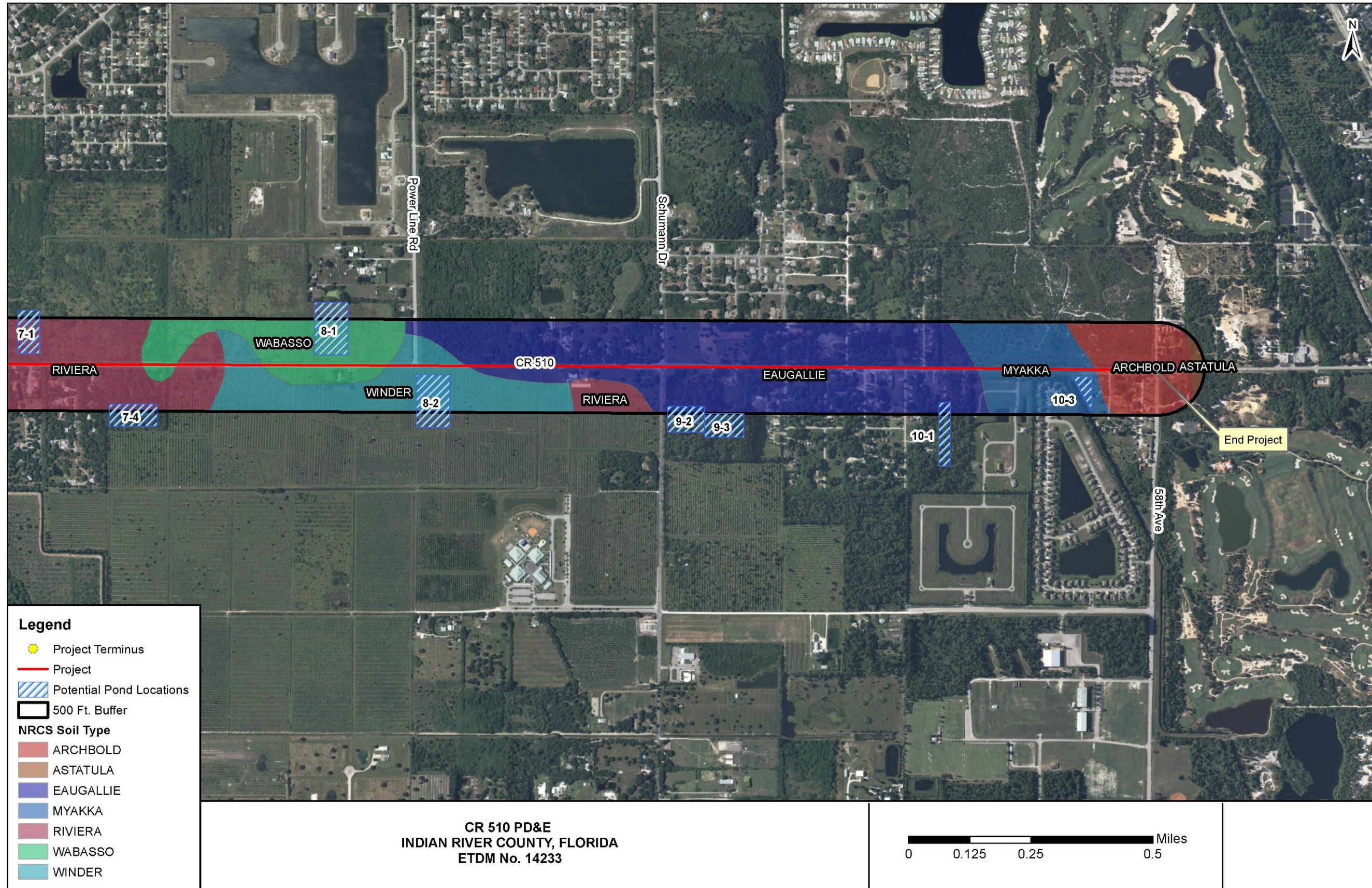


Figure 4-7 Soils Map Eastern Half of Project

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## 5.0 METHODOLOGY

1  
2 This project was evaluated for impacts to protected plant and animal species and their habitats,  
3 wetlands, and EFH in accordance with the following chapters from the FDOT PD&E manual:  
4 *Chapter 16 (Protected Species and Habitat) (Updated June 14, 2017), Chapter 9 (Wetlands and*  
5 *Other Surface Waters) (Updated June 14, 2017), and Chapter 17 (Essential Fish Habitat)*  
6 *(Updated June 14, 2017)*. Preliminary data was collected through literature reviews, ETDM  
7 review and comments, Geographic Information System (GIS) maps, database searches and  
8 agency coordination. The baseline conditions in the project area were used to compare  
9 potential impacts from each alternative. The following data sources and methods were used to  
10 evaluate potential impacts. No notable data gaps were identified. Pertinent ETDM comments  
11 are also presented along with responses.

## 12 DATA COLLECTION

13 Preliminary data collection utilized literature reviews, the ETDM system, database reviews and  
14 agency coordination to identify federal and state listed species, wetlands, and EFH with  
15 potential to occur in or near the project corridor. Soil maps, land use maps and aerial imagery  
16 were also used. Specific information sources and databases utilized for assessment of potential  
17 impacts include the following:

- 18 • ETDM Summary Report for C.R. 510 (Project # 14233)
- 19 • U.S. Fish and Wildlife Service (USFWS) Environmental Conservation Online System
- 20 • Florida Natural Areas Inventory (FNAI) element occurrences database
- 21 • Florida Fish and Wildlife Conservation Service (FWC) databases
- 22 • USFWS National Wetland Inventory (NWI) maps
- 23 • FWC Water Bird Locator (<http://atoll.floridamarine.org/waterBirds/>)
- 24 • FWC Bald Eagle Nest Locator
- 25 • FWC's Strategic Habitat Conservation Areas
- 26 • USFWS wood stork (*Mycteria americana*) nesting colonies map tool
- 27 • SJRWMD land use GIS layers
- 28 • National Marine Fisheries Service (NMFS) EFH Data and Guidance documents
- 29 • Florida Natural Areas Inventory (FNAI) Land Use GIS Layers
- 30 • U.S. Department of Agriculture NRCS Web Soil Survey
- 31 • Previous survey reports provided by FDOT

32 Environmental Technical Advisory Team (ETAT) members were invited to the project kickoff  
33 meeting and were involved in the ETDM process. USFWS and FWC commented on potential  
34 impacts to wildlife and habitats through the ETDM process. During the ETDM process the  
35 project's effect on wildlife and habitat was rated as *substantial* by the USFWS, *moderate* by  
36 FWC, *minimal* by FHWA, and *none* by the Florida Department of Agricultural and Consumer  
37 Services.

1 FHWA, USACE, SJRWMD, NMFS, and USFWS all assigned a degree of effect of “Moderate”  
2 regarding wetlands and surface waters. FHWA and SJRWMD each assigned a degree of effect of  
3 “Minimal” regarding water quality and quantity. For Coastal and Marine resources, FHWA  
4 assigned a degree of effect of “None”, SJRWMD assigned a degree of effect of “No  
5 Involvement”, and NMFS assigned a degree of effect of “Minimal”. These ETDM comments  
6 have been attached to this report as **Appendix D** and responses are provided below.  
7 Consultation with USFWS regarding impacts to Florida scrub-jay are ongoing.

#### 8 **Responses To Comments Regarding Wildlife And Habitats**

9 This document discusses potential impacts to the federally listed species (including wood stork,  
10 Florida scrub-jay, and Audubon’s crested caracara) identified by USFWS through ETDM  
11 comments as potentially occurring in the project area. The USFWS will be consulted as a part of  
12 this PD&E process and FDOT, on behalf of FHWA, will request concurrence with determinations  
13 of effect for each federally listed species. Species-specific responses to USFWS comments are  
14 presented below.

15 Wood Stork- Wood stork SFH occurs in wetlands and other surface waters (OSW), such as  
16 roadside ditches, in the project area. The USFWS Wood Stork Effect Determination Key was  
17 used to evaluate impacts to wood storks and to wood stork SFH. Approximately 2.983 acres of  
18 direct impacts to wood stork SFH are anticipated under the recommended alternative. During  
19 the design phase of the project a functional assessment of wood stork SFH will be conducted, as  
20 appropriate, using the Wood Stork Foraging Analysis Methodology and a suitable wood stork  
21 mitigation plan will be developed.

22 Florida Scrub-Jay- The WSCA is a conservation preserve managed for Florida scrub-jays and was  
23 previously used as mitigation for impacts to Florida scrub-jay habitat. Direct impacts to the  
24 WSCA will be avoided.

25 Audubon’s crested caracara- Potential foraging and nesting habitat for caracaras occurs in the  
26 project area. Nest surveys were conducted in 2017 following USFWS guidelines and the results  
27 are incorporated into this NRE, with additional details provided in **Appendix B**. Additional  
28 caracara nest surveys were conducted by FDOT in 2016.

29 The listed species identified by FWC through the ETDM system as potentially occurring in the  
30 project area were included in this document and assigned effect determinations. Impacts to  
31 protected species habitats were avoided and minimized by following an existing road corridor  
32 and completely avoiding the WSCA and Ansin Tract. Gopher tortoise burrow surveys will be  
33 performed prior to construction following FWC procedures.

#### 34 **Responses To Comments Regarding Wetlands, EFH, And Water Quality**

35 Impacts to wetlands and EFH were avoided and minimized to the maximum extent practicable  
36 while meeting the purpose and need of the proposed project. Further analysis of impacts to  
37 wetlands and surface waters by SJRWMD is anticipated during the ERP process. It was  
38 determined that the south prong of the Saint Sebastian River and associated wetlands are EFH  
39 for white shrimp (*Litopenaeus setiferus*). An interagency site visit with NMFS was not required  
40 and was not conducted. Stormwater runoff will receive 50 percent greater treatment than

1 under FDOT specifications. Standard BMPs for road and bridge construction will also be  
2 implemented to avoid and minimize impacts. Sections 7.0 and 8.0 provide additional details on  
3 avoidance and minimization measures as well as compensatory mitigation for wetlands and  
4 EFH, respectively.

#### 5 6 **Field Investigations**

7 Multiple field investigations were conducted to evaluate wildlife presence and habitat  
8 potential, identify wetlands and EFH, and to document existing conditions in the project area.  
9 Prior to initiating this PD&E study, FDOT conducted multiple surveys in parts of the project  
10 area. These included surveys for gopher tortoise burrows, kestrel nest cavities, and caracara in  
11 2016. Those survey findings were incorporated into the data collection and analysis for this  
12 NRE.

13 On May 3, 2016 and June 21, 2016, biologists performed driving and walking surveys  
14 throughout the project area and abutting streets. They recorded visual observations of  
15 protected plant and animal species and their potential habitats, as well as other indicators of  
16 presence such as vocalizations, tracks, scat, and burrows. They also noted natural vegetative  
17 communities and dominant species in each stratum. All of the right-of-way in the project area  
18 abutting the WSCA, the South Prong Preserve, and other naturally vegetated areas were  
19 traversed on foot. The South Prong Preserve within the project area was also searched on foot,  
20 as was the Ansin Tract in the northeast quadrant of the intersection of C.R. 510 and C.R. 512.

21 An additional field investigation occurred on September 28, 2016 from approximately 10:00 AM  
22 until approximately 1:00 PM. This field investigation focused more specifically on documenting  
23 the wetlands, surface waters, and EFH in the project area. Field investigations were conducted  
24 during spring (May), summer (June) and fall (late September) in order to reveal a variety of  
25 seasonal and weather conditions. Photographs were taken of various habitat types, wetlands,  
26 and listed species observed during surveys. An FWC Authorized Gopher Tortoise Agent was  
27 present during these surveys. Field maps showing land use/land cover types, wetlands, and  
28 protected species occurrences from preliminary data sources were also available during field  
29 investigations. Field personnel compared the land cover/land use types reported by SJRWMD to  
30 field observations in order to highlight any recent changes in land use/land cover.

31 Beginning in January, 2017 nest surveys for Audubon's crested caracara (caracara) (*Polyborus*  
32 *plancus audubonii*) were performed at each of five survey stations along the project corridor.  
33 Surveys were conducted at each station every other week from January through April. These  
34 surveys were specifically targeting Audubon's crested caracara and attempting to locate any  
35 nests, if present.



## 6.0 PROTECTED SPECIES AND HABITAT

1  
2 The protected species addressed in this document are listed in **Table 6-1**. Federal and state  
3 listed plant and animal species with potential to occur in the project corridor were identified  
4 through coordination with US Fish and Wildlife Service (USFWS) and Florida Fish and Wildlife  
5 Conservation Commission (FWC) as well additional research and field investigations. The  
6 eastern diamondback rattlesnake (*Drymarchon corais couperi*) was included because in 2012  
7 the USFWS announced a 90-day finding in response to a petition to list the species. The USFWS  
8 has initiated a status review to determine if the eastern diamondback rattlesnake warrants  
9 listing under the ESA. Plants reported by USFWS (at <http://ecos.fws.gov/ipac/>) and by the  
10 Florida Department of Agriculture and Consumer Services (FDACS)  
11 ([http://www.freshfromflorida.com/Divisions-Offices/Plant-Industry/Bureaus-and-](http://www.freshfromflorida.com/Divisions-Offices/Plant-Industry/Bureaus-and-Services/Bureau-of-Entomology-Nematology-Plant-Pathology/Botany/Florida-s-Endangered-Plants)  
12 [Services/Bureau-of-Entomology-Nematology-Plant-Pathology/Botany/Florida-s-Endangered-](http://www.freshfromflorida.com/Divisions-Offices/Plant-Industry/Bureaus-and-Services/Bureau-of-Entomology-Nematology-Plant-Pathology/Botany/Florida-s-Endangered-Plants)  
13 [Plants](http://www.freshfromflorida.com/Divisions-Offices/Plant-Industry/Bureaus-and-Services/Bureau-of-Entomology-Nematology-Plant-Pathology/Botany/Florida-s-Endangered-Plants)) as potentially occurring in Indian River County were also considered for inclusion in this  
14 NRE, depending on range and habitat associations.

15 Known localities of protected species were identified using the Florida Natural Areas Inventory  
16 (FNAI) element occurrences database as well as additional USFWS and FWC databases and  
17 resources. Habitats were mapped primarily using SJRWMD land use data as well as USFWS NWI  
18 maps and other resources then verified in the field. Information on scrub-jays and gopher  
19 tortoise in the WSCA was provided by Indian River County.

20 The white ibis (*Eudocimus albus*), Florida mouse (*Podomys floridanus*), gopher frog (*Lithobates*  
21 *capito*), limpkin (*Aramus guarana*), and snowy egret (*Egretta thula*) were state-listed at the  
22 outset of this PD&E study; however, they were removed from the state list of threatened and  
23 endangered species in January, 2017 so they are not addressed in this NRE.

24 No potential habitat occurs in the project corridor for any state threatened or endangered plant  
25 species reported by FDACS to occur in Indian River County, so they are not included in this NRE.  
26 Fragrant prickly apple (*Cereus eriophorus* var. *fragrans*) and Lakela's mint (*Dicerandra*  
27 *immaculate*) were considered for inclusion because parts of Indian River County were in their  
28 former ranges and they were identified on <http://ecos.fws.gov/ipac/>. However, these species  
29 specialize in habitat types (Atlantic coastal ridges) and in habitat conditions that do not occur in  
30 the project corridor. Both species ranges are now greatly restricted. Extant fragrant prickly  
31 apple populations are only known from one soil type, St. Lucie Sand, which does not occur in  
32 the project area. Habitat typical of Fragrant prickly apple, early successional sand pine scrub,  
33 also does not occur in the project corridor. Lakela's mint is known only from coastal ridges with  
34 acidic soils, which do not occur in the project corridor. For these reasons, Fragrant prickly apple  
35 and Lakela's mint are not addressed further in this NRE.

36 Determinations of wood stork Suitable Foraging Habitat (SFH) follow the definitions described  
37 in the USFWS *Habitat Management Guidelines for the Wood Stork in the Southeast Region*  
38 (USFWS 1990) (**Appendix A**). Caracara nest surveys were performed as part of this PD&E study  
39 and potential nesting habitat was mapped within 1,500 meters (4,920 feet) of the project  
40 (**Figure 6-1**), in accordance with the methods described in *Survey Protocol for Finding Caracara*

41

1 **Table 6-1 Listed Species Potentially Occurring in Project Area**

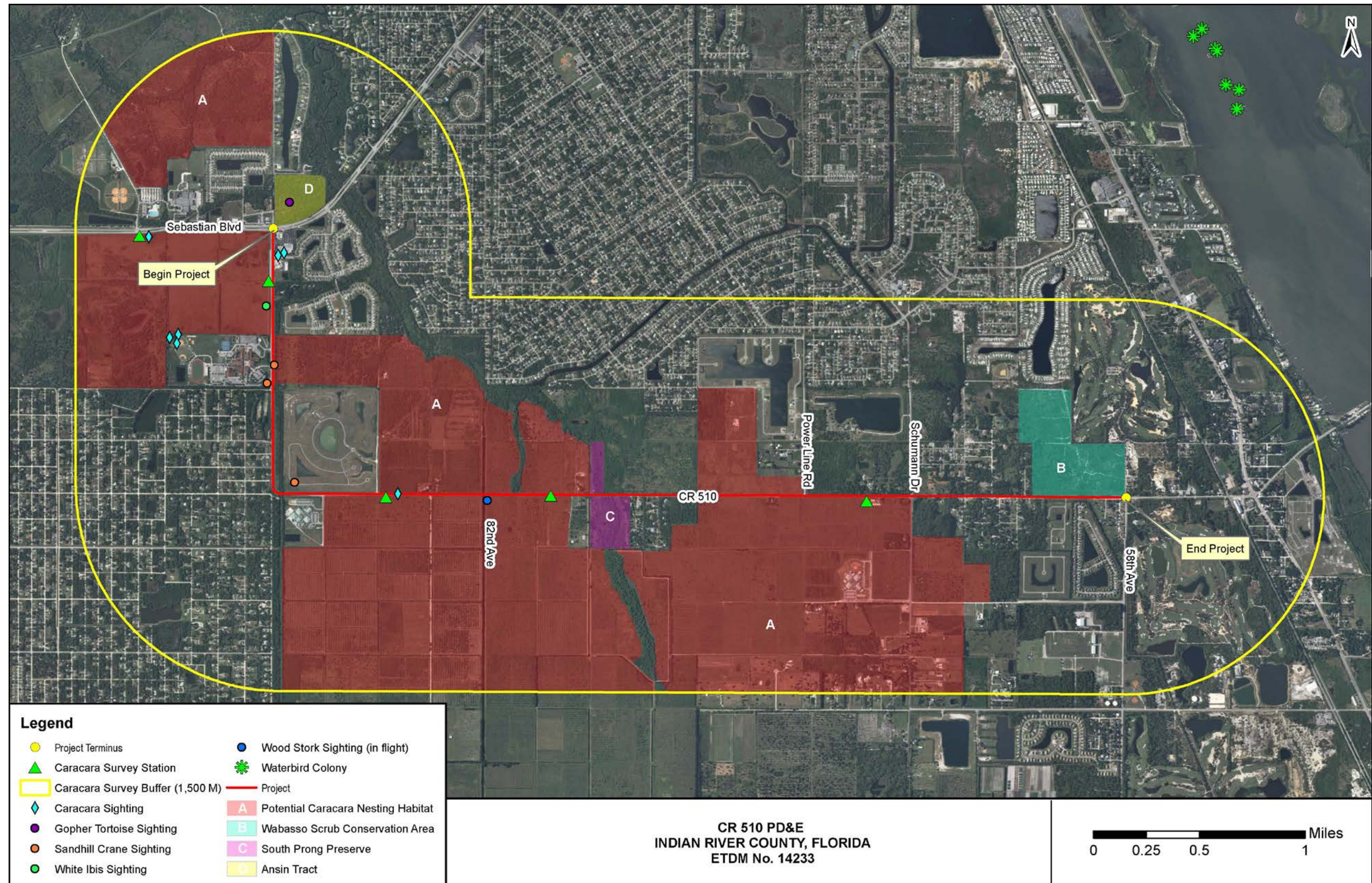
Common Name	Scientific Name	Federal Status	State Status	Observed During Surveys	Occurrence Potential in Project Area
Audubon's crested caracara	<i>Polyborus plancus audubonii</i>	FT	-	N	Documented presence
Burrowing owl	<i>Athene cunicularia</i>	-	ST	N	Low
Eastern indigo snake	<i>Drymarchon corais couperi</i>	FT	-	N	Medium
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>	FC	-	N	Medium
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	-	ST	N	Low
Florida sandhill crane	<i>Grus canadensis pratensis</i>	-	ST	Y	Documented presence
Florida scrub-jay	<i>Aphelocoma coerulescens</i>	FT	-	N	High
Gopher tortoise	<i>Gopherus polyphemus</i>	FC	ST	Y	Documented presence
Little blue heron	<i>Egretta caerulea</i>	-	ST	N	High
Roseate spoonbill	<i>Platalea ajaja</i>	-	ST	N	Low
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	-	SSC	N	Low
Southeastern American kestrel	<i>Falco sparverius paulus</i>	-	ST	N	High
Tricolored heron	<i>Egretta tricolor</i>	-	ST	N	High
Wood stork	<i>Mycteria americana</i>	FE	-	Y	High

2 Notes: PFL= Petitioned for Federal Listing, FE = Federally Endangered, FT = Federally Threatened, FC= Federal

3 Candidate, ST = State-Threatened, SSC = State Species of Special Concern, SC - Federal Species of Concern

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Figure 6-1 Sensitive Environmental Features



1 *Nests (USFWS 2004), Recommended Management Practices and Survey Protocols for Audubon's*  
2 *Crested Caracara (Caracara cheriway audubonii) in Florida (Morrison 2001), and USFWS Crested*  
3 *Caracara Survey Protocol – Additional Guidance (November 2015). Florida scrub-jay potential*  
4 *habitat was evaluated following descriptions in USFWS 2014d as well as the USFWS Scrub-Jay*  
5 *Survey Guidelines. The WSCA is managed for scrub-jays and their presence there has been*  
6 *documented annually for more than 10 years, so Florida scrub-jay specific surveys of the WSCA*  
7 *and adjacent area were not conducted and presence was assumed.*

8 According to the FWC Water Bird Locator, the nearest reported active waterbird colony (Colony  
9 616181) is approximately 1.9 miles north of the project corridor. The project is outside the 300-  
10 foot buffer FWC proposes as a standardized buffer around high priority wading bird nesting  
11 colonies (FWC 2013), so no impacts to waterbird colonies are anticipated. The nearest bald  
12 eagle (*Haliaeetus leucocephalus*) nest reported by the FWC online bald eagle nest locator tool is  
13 approximately 2.76 miles from the project corridor. USFWS and FWC generally do not require  
14 any special protective measures or monitoring if a bald eagle nest is further than 660 feet from  
15 a project.

16 Habitats are mapped by FLUCCS code in **Figures 4-1 and 4-2**, sensitive environmental feature  
17 and sightings of listed species are show in **Figure 6-1**. During field surveys of the project area  
18 two federally listed species, wood stork and caracara, and two state listed species, Florida  
19 sandhill crane (*Grus canadensis pratensis*) and gopher tortoise (*Gopherus polyphemus*), were  
20 observed in the project area. The gopher tortoise is also a candidate for federal listing.

## 21 **FEDERALLY PROTECTED SPECIES IN THE PROJECT AREA**

22 Below is a description of each species in **Table 6-1** along with pertinent aspects of their ecology,  
23 conservation, and potential habitat in the project area.

### 24 *Audubon's crested caracara (Threatened-Federal)*

25 Audubon's crested caracara is a non-migratory subspecies that occurs in Florida and is isolated  
26 from other crested caracara populations (USFWS 2014a) in the southwestern U.S., Mexico, and  
27 Central America. The project occurs within the USFWS consultation area for caracara.

28 Audubon's crested caracara range throughout central Florida and typically inhabited dry and  
29 wet prairies with scattered cabbage palms (*Sabal palmetto*). They are also known to inhabit  
30 lightly wooded areas as well as improved and unimproved pastures (USFWS 2014a). The typical  
31 breeding territory for caracara is generally considered to be all land within 5,000 feet of a nest  
32 tree. As shown in **Figure 6-1**, potential nesting habitat occurs throughout the project area on  
33 land mapped by SJRWMD as Improved Pastures (FLUCCS 2110), Woodland Pastures (FLUCCS  
34 2130), Citrus Groves (FLUCCS 2210), Other Open Land-Rural (FLUCCS 2600), Herbaceous Upland  
35 Nonforested (FLUCCS 3100), Freshwater Marsh (FLUCCS 6410), and Wet Prairies (FLUCCS 6430).  
36 Roads in the project area are a potential source of roadkill for caracaras.

37 Audubon's crested caracara nest in the winter and early spring, with peak nesting in January  
38 and February. They often feed on carrion and will forage on the ground for insects, turtles,



1 snakes, frogs, or fish. They occasionally eat larger animals like rabbits and cattle egrets and may  
2 perch on tall structures and scan for prey. Audubon's crested caracara are primarily threatened  
3 by habitat loss through urbanization and conversion to agriculture. Caracaras are drawn to  
4 roadkill and vehicle collisions are another threat (FWC 2015a). Because of a relatively small  
5 geographic range and small population size, a catastrophic event could cause significant  
6 declines in the population of Audubon's crested caracara. Previous nest surveys for Audubon's  
7 crested caracara conducted by FDOT in 2016 reported that two adults and a juvenile caracara  
8 were seen in Segments 1 and 2 of the project corridor, but no nest was located. Additional  
9 caracara nest surveys were conducted in 2017 as part of this PD&E study and a survey report is  
10 provided as **Appendix B**.

11 Caracara survey data from 2017 reveals clusters of sightings and flight tracks that appear to  
12 converge or depart from similar locations. Caracara sightings clustered around the Publix  
13 shopping center in the southeast corner of the intersection of C.R. 510 and C.R. 512. Caracaras  
14 were observed in this area on six different occasions and were regularly observed circling or  
15 perched on light posts in the parking lots of the Publix shopping center. On January 5, 2017, an  
16 adult and a juvenile caracara were observed at the dumpster behind the Papa Johns' Pizza,  
17 located just south of the Publix, at 9360 90<sup>th</sup> Avenue. These consistent observations suggest  
18 that area, where there is a Publix, a Papa John's Pizza, and other restaurants and stores, is  
19 regularly used for foraging by caracara. Potential nesting habitat for caracaras does not occur  
20 east of C.R. 510 and north of Sebastian River High School. The land is too densely forested or  
21 has been converted to residential and commercial uses. Potential nesting habitat does occur in  
22 pastures west of C.R. 510 and north and west of Sebastian River High School (**Figure 6-1**). These  
23 pastures are predominantly open and contain isolated cabbage palms, with denser vegetation  
24 along the fence lines and to the west of Sebastian River High School. During four of the six days  
25 in 2017 when caracaras were detected in Segment 1 there were flights beginning or ending in  
26 the vicinity of Sebastian River High School. Caracaras were repeatedly observed perched on the  
27 stadium lighting in the northwest portion of the school grounds. Multiple observations were  
28 made very early in the morning (before 0730) of a caracara flying from near the northwest  
29 corner of Sebastian River High School towards the Publix shopping center, and caracaras were  
30 repeatedly observed flying from the Publix shopping center towards the northwest corner of  
31 Sebastian River High School. On three different days, a caracara was observed flying along C.R.  
32 512, just west of the intersection with C.R. 510. On two of those occasions the caracara arrived  
33 from the south, the direction of Sebastian River High School.

34 No potential caracara habitat occurs west of C.R. 510 and south of Sebastian River High School  
35 because that land has been converted to residential use. The pastures north and west of  
36 Sebastian River High School appear to be relatively high quality potential nesting habitat. No  
37 caracaras were observed entering or exiting a potential nest tree or focusing on any specific  
38 group of trees. However, the repeated observations around the northwest corner of Sebastian  
39 River High School and the multiple flights between that area and the Publix shopping center  
40 suggest that a roost or a nest could occur nearby. Multiple potential nest trees occur in this  
41 area and direct observations of localized nesting behavior were difficult due to the distance  
42 from observation points and vegetation that obscured views.

1 On four occasions caracaras were observed from a survey station (CC3) just east of the 90-  
2 degree bend in C.R. 510, east of near Treasure Coast Elementary School. The majority of those  
3 sightings fall within what would be considered the breeding territory (5,000 feet) of a potential  
4 nest hypothetically located at the northwest corner of Sebastian River High School. Relatively  
5 high quality potential nesting habitat occurs south of C.R. 510 in this area, but there was no  
6 cluster of sightings in this area and the majority of flight tracks appear to be to or from the  
7 general direction of Sebastian River High School.

#### 8 *Eastern indigo snake (Threatened-Federal)*

9 Habitat loss is the primary threat to eastern indigo snakes and the most recent five-year status  
10 review of the species reported that populations are declining. In central, south central, and  
11 coastal Florida, the eastern indigo snake inhabits hammocks, coastal scrub, dry glades,  
12 palmetto flats, prairie, brushy riparian areas, canal corridors, and wet fields (Matthews and  
13 Moseley 1990, Tennant 1997, Ernst and Ernst 2003)..

14 Vegetated lands in the project area contain potential habitat for eastern indigo snakes including  
15 those mapped by SJRWMD as Improved Pastures (FLUCCS 2110), Woodland Pastures (FLUCCS  
16 2130), Citrus Groves (FLUCCS 2210), Other Open Lands-Rural (FLUCCS 2600), Herbaceous  
17 Upland Nonforested (FLUCCS 3100), Shrub and Brushland (FLUCCS 3200), Mixed Upland  
18 Nonforested (FLUCCS 3300), Pine Flatwoods (FLUCCS 4110), Upland Hardwood Forests (FLUCCS  
19 4200), Upland Mixed Coniferous Hardwood (FLUCCS 4340), Australian Pine (FLUCCS 4370),  
20 Streams and Waterways (FLUCCS 5100), Mixed Wetland Hardwoods (FLUCCS 6170), Freshwater  
21 Marshes (FLUCCS 6410), and Wet Prairies (FLUCCS 6430). No gopher tortoise burrows or other  
22 refugia that are occasionally inhabited by eastern indigo snakes were found in the project  
23 corridor; however, a gopher tortoise was sighted nearby on the Ansin tract during field surveys  
24 and gopher tortoise are known to occur on the WSCA. The nearest reported occurrence of an  
25 eastern indigo snake in the FNAI database is 2.8 miles to the east. The *Eastern Indigo Snake*  
26 *Programmatic Effect Determination Key* (USFWS 2013) was followed in evaluating potential  
27 impacts from the proposed project and the *USFWS Standard Protection Measures for the*  
28 *Eastern Indigo Snake (Appendix C)* will be implemented during construction to minimize  
29 impacts.

#### 30 *Florida scrub-jay (Threatened-Federal)*

31 Florida scrub-jays generally inhabit sandpine scrub, scrubby flatwoods, oak scrub, and coastal  
32 scrub habitats of peninsular Florida where the canopy is less than ten feet tall. These habitat  
33 types require well-drained sandy soils and occur along the coastlines, ridges, and dry portions  
34 of the central Florida peninsula (USFWS 2014d). Florida scrub-jay populations continue to show  
35 decreasing trends, predominantly due to habitat loss from development and habitat  
36 degradation through fire suppression (USFWS 2014d).

37 This project occurs in the USFWS consultation area for Florida scrub-jays and coordination  
38 occurred with the USFWS Vero Beach office and Indian River County during the development of  
39 this project. Florida scrub-jays are known to inhabit the WSCA and the entirety of the WSCA is  
40 considered occupied habitat. A portion of the WSCA was previously used for mitigation for



1 impacts to Florida scrub-jays. In addition to the WSCA, four small patches in the project area  
2 are mapped as Shrub and Brushland (FLUCCS 3200). One is south of C.R. 510, immediately east  
3 of 62 Avenue; however, this relatively small patch of habitat is dominated by pine trees and has  
4 a taller and more well developed tree canopy than typical scrub-jay habitat. Another area of  
5 Shrub and Brushland (FLUCCS 3200) is located approximately 350 feet south of C.R. 510,  
6 immediately east of 58 Avenue. This habitat forms a linear strip of shrubby vegetation  
7 stretching southwards beside 58 Avenue. Two patches of Shrub and Brushland (FLUCCS 3200)  
8 occur at the far eastern end of the project area, east of the project limits. While these five areas  
9 are smaller and are not managed to maintain habitat suitable for Florida scrub-jays, they could  
10 be potential dispersal corridors and their proximity to the WSCA increases the potential of  
11 occasional use by scrub-jays.

### 12 *Wood stork (Threatened-Federal)*

13 The main threat to wood storks stems from the loss, fragmentation, and modification of  
14 habitat, typically through urban encroachment and alterations of hydrology (USFWS 2014e).  
15 Wood stork population data suggest a decline in the area and quality of breeding and foraging  
16 habitats range wide. However, data from 1991 to 1995 suggest an increasing number of nests  
17 within the U.S. breeding range (USFWS 2014e).

18 Wood storks occur in a variety of wetland habitats, including freshwater marshes, stock ponds,  
19 shallow, seasonally flooded roadside and agricultural ditches, narrow tidal creeks, managed  
20 impoundments, and depressions in cypress heads and swamp sloughs. Because of their foraging  
21 method of wading and feeling for prey with their open bill, wood stork forage most effectively  
22 in shallow water with highly concentrated prey. High quality foraging conditions include  
23 relatively calm water with a depth of 5 to 15 inches lacking dense vegetation. Wood storks form  
24 nesting colonies that are typically located in medium to tall trees that are isolated and  
25 protected by open water so that human disturbance and exposure to land-based predators is  
26 minimized.

27 For this region of Florida, the USFWS has defined a wood stork Core Foraging Area (CFA) as  
28 being within 18.6 miles of a wood stork nesting colony. The project occurs within the CFA of the  
29 Wabasso, Pelican Island, Micco North, Micco South, Grange Island and Grant Farm Island wood  
30 stork nesting colonies. The Wabasso colony is approximately 2.11 miles, the Pelican Island  
31 colony is approximately 3.45 miles, the Micco North colony is approximately 9.3 miles, the  
32 Micco South colony is approximately 8.68 miles, the Grange Island is approximately 8.69 miles  
33 and the Grant Farm Island colony is 10.36 miles from the project corridor. No other colonies  
34 listed in the USFWS wood stork nesting colonies map data are within 18.6 miles of the project.  
35 The USFWS *Wood Stork Effect Determination Key* (**Appendix A**) was used to evaluate the  
36 potential effects of the project on wood storks.

37 During field surveys a wood stork was observed flying over the project and SFH occurs  
38 throughout the project area. Wood stork SFH includes areas mapped by SJRWMD as Streams  
39 and Waterways (FLUCCS 5100), Reservoirs (FLUCCS 5300), Mixed Wetland Hardwoods (FLUCCS  
40 6170), Freshwater Marshes (FLUCCS 6410), Wet Prairies (FLUCCS 6430), and Surface Water

1 Collection Basins (FLUCCS 8370). Some roadside swales and ditches in the project area as well  
2 as furrows in agricultural fields contain SFH for wood storks. However, the majority of swales  
3 are extremely shallow, dry, and do not appear to regularly hold water that allows for foraging  
4 by wood storks. The canals generally have steep banks that limit the area available to foraging  
5 by wood storks. Segment 1 borders a canal and the small swales next to C.R. 510 lack any  
6 wetland vegetation and do not appear to hold water, so they are not considered SFH. The  
7 swales closest to the canal in Segment 2 appear to periodically hold water and are potential  
8 SFH; however, these swales would not be impacted by the recommended alternative. In  
9 segment 3, particularly east of the South Prong Slough, the roadside swales are deeper and  
10 form SFH in multiple locations. Approximately 7,300 square feet of wood stork SFH occurs in  
11 swales in segment 3. Approximately 4,000 square feet of SFH occurs in roadside swales in  
12 segment 4.

### 13 **STATE PROTECTED SPECIES IN THE PROJECT AREA**

#### 14 *Burrowing owl (Threatened-Florida)*

15 The Florida burrowing owl occurs throughout the state, although it is patchily distributed. Some  
16 human activities, such as land clearing and draining of wetlands, have increased their range in  
17 Florida but have exposed owls to additional threats. They traditionally inhabited native prairies  
18 and now can be found in pastures, agricultural fields, golf courses, airports, and vacant lots. Any  
19 open land within the project area could be potential habitat; however, burrowing owl colonies  
20 are typically conspicuous and well documented and no burrowing owls were identified in the  
21 project area during records research or field surveys.

#### 22 *Florida pine snake (Threatened-Florida)*

23 Florida pine snakes range from South Carolina west to Mobile Bay and south through Florida,  
24 excluding the Everglades. Florida pine snakes inhabit areas with a moderate to open tree  
25 canopy and well-drained, sandy soils, which can include scrub habitat or longleaf pine  
26 communities (FWC 2014b). Florida pine snakes chief threat is habitat loss and fragmentation  
27 resulting from urbanization, timber management practices, mining, and road construction. The  
28 suppression of fire also threatens Florida pine snakes by allowing encroachment of hardwoods  
29 (FWC 2014b). The most recent Biological Status Review of Florida Pine Snake is from 2011 and  
30 predicts a continued population decline.

31 Potential habitat for Florida pine snakes occurs throughout vegetated portions of the project  
32 area with the exception of Streams and Waterways (FLUCCS 5100), Reservoirs (FLUCCS 5300),  
33 Mixed Wetland Hardwoods (FLUCCS 6170), Freshwater Marshes (FLUCCS 6410), Wet Prairies  
34 (FLUCCS 6430) and Surface Water Collection Basins (FLUCCS 8370). No Florida pine snakes were  
35 detected during field surveys.

#### 36 *Florida sandhill crane (Threatened-Florida)*

37 Florida sandhill cranes, a subspecies of sandhill crane, have a range that includes Florida and as  
38 far north as the Okefenokee Swamp in Georgia. Florida sandhill cranes are non-migratory and



1 usually nest over freshwater ponds and marshes, where they typically lay two eggs. Young  
2 Florida sandhill cranes are able to leave the nest within 24 hours of hatching and become  
3 independent after ten months (Nesbitt 1996). Florida sandhill cranes inhabit freshwater  
4 marshes, prairies, and pastures throughout the state. The drainage of wetlands and conversion  
5 of prairies to agriculture are the primary threats to Florida sandhill cranes. Their former range  
6 included parts of coastal Texas, Alabama, and Louisiana, but habitat loss and overhunting  
7 greatly diminished the populations in the 20<sup>th</sup> century and their range shrank to its current area  
8 (FWC 2015c). The most recent Biological Status Review of Florida Sandhill Cranes, from 2011,  
9 indicates continuing population declines from 1974 to 2003.

10 Potential foraging habitat for Florida sandhill cranes occurs throughout the project area in  
11 shallow waters, wetlands, and in uplands that are clear of dense vegetation. These uplands may  
12 include abandoned citrus crops, improved pastures, manicured lawns and maintained  
13 roadsides. Sandhill cranes with young chicks were observed foraging in the project area on the  
14 grounds of Sebastian River High School during field surveys.

15 *Gopher tortoise (Threatened- Florida, Candidate-Federal)*

16 Gopher tortoise range from south-central Florida, north into Georgia, southern South Carolina,  
17 west through Mississippi, and into part of eastern Louisiana (FWC 2007). Gopher tortoises live  
18 in areas with well drained, sandy soils and a sparse tree canopy that allows sunlight to reach  
19 the ground and support abundant herbaceous vegetation. They are commonly found in  
20 sandhill, pine flatwoods, scrub, scrubby flatwoods, dry prairies, xeric hammock, pine-mixed  
21 hardwoods, and coastal dunes. In habitats where fire is suppressed, encroachment of woody  
22 vegetation makes it more difficult for gopher tortoises to move around and restricts the low  
23 growing plants that they eat. Gopher tortoises excavate burrows which offer a refuge from fire,  
24 extreme temperatures, and predators. These burrows are often co-inhabited by other species,  
25 which has caused the gopher tortoise to be considered a keystone species in some Florida  
26 ecosystems.

27 The primary threat to gopher tortoises is habitat loss, degradation, and fragmentation.  
28 Urbanization, agriculture, and mining have all caused habitat loss, and suppression of fire and  
29 silviculture methods that allow a closed canopy have reduced habitat quality in some forests.  
30 Gopher tortoises were once threatened due to overcollecting by humans and mortality from  
31 pets and other predators is a continuing problem. The most recent Biological Status Report,  
32 from 2006, cites a population size reduction in Florida of 50-60 percent in the past 60 to 93  
33 years and notes that increasing habitat fragmentation and destruction will affect the long-term  
34 viability of remaining populations.

35 Potential gopher tortoise habitat occurs throughout vegetated portions of the project area with  
36 the exception of areas mapped as Streams and Waterways (FLUCCS 5100), Reservoirs (FLUCCS  
37 5300), Mixed Wetland Hardwoods (FLUCCS 6170), Freshwater Marshes (FLUCCS 6410), Wet  
38 Prairies (FLUCCS 6430) and Surface Water Collection Basins (FLUCCS 8370). During field surveys  
39 on June 21, 2016, an adult gopher tortoise was sighted approximately 600 feet northeast of the  
40 intersection of C.R. 510 and C.R. 512, on the Ansin Tract. Gopher tortoise are also known to

1 inhabit the WSCA. An authorized gopher tortoise agent traversed all the naturally vegetated  
2 portions of the project corridor on foot and did not detect any additional signs of gopher  
3 tortoises.

4 *Little blue heron (Threatened-Florida)*

5 Little blue herons occur along the entire eastern and Gulf coasts of the U.S. as well as  
6 throughout the Mississippi River Valley, southern California, and into central and South  
7 America. The threats to little blue heron are poorly understood (FWC 2015f) but likely include  
8 coastal development, disturbance at foraging and breeding sites, environmental issues,  
9 degradation of feeding habitat, reduced prey availability, and predators. Other threats may  
10 include exposure to pesticides, toxins, and infection by parasites (FWC 2015f, Rodgers et al.  
11 1996). According to the Biological Status Report published in 2011, little blue heron populations  
12 increased gradually throughout the 20<sup>th</sup> Century until the 1990's, when a slow but steady  
13 decline was observed.

14 Little blue herons inhabit a variety of aquatic environments including fresh, salt, and brackish  
15 water systems like swamps, estuaries, ponds, lakes, and rivers (Rodgers et al. 1996). Their nests  
16 are typically built in trees and shrubs on islands, emergent vegetation, or in dense thickets near  
17 water. Potential foraging habitat in the project area occurs in areas mapped by SJRWMD as  
18 Streams and Waterways (FLUCCS 5100), Reservoirs (FLUCCS 5300), Mixed Wetland Hardwoods  
19 (FLUCCS 6170), Freshwater Marshes (FLUCCS 6410), Wet Prairies (FLUCCS 6430), and Surface  
20 Water Collection Basins (FLUCCS 8370). The project area does not contain habitat typical of  
21 nesting little blue herons because it lacks expanses of open water or concealing vegetation that  
22 shield nesting areas from disturbance.

23 *Roseate spoonbill (Species of Special Concern-Florida)*

24 Roseate spoonbills can be found in coastal areas of Central America, the Caribbean, and the  
25 Gulf of Mexico as well as South America east of the Andes Mountains. Nesting habitats include  
26 coastal mangroves and dredge spoil islands and they often nest near other wading bird species  
27 (FNAI 2001). The primary historical threat to roseate spoonbills was hunting for their feathers;  
28 however, this practice was prohibited, allowing populations to rebound (FWC 2015g). Current  
29 threats include reduced prey availability and general habitat degradation or loss, pesticide  
30 exposure, and illegal shooting.

31 The project corridor does not contain flats, tidal areas, or large expanses of shallow water  
32 typical of potential foraging habitat, but low quality potential habitat in the project area occurs  
33 in locations mapped by SJRWMD as Streams and Waterways (FLUCCS 5100), Reservoirs (FLUCCS  
34 5300), Freshwater Marshes (FLUCCS 6410), and Surface Water Collection Basins (FLUCCS 8370).  
35 The project area lacks potential nesting areas that offer the seclusion and protection from  
36 predators by open water that is typical of nesting habitat.

37

38



1 *Sherman's fox squirrel (Species of Special Concern-Florida)*

2 Sherman's fox squirrels (*Sciurus niger shermani*) inhabit open, fire-maintained woodlands and  
3 the population ranges from peninsular Florida, north to central Georgia, and west to the  
4 Apalachicola River. Their diet is primarily composed of longleaf pine seeds and/or turkey oak  
5 acorns, but they are also known to eat fungi, fruit, and plant buds (FWC 2014f). Destruction of  
6 fire-maintained woodland habitat is the primary threat to Sherman's fox squirrels. Today an  
7 estimated 10-20% of the original Sherman's fox squirrel habitat remains (FWC 2014f).  
8 Improper burning and inappropriate silviculture techniques may make remaining forest less  
9 suited to supporting Sherman's fox squirrels, and collisions with vehicles are a threat.

10 Potential habitat occurs in areas mapped as Pine Flatwoods (FLUCCS 4110), Upland Hardwood  
11 Forest (FLUCCS 4200), and Upland Mixed Coniferous/Hardwood (FLUCCS 4340) in the project  
12 area; however, due to a lack of fire maintaining open conditions these habitats are of relatively  
13 low quality. The WSCA regularly maintains and thins vegetation and contains some wooded  
14 areas with higher quality potential habitat. No Sherman's fox squirrels were detected during  
15 field surveys.

16 *Southeastern American kestrel (Threatened-Florida)*

17 The southeastern American kestrel is a non-migratory subspecies that can be found throughout  
18 Florida, as well as the coastal plains of Louisiana, Georgia, and South Carolina. A northern  
19 subspecies of American kestrel, *Falco sparverius*, also occurs in Florida but is migratory. Any  
20 American kestrel seen in Florida in May or June is assumed to be a Southeastern American  
21 kestrel (FWC 2014d).

22 In Florida, southeastern American kestrels inhabit open woodlands, sandhill, fire maintained  
23 savannah pine forests, as well as pastures and open fields near residential areas. They primarily  
24 nest in dead trees using cavities that they do not construct themselves (FWC 2014d). The  
25 primary threat to Southeastern American kestrels is loss of nesting and foraging habitat. Habitat  
26 is lost primarily through development of residential areas and farmland, removal of trees in  
27 agricultural fields, and through the suppression of fire that maintains open pine habitats.  
28 Southeastern American kestrels are also vulnerable to pollutants, predation, collision with  
29 vehicles and aircraft, and the West Nile Virus (FWC 2014d). According to the Biological Status  
30 Review published in 2011, Southeastern American kestrels have been experiencing significant  
31 population declines that appears to be ongoing.

32 Potential foraging habitat occurs throughout the project area and potential nesting habitat  
33 occurs in trees in the project area. No nest cavities were detected during field surveys, but a  
34 survey specifically for potential nesting cavities in trees was not performed as part of this PD&E  
35 study.

36 *Tricolored heron (Threatened-Florida)*

37 Tricolored herons range from Massachusetts south throughout the Gulf coast, and as far south  
38 as northern Brazil. They also inhabit the Pacific coast from Baja California to Ecuador. Nests are

1 typically found on protected islands or in trees overhanging water. Tricolored herons are  
2 permanent residents in Florida and are most common in south and central Florida regions.  
3 According to the Biological Status Review published in 2011, tricolored heron population trends  
4 are difficult to detect because of high variability between survey years, though a significant  
5 decline was documented across the 1970's and 1980's.

6 The major threat facing tricolored heron populations is loss of habitat through development  
7 and draining of wetlands. Other threats include pesticides and pollutants (Rogers 1997,  
8 Spalding et al. 1997), alterations to the hydrology of foraging areas, reduced prey abundance,  
9 and oil spill impacts to critical breeding, foraging, and roosting sites (FWC 2015i). Potential  
10 foraging habitat for tricolored herons in the project area occurs in areas mapped by SJRWMD as  
11 Streams and Waterways (FLUCCS 5100), Reservoirs (FLUCCS 5300), Mixed Wetland Hardwoods  
12 (FLUCCS 6170), Freshwater Marshes (FLUCCS 6410), Wet Prairies (FLUCCS 6430), and Surface  
13 Water Collection Basins (FLUCCS 8370). The project corridor lacks the vegetation protected by  
14 water typical of nesting habitat. No tri-colored herons were detected during field surveys.

### 15 **CRITICAL HABITAT, CONSULTATION AREAS AND CONSERVATION LANDS**

16 The USFWS Critical Habitat Portal was used to locate designated Critical Habitat and assess  
17 potential impacts from the project. No designated Critical Habitat occurs in or adjacent to the  
18 project area, so no impacts to critical habitat are anticipated. The nearest designated Critical  
19 Habitat is for the West Indian manatee (*Trichechus manatus*) and occurs in coastal waters  
20 approximately 1.5 miles east of the project corridor.

21 The project is within the USFWS consultation areas for caracara, red-cockaded woodpecker  
22 (*Leuconotopicus borealis*), piping plover (*Charadrius melodus*), Florida scrub-jay, and West  
23 Indian manatee. It is also within the CFAs of six wood stork colonies. Caracara, scrub-jay, and  
24 wood stork are addressed in this document. No potential habitat occurs in the project area for  
25 red-cockaded woodpecker, piping plover, or West Indian Manatee.

26 Three areas of conservation lands are contiguous with the project corridor and are shown in  
27 **Figure 6-1**. The parcel in the northeast quadrant of the intersection of C.R. 510 and C.R. 512,  
28 known as the Ansin Tract, is owned by Indian River County and is protected for conservation  
29 and recreation. The South Prong Preserve, in the middle of the project, is owned by Indian River  
30 County and is part of a larger network of greenways and trails that protects riparian habitats  
31 and provides outdoor recreation. The WSCA, at the eastern end of the project, is also owned by  
32 Indian River County. Portions of the WSCA were previously used for mitigation for unavoidable  
33 impacts to scrub-jay habitat during the expansion of C.R. 512. The remainder of the WSCA is  
34 part of the Sebastian Area Wide Scrub-Jay Habitat Conservation Plan (SHCP). The land manager  
35 at the WSCA, Beth Powell, reported that scrub-jays and gopher tortoises have been observed  
36 throughout the portions of the WSCA that abut C.R. 510.

### 37 **POTENTIAL IMPACTS TO PROTECTED SPECIES AND HABITATS**

38 The "No-Build" and TSM&O Alternatives would have no significant impacts on listed species or  
39 habitats; however, the "No-Build" and TSM&O alternatives would not address the needs of the



1 proposed project. Additionally, the “No-Build” and TSM&O Alternatives would not realize the  
2 potential benefits of replacing the culvert at the south prong of the Saint Sebastian River with a  
3 bridge. Replacement of the culvert is anticipated to remove a barrier to migration of fish,  
4 invertebrates, and other wildlife and restore the site to more natural conditions and flow  
5 regimes.

6 The extent of potential impacts was assessed by overlaying habitat types (as mapped by  
7 SJRWMD and compared with USFWS NWI maps and field investigations) and wood stork SFH  
8 with the recommended alternative and pond sites. Typical sections for the recommended  
9 alternative along with illustrations and an aerial view of the roadway are provided in Section  
10 3.0.

### 11 **Direct Impacts to Protected Species and Habitats**

12 The extent of anticipated direct impacts to jurisdictional wetlands, open water bodies  
13 (Streams/Waterways [FLUCCS 5100] and Reservoirs [FLUCCS 5300]), wood stork SFH, and  
14 upland habitats are summarized in **Table 6-2**. Upland habitats include areas mapped as  
15 Improved Pastures (FLUCCS 2110), Woodland Pasture (FLUCCS 2130), Citrus Groves (FLUCCS  
16 2210), Ornamentals (FLUCCS 2430), Other Open Land-Rural (FLUCCS 2600), Herbaceous Upland  
17 Non-Forested (FLUCCS 3100), Shrub and Brushland (FLUCCS 3200), Mixed Upland Non-Forested  
18 (FLUCCS 3300), Pine Flatwoods (FLUCCS 4110), Upland Hardwood Forest (FLUCCS 4200), Upland  
19 Mixed Coniferous/Hardwood (FLUCCS 4340), and Australian Pine (FLUCCS 4370). Acreages of  
20 direct impacts are presented by FLUCCS code in **Table 6-3** for the recommended alternative and  
21 **Table 6-4** for drainage ponds.

22

### 23 **Indirect Impacts to Protected Species and Habitats**

24 Indirect Impacts are those impacts that are linked and causally related to the proposed project  
25 and may be temporary or permanent. For transportation projects, indirect impacts typically  
26 include disturbance to areas adjacent to the project area. These impacts include the short-term  
27 impacts associated with road construction activities as well as other long-term impacts due to  
28 the proximity of the roadway to wildlife habitat.

29 Potential short-term indirect impacts for the recommended alternative could result from the  
30 use of heavy equipment, the staging or stockpiling of equipment and materials, and  
31 sedimentation resulting from increased erosion associated with soil disturbance. BMPs typically  
32 associated with road construction projects will be implemented and maintained throughout all  
33 construction activities to minimize indirect impacts. Temporary indirect impacts to protected  
34 species are possible due to disturbance during construction. Most protected species that may  
35 occur in the project corridor, such as wood storks or caracara, are highly mobile and are  
36 anticipated to readily relocate to adjacent habitats. A gopher tortoise burrow survey will be

37

1

**Table 6-2 Alternatives Evaluation Matrix**

<b>Alternative</b>	<b>Direct Impacts to Jurisdictional Wetlands (Acres)</b>	<b>Direct Impacts to Stream/Waterways and Reservoirs (Acres)</b>	<b>Direct Impacts to Wood Stork SFH (Acres)</b>	<b>Direct Impacts to Upland Habitats (Acres)</b>
No Build	-	-	-	-
TSM&O	-	-	-	-
Recommended Alternative	0.65	0.54	2.983	23.08
Pond 2-1	-	-	-	2.55
Pond 2-2	-	-	-	2.53
Pond 5-3	-	-	-	2.58
Pond 5-4	-	-	0.0000229	2.65
Pond 6-1	-	-	0.0000229	2.55
Pond 6-2	-	-	0.0000229	2.63
Pond 7-1	-	-	-	2.53
Pond 7-4	-	-	-	2.83
Pond 8-1	-	-	-	4.56
Pond 8-2	-	-	-	4.7
Pond 9-2	-	-	-	2.53
Pond 9-3	-	-	-	2.5
Pond 10-1	-	-	-	1.71
Pond 10-3	-	-	-	-

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**Table 6-3 Recommended Alignment Direct Impacts by FLUCCS Code**

<b>Land Use/Land Cover</b>	<b>FLUCCS CODE</b>	<b>Impacts Under Recommended Alternative (Acres)</b>
Residential, Low Density	1100	2.57
Residential Rural	1180	1.10
Low Density Under Construction	1190	1.78
Residential, Medium Density	1200	4.62
High Density Under Construction	1390	0.42
Commercial and Services	1400	0.15
Institutional	1700	0.57
Improved Pastures	2110	0.47
Woodland Pasture	2130	1.05
Citrus Groves	2210	15.55
Ornamentals	2430	0.35
Other Open Land- Rural	2600	3.03
Herbaceous Upland Non-Forested	3100	0.29
Shrub and Brushland	3200	0.06
Pine Flatwoods	4110	0.08
Upland Hardwood Forest	4200	1.00
Upland Mixed Coniferous/Hardwood	4340	1.2
Streams and Waterways	5100	0.14
Reservoirs	5300	0.40
Mixed Wetland Hardwoods	6170	0.65
	<b>TOTAL</b>	<b>35.48 acres</b>

1

**Table 6-4 Potential Pond Impacts by FLUCCS Code**

<b>Pond Name</b>	<b>Impacted Land Use Type</b>	<b>Acres of Impact</b>
2-1	2110: Improved Pasture	2.55
2-2	2110: Improved Pasture	2.53
5-3	2210: Citrus Groves	2.58
5-4	2210: Citrus Groves	2.65
6-1	2210: Citrus Groves	2.55
6-2	2210: Citrus Groves	2.63
7-1	2600: Other Open Lands – Rural	2.53
7-4	2210: Citrus Groves	2.83
8-1	2210: Citrus Groves	4.56
	1100: Residential, Low Density	0.14
8-2	2210: Citrus Groves	4.70
9-2	4340: Upland Mixed Hardwood	2.53
9-3	4340: Upland Mixed Hardwood	1.97
	4370: Australian Pine	0.53
10-1	1200: Residential, Medium Density	0.21
	3200: Shrub and Brushland	1.17
	4110: Pine Flatwoods	0.54
10-3	1200: Residential, Medium Density	0.90

2



1 performed prior to construction activities; therefore, the potential for short-term indirect  
2 impacts to protected species from construction is anticipated to be minimal.

3 Potential long term indirect impacts to protected species could result from increased noise and  
4 traffic from C.R. 510. The most sensitive area to noise and traffic impacts is likely the WSCA. On  
5 CR 510 in front of the WSCA the recommended alternative would result in a projected 8.3  
6 percent increase in AADT in 2020 and a 23.5 percent increase in AADT in 2040. Traffic and noise  
7 levels from such a small increase in AADTs are not anticipated to substantially impact the  
8 WSCA. Indirect impacts from the increased chance for vehicle strikes on Florida scrub-jays are  
9 anticipated to be minor and are being coordinated with USFWS.

10 Another indirect impact is the potential for increased movement of wildlife upstream of the  
11 culverts under C.R. 510 in the south prong of the Saint Sebastian River. The replacement of that  
12 culvert under C.R. 510 with a bridge would result in a potential positive impact for wetland and  
13 wildlife species by removing a barrier and restoring the site to more natural conditions and flow  
14 regimes.

15 Secondary Impacts are those that may result separately, but in direct response to the project.  
16 An example of a secondary impact would be development on vacant land that is spurred by  
17 improvements to an adjacent roadway. Future land use plans for the area are described in the  
18 Indian River County 2030 Comprehensive Plan and the LRTP, which describes the project area  
19 as having similar land uses compared to its current condition. The future local and regional  
20 traffic demand that is generating the need for this roadway is anticipated regardless of these  
21 roadway improvements, not as a result of the project, and no significant secondary impacts are  
22 anticipated as a result of the proposed project. A future land use map that was taken from the  
23 Indian River County 2030 Comprehensive Plan is provided as **Figure 6-2**.



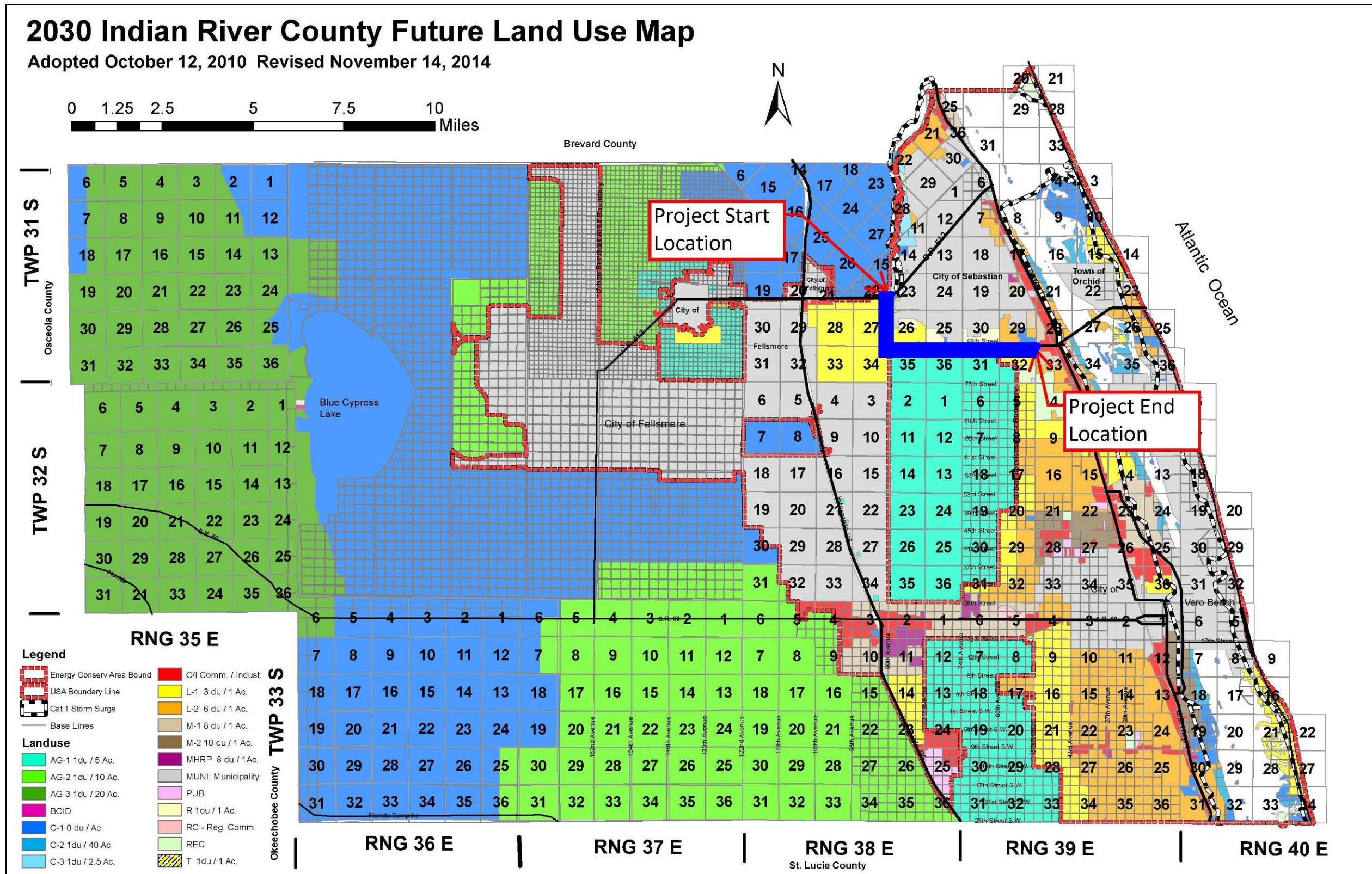


Figure 6-2 Future Land Use



## 1 **Cumulative Impacts to Protected Species and Habitats**

2 A “cumulative impact”, according to the definition in the Council of Environmental Quality  
3 Regulations (40 CFR 1508.7), is “the impact on the environment, which results from the  
4 incremental impacts of the action when added to other past, present and reasonably  
5 foreseeable future actions regardless of what agency (federal or non-federal) or person  
6 undertakes such other actions.” Under the recommended alternative, 23.08 acres of direct  
7 impacts to upland habitats are anticipated. The majority of these upland areas were previously  
8 disturbed, none contain critical habitat for listed species, and no adverse impacts to listed  
9 species are anticipated as a result of the project. BMPs will be implemented to reduce potential  
10 cumulative impacts from construction, runoff, and sedimentation. Mitigation will be provided  
11 for impacts to wood stork SFH, as applicable. The recommended alternative also produces  
12 potential improvements to the baseline conditions by replacing a culvert at the south prong of  
13 the Saint Sebastian River with a bridge. Therefore, if future roadway improvement projects  
14 within the region result in similar levels of disturbance to protected species and their habitats,  
15 no significant cumulative impacts would be anticipated.

## 16 **Avoidance, Minimization, and Mitigation**

17 Impacts to protected species and habitats were sequentially avoided and then minimized by  
18 following the existing C.R. 510 right-of-way as much as possible and by limiting the width of  
19 right-of-way in sensitive areas, such as the WSCA. Impacts to protected species and habitats will  
20 also be minimized by replacing the culverts at the south prong of the Saint Sebastian River with  
21 a bridge. The bridge is anticipated to facilitate movement of water and wildlife and create more  
22 natural conditions that will be an improvement over existing conditions. Additional  
23 minimization measures, which may include reductions in the typical section, use of retaining  
24 walls to minimize roadway embankments and similar measures will be considered during the  
25 project design phase. FDOT *Standards Specifications for Road and Bridge Construction* will be  
26 implemented to further minimize impacts. USFWS Standard Protection Measures for the  
27 eastern indigo snake will be observed during all construction activities. Because at least part of  
28 the project area drains into an OFW, the Indian River Lagoon, the stormwater management  
29 system is being planned to achieve 50 percent greater treatment of water than under standard  
30 specifications, reducing impacts to downstream habitats. Unavoidable impacts to wood stork  
31 SFH will also be mitigated following USFWS protocols.

32

## 33 **Potential Impacts to Federally Protected Species**

### 34 *Audubon’s Crested Caracara*

35 A report containing survey data and analysis from caracara nest surveys is provided as  
36 **Appendix B**. During both 2016 and 2017 caracaras were observed in Segments 1 and 2 and  
37 sightings clustered around the Publix shopping center (in the southeast corner of the  
38 intersection of C.R. 510 and C.R. 512) as well as around the northwest corner of Sebastian River  
39 High School. No caracara nests were located during surveys following USFWS protocols in 2017  
40 or during surveys conducted by FDOT in 2016. Caracara nests can be extremely cryptic and  
41 difficult to detect and caracaras are not always visible as they approach the nest because they

1 may fly low or behind concealing vegetation before landing in the nest tree. If a nest is present  
2 in the survey area but was undetected, it would most likely be in an area where sightings of  
3 caracara clustered, and where flight tracks appeared to converge. There is no potential nesting  
4 habitat at the Publix shopping center where sightings of caracara clustered. However, high  
5 quality nesting habitat occurs in the pastures immediately north and west of Sebastian River  
6 High School and sightings clustered in that area and flight tracks suggested it was the begin or  
7 end point of multiple observed flights in 2016 and 2017.

8  
9 If a nest did occur near the northwest corner of Sebastian River High School, direct impacts  
10 from the proposed project would be outside the core nesting territory (greater than 985 feet  
11 from the nest). The breeding territory of a caracara is assumed to encompass all land within  
12 5,000 feet of a nest tree. Under the recommended alternative, direct impacts to the potential  
13 breeding territory would result from the conversion of unpaved land to pavement. Under the  
14 recommended alternative approximately 8.93 previously unpaved acres within the potential  
15 breeding territory would be paved. That represents approximately 0.00495 percent of the  
16 potential breeding territory. Because no caracara nests were detected in two years of surveys,  
17 because direct impacts to the most likely potential core nesting territory are not anticipated,  
18 and because impacts to the potential breeding territory would be in previously disturbed areas  
19 and would be to such a small proportion of the potential territory and available foraging  
20 habitat, a determination of **may affect, not likely to adversely affect** is made for this species.

#### 21 *Eastern Diamondback Rattlesnake*

22  
23 The eastern diamondback rattlesnake has been petitioned for Federal listing and could be  
24 placed on the endangered species list during design or construction of this project. No eastern  
25 diamondback rattlesnakes were detected during field surveys. The majority of upland habitats  
26 in the project area are of relatively low quality due to previous disturbance and fragmentation;  
27 however, the Ansin Tract, the South Prong Preserve, and the WSCA contain high quality habitat.  
28 Impacts to these habitats were avoided and minimized as much as practicable. Additional  
29 habitats are available that are contiguous with the areas that would be impacted by the  
30 recommended alternative. For these reasons, if the eastern diamondback rattlesnake were to  
31 be listed in the future, a determination of **may affect, not likely to adversely affect** would be  
32 anticipated.

#### 33 *Eastern Indigo Snake*

34  
35 To assess potential impacts from the project on eastern indigo snakes, the *USFWS Eastern*  
36 *Indigo Snake Programmatic Effect Determination Key* (USFWS 2013) was followed. Impacts to  
37 potential habitat would occur in disturbed areas that are either adjacent to a roadway or canal  
38 or were previously cleared and graded for residential or agricultural use. The *USFWS Standard*  
39 *Protection Measures for the Eastern Indigo Snake* will be implemented during site preparation  
40 and construction and any gopher tortoise burrows or other refugia will be cleared of eastern  
41 indigo snakes prior to construction. Because direct impacts would be to a relatively small  
42 amount of available potential habitat, because the impacts would be adjacent to a previously  
43 impacted road corridor, and because protection measures will be implemented, a  
44 determination of **may affect, not likely to adversely affect** was made for this species.



1 *Florida Scrub-Jay*

2 Florida scrub-jays are known to occur throughout the WSCA. Under the recommended  
3 alternative, direct impacts to the WSCA will be avoided by expanding the right-of-way on the  
4 south side of C.R. 510, away from the WSCA. No scrub habitat would be directly impacted by  
5 the proposed project. Potential indirect impacts to Florida scrub-jays could occur from an  
6 increased chance of vehicle strikes on C.R. 510. Under the recommended alternative, the C.R.  
7 510 right-of-way would be expanded from 80 feet to 104 and there would be two additional  
8 vehicle lanes. Traffic levels on C.R. 510 adjacent to the WSCA were projected for the no build  
9 and recommended alternative for the design year, 2020, as well as for 2040 (**Table 6-5**).

10  
11 **Table 6-5 C.R. 510 Traffic Levels from 66 Avenue to 58 Avenue**

12

Alternative	AADT 2020	AADT 2040
No Build	12,000	17,590
Recommended Alternative	13,000	21,578
Percent Change	8%	23%

13  
14 The recommended alternative would result in a projected 8 percent increase in AADT in 2020  
15 and a 23 percent increase in AADT in 2040. Minimization and mitigation measures are being  
16 developed through consultation with USFWS. Because no scrub habitat would be directly  
17 impacted and through implementation of minimization/mitigation measures, a determination  
18 of **may affect, not likely to adversely affect** is anticipated for this species. Coordination with  
19 USFWS regarding impacts to Florida scrub-jay is ongoing.

20  
21 *Wood Stork*

22 The USFWS Wood Stork Active Florida Colonies map data identified six active wood stork  
23 colonies (Wabasso, Pelican Island, Micco North, Micco South, Grange Island and Grant Farm  
24 Island colonies) within 18.6 miles of the project corridor. Determinations of wood stork SFH  
25 follow the definitions described in the USFWS *Habitat Management Guidelines for the Wood*  
26 *Stork in the Southeast Region* (USFWS 1990). The USFWS *Wood Stork Effect Determination Key*  
27 *for South Florida* was used to evaluate the potential effects of the project on wood storks.

28 Under the recommended alternative, 2.983 acres of wood stork SFH would be directly  
29 impacted. (**Table 6-2**). Ponds 5-4, 6-1 and 6-2 would each directly impact 0.0000229 acres of  
30 wood stork SFH because they occur where furrows in agricultural fields may form SFH during  
31 high water. Since impacts to SFH would total more than one-half acre, and because multiple  
32 wood stork nesting colonies occur within 18.6 miles of the impacts, a mitigation plan for  
33 impacts to wood storks will be prepared during the design phase of the project. Because the  
34 impacts to SFH will total less than five acres, an analysis of foraging prey base losses to support  
35 mitigation is not anticipated.

36 Mitigation for impacts to wood stork SFH could potentially be achieved through wetland  
37 mitigation banks, including the use of the Senate Bill program in cooperation with the SJRWMD.  
38 The SJRWMD Basin 22 Mitigation Bank is located within the Central Indian River Lagoon

1 drainage basin, its service area includes the proposed project as well all six of the wood  
2 colonies that have a CFA that includes the project.. On-site replacement of swales "in-kind" can  
3 also serve to adequately replace lost wood stork habitat, without the need for off-site  
4 mitigation. This option will be further explored in the design phase of the project. By mitigating  
5 and/or maintaining wood stork SFH in accordance with the USFWS Wood Stork Effect  
6 Determination Key for South Florida, a determination of **may affect, not likely to adversely**  
7 **affect** is anticipated for this species.

#### 8 9 *Bald Eagle - Regulated through the Bald and Golden Eagle Protection Act*

10 The FWC bald eagle nest locator tool was used to identify the location and status of bald eagle  
11 nests near the project corridor. The nearest bald eagle nest, IN011, is approximately 2.76 miles  
12 north of the project area and was last known to be active in 2012. USFWS and FWC generally do  
13 not require any special protective measures or monitoring if a bald eagle nest is further than  
14 660 feet from a project. The next closest bald eagle nest, IN013, is approximately 3.4 miles to  
15 the southeast and was last known to be active in 2014. The effect determination key in the  
16 USFWS *Bald Eagle Management Guidelines and Conservation Measures* was followed to assess  
17 impacts to bald eagles. Because the nearest nest is not visible from the project, road  
18 construction and maintenance is common in the area, and because a buffer of more than 660  
19 feet will be realized between the project and the IN011 bald eagle nest, no impacts to bald  
20 eagles are anticipated.

#### 21 **Potential Impacts To State Protected Species**

##### 22 *Burrowing Owl*

23 Potential habitat for burrowing owls occurs in the project area. No burrowing owls were  
24 identified during field surveys and FNAI does not report any burrowing owls as occurring in the  
25 project area. Burrowing owl colonies are typically conspicuous and well documented. Because  
26 of a lack of sightings and records of occurrence in the project area, a determination of **may**  
27 **affect, not likely to adversely affect** was made for burrowing owls.

##### 28 29 *Florida Pine Snake*

30 Potential habitat for Florida pine snakes exists in vegetated uplands in the project area. The  
31 majority of this potential habitat is low quality because it lacks the longleaf pine or scrub typical  
32 of Florida pine snake habitat and is highly fragmented; however, the WSCA contains higher  
33 quality potential habitat as well as gopher tortoises that provide burrows. Temporary impacts  
34 could occur if Florida pine snakes avoid the area near C.R. 510 during construction; however,  
35 these impacts from avoidance would be short in duration and snakes would likely relocate to  
36 similar adjacent habitats. Long term direct impacts to uplands that are low quality potential  
37 habitat were minimized and direct impacts to the high-quality habitat in the WSCA were  
38 avoided. Because no occurrences of Florida pine snakes are known from the project area, and  
39 because similar potential Florida pine snake habitats to those in the project corridor are locally  
40 abundant, a determination of **may affect, not likely to adversely affect** was made for the  
41 Florida pine snake.



1 *Florida Sandhill Crane*

2 Multiple Florida sandhill cranes were observed in the project area and potential foraging  
3 habitat occurs throughout open areas of the project corridor. Florida sandhill cranes are highly  
4 mobile and may avoid construction activities, potentially resulting in temporary impacts from  
5 avoidance. Florida sandhill cranes commonly inhabit roadsides near traffic and were observed  
6 beside C.R. 510 within the project area, so long term impacts from avoidance of increased  
7 traffic are not anticipated. Direct impacts to upland habitats would total 23.08 acres under the  
8 recommended alternative. Potential Florida sandhill crane foraging habitat is locally abundant  
9 and the birds observed during surveys appeared to forage throughout a wide area without  
10 focusing on the project corridor. Because the potential long term impacts would be to such a  
11 small proportion of the available habitat, a determination of **may affect, not likely to adversely**  
12 **affect** was made for this species.

13  
14 *Gopher Tortoise*

15 No gopher tortoise burrows were found during surveys of the project corridor performed by an  
16 authorized gopher tortoise agent. One gopher tortoise was sighted outside of the project  
17 corridor, on the Ansin Tract, and gopher tortoise are known to occur throughout the WSCA. No  
18 direct impacts are anticipated to the Ansin Tract or the WSCA. A gopher tortoise burrow survey  
19 will be conducted prior to construction so that impacts to gopher tortoise may be avoided;  
20 therefore, a determination of **may affect, not likely to adversely affect** was made for this  
21 species.

22  
23 *Roseate Spoonbill*

24 No roseate spoonbills were detected during field surveys and the project corridor does not  
25 contain flats, tidal areas, or expanses of shallow water that are typical high quality potential  
26 foraging habitat. Lower quality potential foraging habitat does occur in the project area, but  
27 potential nesting habitat does not. The nearest documented occurrence of a roseate spoonbill  
28 is from 7.6 miles northeast of the project area. For these reasons, a determination of **may**  
29 **affect, not likely to adversely affect** was made for this species.

30 *Sherman's Fox Squirrel*

31 The project corridor contains low quality potential habitat for Sherman's fox squirrels and the  
32 WSCA contains higher quality potential habitat. Direct impacts to the WSCA will be avoided. No  
33 Sherman's fox squirrels were identified during field surveys and FNAI does not report any as  
34 occurring in the project area. For these reasons, a determination of **may affect, not likely to**  
35 **adversely affect** was made for this species.

36  
37 *Southeastern American Kestrel*

38 No Southeastern American kestrels were detected in the project area during field surveys in  
39 2016 or 2017. No nests or cavities in trees that could be potential nesting substrates for kestrels  
40 were observed in the project corridor, but a survey specifically for potential nesting cavities in  
41 trees was not performed. Southeastern American kestrels are highly mobile and likely to avoid  
42 close proximity to construction activities, potentially resulting in temporary impacts from

1 avoidance. For these reasons a determination of **may affect, not likely to adversely affect** was  
2 made for this species.

3

4 *Tricolored Heron*

5 No tri-colored herons were detected in the project area during field surveys. Potential foraging  
6 habitat occurs throughout the project area and is locally abundant. Tri-colored herons are  
7 highly mobile and likely to avoid close proximity to construction activities, potentially resulting  
8 in temporary impacts from avoidance. Due to the lack of potential long term impacts and  
9 availability of nearby similar habitats, a determination of **may affect, not likely to adversely**  
10 **affect** was made for this species.



## 7.0 WETLAND EVALUATION

1  
2 Wetlands, as stated in Section 373.019(27) F.S. and in 33 CFR 328.3(b) and as used by the U.S.  
3 Army Corps of Engineers (USACE) in administering Section 404 of the Clean Water Act, are  
4 defined as “those areas that are inundated or saturated by surface or ground water at a  
5 frequency and duration sufficient to support, and that under normal circumstances do support,  
6 a prevalence of vegetation typically adapted for life in saturated soil conditions.”  
7

8 Surface waters are considered by Section 373.019(21) F.S. to be waters on the surface of the  
9 earth, contained in bounds created naturally or artificially, including, the Atlantic Ocean, the  
10 Gulf of Mexico, bays, bayous, sounds, estuaries, lagoons, lakes, ponds, impoundments, rivers,  
11 streams, springs, creeks, branches, sloughs, tributaries, and other watercourses. Regulatory  
12 agencies do not typically require mitigation for impacts to surface waters other than wetlands.  
13 Wetlands, OSW, and EFH were sought in the project area and within the project corridor during  
14 field surveys. Wetlands and OSW were delineated using three parameters as indicators of  
15 wetlands: presence of hydrophytic vegetation, hydric soils, and hydrology, utilizing  
16 methodologies consistent with the USACE *Federal Manual for Identifying and Delineating*  
17 *Jurisdictional Wetlands* (1987), the *Regional Supplement to the Corps of Engineers Wetland*  
18 *Delineation Manual: Atlantic and Gulf Coastal Plain Region* (2010), Chapter 62-340, Florida  
19 Administrative Code, and the *Florida Wetlands Delineation Manual* (Gilbert et. al. 2011).

### 20 WETLANDS IN THE PROJECT AREA

21 Natural wetlands, as well as drainage and irrigation features that were cut into uplands and  
22 contain some wetland vegetation, occur in the project area. SJRWMD land use maps that  
23 include wetlands are provided as **Figures 4-1** and **4-2**. Aside from wetlands in ditches or  
24 irrigation features, five wetland or OSW types are mapped by SJRWMD in the project area. They  
25 are Streams and Waterways (FLUCCS 5100), Reservoirs (FLUCCS 5300), Mixed Wetland  
26 Hardwoods (FLUCCS 6170), Freshwater Marshes (FLUCCS 6410), and Wet Prairies (FLUCCS  
27 6430). Wetlands and OSW in the project area mapped by the USFWS NWI are shown in **Figures**  
28 **4-4** and **4-5**. They include freshwater emergent wetlands, freshwater forested/shrub wetlands,  
29 freshwater ponds, and riverine areas. In multiple locations, areas identified by NWI as “riverine”  
30 no longer contain a waterbody or wetlands, or instead represent ditches or swales. None of the  
31 proposed pond locations occur in wetlands or surface waters except for furrows in agricultural  
32 fields.  
33

34 Roadside ditches and swales occur along C.R. 510 and adjacent lands and are classified as OSW.  
35 Furrows occur in agricultural fields adjacent to C.R. 510. These furrows are not considered  
36 jurisdictional wetlands by the USACE because their creation is classified as normal farming  
37 activity (Section 404(f)(1)(A)). The furrows are classified as OSW by the State of Florida (62-  
38 340.600 FAC). Many of the OSWs that were cut into uplands contain exotic or invasive plant  
39 species and so are relatively low quality. Brazilian pepper is found throughout the project area  
40 and grows in dense stands in some areas, often adjacent to wetlands/OSW.

1 Wetlands and OSWs that overlap or are adjacent to the project corridor were assigned a unique  
2 Assessment Area (AA) number to aid in the identification of potential impacts. There were a  
3 total of eight AAs, which are presented in **Table 7-1**, shown in **Figure 7-1**, and described below.  
4

5 AA1- This is a ditch cut into uplands that runs east-west and passes underneath C.R. 510  
6 through a culvert. The outfall on the west side of C.R. 510 is in the right-of-way between C.R.  
7 510 and a sidewalk and contains spike rushes (*Eleocharis* spp.), penny wort (*Hydrocotyle* spp.)  
8 and grasses. It is bordered by mowed turf grass. The ditch to the east of C.R. 510 is overhung by  
9 a dense canopy of trees and shrubs. This ditch provides potential habitat for small animals like  
10 snakes, turtles, and frogs as well as wading birds. AA1 is part of a flood control and drainage  
11 network and is considered an OSW. The total area of AA1 within the project area is 0.284 acres.  
12

13 AA2- This AA includes the Lateral D Canal, which runs parallel to the north-south oriented part  
14 of C.R. 510, as well as a smaller ditch that crosses beneath C.R. 510 via a culvert immediately  
15 north of 89 Street. AA2 is lined with trees and shrubby vegetation, including Brazilian Pepper,  
16 growing on adjacent uplands that provide potential habitat for a number of wildlife species. The  
17 ditch is SFH for wood stork and the canal appears to hold water year-round, providing habitat  
18 for amphibious and aquatic species. The majority of the canal appears too deep to be wood  
19 stork SFH. AA2 is part of a flood control and drainage network and is considered an OSW. The  
20 total area of AA2 within the project area is 5.279 acres.  
21

22 AA3- This area is an isolated retention pond that was part of a residential development that  
23 stalled after the site was cleared and graded and roads and utilities were installed. The area  
24 surrounding AA3 appears regularly mowed. AA3 is low quality potential habitat for wildlife due  
25 to its isolation, man-made origin, and lack of surrounding natural vegetation. It is SFH for wood  
26 stork. AA3 is an OSW and functions as a stormwater retention pond that drains the surrounding  
27 area. The total area of AA3 within the project area is 0.716 acres.  
28

29 AA4- This large canal runs north-south and C.R. 510 spans it with a bridge. The banks contain  
30 large bunch grasses. AA4 appears to hold water year-round, forming potential habitat for  
31 amphibious and aquatic species like frogs, turtles, fish, and other species. The majority of AA4 is  
32 too deep to be SFH for wood stork. This canal is bordered by former citrus groves that now  
33 appear abandoned and contain large stands of Brazilian pepper. AA4 functions as part of a  
34 flood control and drainage network and is considered an OSW. The total area of AA4 within the  
35 project area is 1.755 acres.  
36

37 AA5- This area of Mixed-Wetland Hardwoods begins slightly north of the project corridor and  
38 extends northwards to connect with the riparian corridor of the south prong of the Saint  
39 Sebastian River. AA5 is considered forested palustrine wetlands. AA5 is surrounded by  
40 abandoned citrus groves and the area nearest the project corridor is overhung with mature  
41 oaks (*Quercus* sp.), pines (*Pinus* sp.), and cabbage palms, which form a dense canopy. Tall  
42 grasses and wax myrtle (*Myrica cerifera*) grow in the dense understory along with Brazilian  
43 pepper. It appears that AA5 once extended further south, but now the southern edge of the  
44 mapped wetland area ends at the C.R. 510 right-of-way. AA5 forms high quality potential



1  
2

**Table 7-1 Wetland Assessment Areas**

AA #	FLUCCS Code	USFWS NWI Classification	Contiguity	Edge Relationships	Wildlife Habitat Value	Hydrologic Functions	Public Use	Integrity
1	None	Riverine	Connected to drainage network	Surrounded by pasture and forest	Low	Flood and erosion control	None	Manmade
2	None	Riverine	Connected to drainage network	Surrounded by forest, schools, and residential areas	Low	Flood and erosion control	None	Manmade
3	5300-Reservoirs	Freshwater Pond	Isolated	Surrounded by cleared and graded area prepared for residential use	Low	Water quality enhancement/pollution abatement, water detention/flood and erosion control	None	Manmade
4	5100-Streams and Waterways	Riverine	Connected to drainage network	Surrounded by agricultural use (or abandoned agricultural lands)	Low	Flood and erosion control	None	Manmade
5	6170- Mixed Wetland Hardwoods	Freshwater Forested/ Shrub	Connected to larger riparian corridor and waterways of South prong of Saint Sebastian River	Surrounded by agricultural use (or abandoned agricultural lands)	High	Water quality enhancement/pollution abatement, water detention/flood and erosion control	None	Natural but degraded and limited in size by adjacent roadway and agriculture
6	None	Riverine	Connected to drainage network	Borders forest and former agricultural lands with some residential development	Low	Flood and erosion control	None	Manmade
7	6170- Mixed Wetland Hardwoods	Freshwater Forested/ Shrub	Part of riparian corridor of South prong of Saint Sebastian River	Borders forested upland, some residential, and agricultural lands	High	South prong of Saint Sebastian River, water quality enhancement/pollution abatement, water detention/flood and erosion control	Recreation	Natural and part of preserved ecological greenway
8	None	Riverine	Connected to drainage network	Occurs throughout project area, particularly next to roadways and in agricultural area	Low	Flood and erosion control	None	Manmade

3  
4



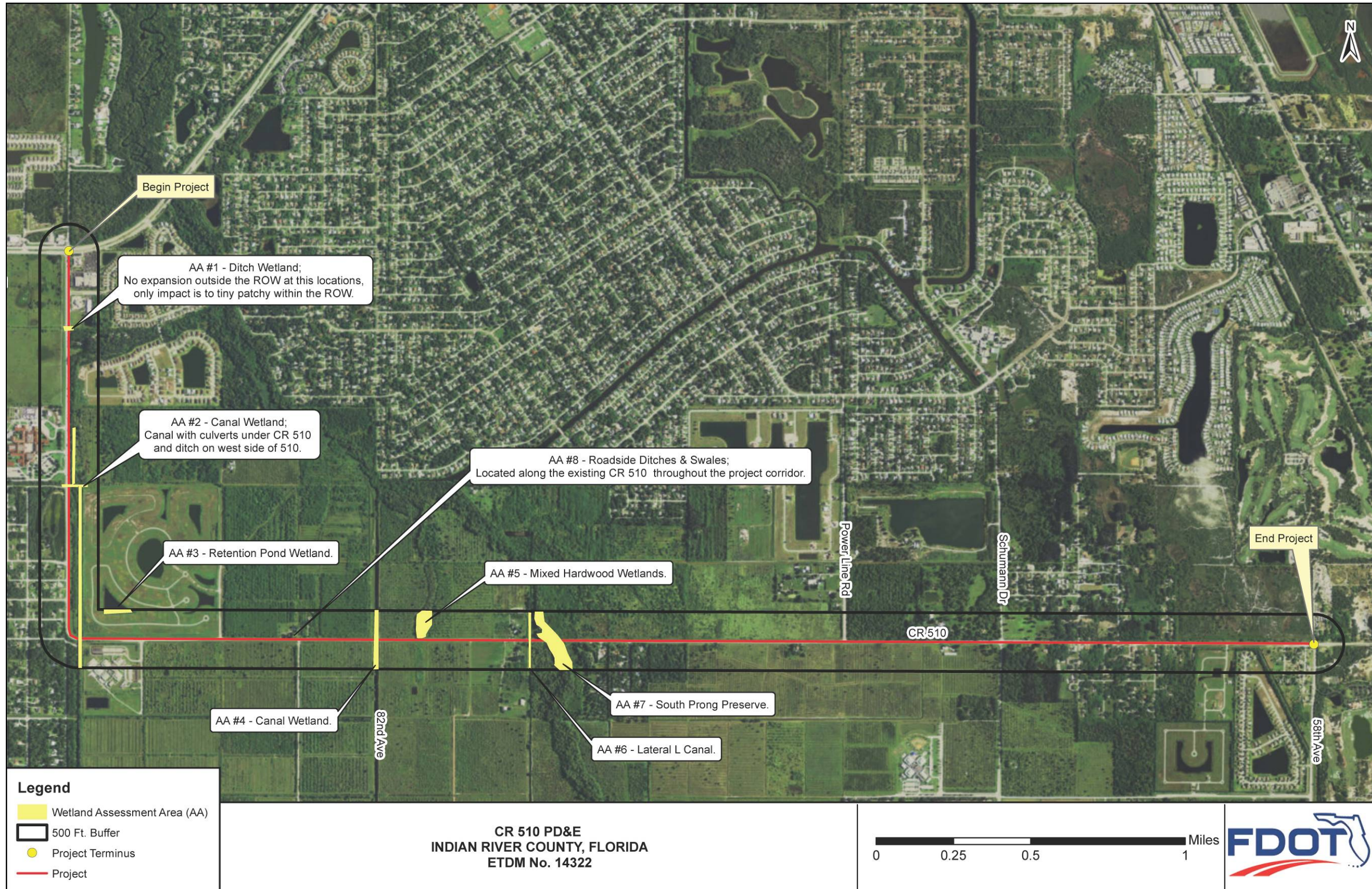


Figure 7-1 Wetland and OSW Assessment Areas



1 wildlife habitat for small mammals, reptiles, birds and amphibians due to its natural vegetation  
2 and connection to a larger network of riparian habitats and preserves. The vegetation is too  
3 dense to make AA5 SFH for wood stork and Brazilian pepper encroaches into AA5 from adjacent  
4 pastures. The total area of AA5 within the project area is 2.428 acres.  
5

6 AA6- This is the Lateral L Canal, which is bridged by C.R. 510. It is immediately west of the south  
7 prong of the Saint Sebastian River and borders abandoned citrus orchards and limited  
8 residential areas near the project area. Its banks are heavily vegetated with tall grasses,  
9 providing little access to the waterway. It appears to hold water year-round, forming habitat for  
10 reptiles, amphibians, and aquatic species. This canal is too deep to be SFH for wood stork. AA6  
11 provides drainage and flood control and is considered an OSW. The total area of AA6 within the  
12 project area is 0.851 acres.  
13

14 AA7- This area of Mixed-Wetland Hardwoods is part of the south prong of the Saint Sebastian  
15 River and is considered forested palustrine wetlands. AA7 and surrounding lands are owned by  
16 Indian River County and are protected as part of the South Prong Preserve. AA7 is part of a  
17 larger network of ecological greenways and is open to the public for recreation. The waterway  
18 currently passes beneath C.R. 510 via a culvert and flows north to connect with the Saint  
19 Sebastian River. It is unknown if the south prong of the Saint Sebastian River at this location  
20 ever runs dry, but it forms a narrow stream where it crosses the project. A mature canopy of  
21 trees surrounds the waterway. Because it is connected to a larger network of riparian habitats  
22 and is protected and managed for ecological integrity, it is high quality potential habitat for  
23 small mammals, reptiles, amphibians, and smaller aquatic species. The forest around the  
24 waterway includes wax myrtle and mature oaks, pines, cabbage palms, willows (*Salix* sp.) and  
25 other species with relatively few observed invasive plants. Portions of the waterway in AA7 are  
26 sufficiently open and shallow enough to be SFH for wood stork. The total area of AA7 within the  
27 project area is 5.621 acres.  
28

29 AA8- This AA includes roadside ditches and swales cut into uplands, some of which are  
30 incorrectly mapped as "Riverine" by the USFWS NWI. These ditches and swales vary from  
31 relatively dry swales covered with turf grasses to ditches that contain wetland vegetation such  
32 as spike rushes and pennywort. AA8 provides relatively low quality potential habitat for wildlife  
33 due to its man-made nature, areas with exotic vegetation, limited extent, and proximity to  
34 developed area. Portions of AA8 form SFH for wood storks. The total area of AA8 within the  
35 project area is approximately 3 acres.

## 36 **POTENTIAL IMPACTS TO WETLANDS**

37 The "No-Build" and TSM&O Alternatives would have no significant impacts to wetlands or OSW;  
38 however, the "No-Build" and TSM&O alternatives would not address the needs of the proposed  
39 project. Additionally, the "No-Build" and TSM&O Alternatives would not realize the potential  
40 benefits of replacing the culvert at the south prong of the Saint Sebastian River with a bridge.  
41 Replacement of the culvert is anticipated to restore the site to more natural conditions and  
42 flow regimes.



1 The extent of potential impacts to wetlands was assessed by overlaying wetland limits and OSW  
2 (as mapped by SJRWMD and compared with USFWS NWI maps and field investigations) with  
3 the recommended alternative and pond sites. Typical sections for the recommended  
4 alternative along with illustrations and an aerial view of the roadway are provided in Section  
5 3.0.

### 6 **Direct Wetland Impacts**

7 Under the recommended alternative there would be a total of 0.65 acres of impacts to  
8 jurisdictional wetlands (**Table 6-2**). These impacts occur in Segment 3, to AA5 and AA7. There  
9 would be no direct impacts to jurisdictional wetlands in Segments 1, 2, or 4.

10 AA5 was assigned a Uniform Mitigation Assessment Method (UMAM) score of 0.43. Direct  
11 impacts to AA5 under the Recommended Alternative are anticipated to be approximately 0.1  
12 acre, with a UMAM functional loss score of -0.00129 for the impact assessment area.

13  
14 AA7 was assigned a UMAM score of 0.76. Direct impacts to AA7 under the Recommended  
15 Alternative are anticipated to be approximately 0.55 acres, with a UMAM functional loss score of -  
16 0.0417 for the impact assessment area.

### 17 18 **Indirect Wetland Impacts**

19 Potential long-term indirect wetland impacts include reduced cover of vegetation beneath the  
20 proposed bridge over the south prong of the Saint Sebastian River due to shading. One positive  
21 indirect impact of the bridge would be a more natural flow regime and stream bed where the  
22 culvert currently exists. A potential positive indirect impact to downstream wetlands would also  
23 be realized through the introduction of 50 percent greater treatment of stormwater due to  
24 outfall into the Indian River Lagoon, an OFW.

### 25 **Cumulative Wetland Impacts**

26 BMPs will be implemented to reduce potential cumulative impacts from construction, runoff,  
27 and sedimentation. Mitigation will be provided for impacts to wetlands, as applicable. The  
28 recommended alternative also produces potential improvements to the baseline conditions by  
29 replacing a culvert at the south prong of the Saint Sebastian River with a bridge. Therefore, if  
30 future roadway improvement projects within the region result in similar levels of disturbance to  
31 wetlands, no significant cumulative impacts would be anticipated.

### 32 **Wetland Impact Avoidance, Minimization, and Mitigation**

33 Impacts to wetlands were sequentially avoided and then minimized by following the existing  
34 C.R. 510 right-of-way as much as possible and by limiting the width of right-of-way along  
35 wetlands at the South Prong Slough. Minimization measures, which may include reductions in  
36 the typical section, use of retaining walls to minimize roadway embankments and similar  
37 measures will be considered during the project design phase. FDOT *Standards Specifications for*  
38 *Road and Bridge Construction* will be implemented to further minimize impacts. Because at

1 least part of the project area drains into an OFW, the Indian River Lagoon, the stormwater  
2 management system is being planned to achieve 50 percent greater treatment of water than  
3 under standard specifications, reducing impacts to downstream wetlands. Wetland impacts  
4 were also minimized by replacing the culverts at the south prong of the Saint Sebastian River  
5 with a bridge. The bridge is anticipated to facilitate movement of water and wildlife and create  
6 more natural conditions that will be an improvement over existing conditions.

7 Unavoidable impacts to wetlands will be mitigated pursuant to Section 373.4137, F.S., to satisfy  
8 all mitigation requirements of Part IV of Chapter 373, F.S., and 33 U.S.C. §1344. Wetland  
9 mitigation will follow the Uniform Mitigation Assessment Method (UMAM) to gauge the  
10 function and value of the impacted wetlands as well as mitigation properties. Mitigation could  
11 potentially be achieved through use of the Senate Bill program in cooperation with the  
12 SJRWMD, or through use of a Mitigation Bank. The Basin 22 Mitigation Bank is located within  
13 the Central Indian River Lagoon drainage basin, its service area includes the proposed project,  
14 and the bank contains approximately 109.58 acres of freshwater herbaceous and freshwater  
15 forested state wetland mitigation credits. Federal wetland mitigation credits are available from  
16 the Mary A Ranch wetland mitigation bank.

17  
18



## 8.0 ESSENTIAL FISH HABITAT ASSESSMENT

The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 et seq), and amendments, require the identification of EFH for Federally managed fishery species and the implementation of measures to conserve and enhance this habitat. EFH is defined as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.” For the purpose of interpreting the definition of EFH “waters” includes aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include areas historically used by fish, where appropriate; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means the habitat required to support a sustainable fishery and a healthy ecosystem; “spawning, breeding, feeding, or growth to maturity” encompasses a species’ full life cycle.

During the ETDM process, the National Marine Fisheries Service (NMFS) provided comments stating that EFH occurs within the project area. Specifically, NMFS identified the South Prong Slough of the Saint Sebastian River as EFH because the South Atlantic Fishery Management Council (SAFMC) designated forested palustrine wetlands as EFH for juvenile white shrimp. A field inspection with NMFS personnel was not conducted but habitat was evaluated in the field on multiple occasions.

Habitat definitions and EFH information for white shrimp were adopted from the *Fishery Management Plan for the Shrimp Fishery of the South Atlantic Region* (NMFS 1993) (FMP), and subsequent amendments. Shrimp have a life cycle with multiple stages that require a variety of habitats. Shrimp habitats include inshore nursery areas, offshore marine habitats used for spawning and growth to maturity, and all interconnecting water bodies. Inshore nursery areas for shrimp include palustrine, estuarine, and marine emergent wetlands, tidal palustrine forested areas, mangroves, tidal freshwater, estuarine, marine submerged aquatic vegetation and sub-tidal and intertidal non-vegetated flats.

In Florida, white shrimp spawning occasionally takes place inshore at or near inlets, though most spawning occurs offshore (NMFS 1993). White shrimp enter inshore habitats as postlarvae and maintain a predominantly benthic existence while inshore. In Florida, postlarval white shrimp usually begin entering inshore waters in April and early May. Postlarval white shrimp appear to tolerate relatively low salinities and appear to prefer muddy or peaty bottoms rich in organic matter and decaying vegetation (NMFS 1993). As shrimp increase in size they begin migrating toward higher salinity, oceanic waters.

The original FMP (NMFS 1993) specified that Essential Fish Habitat- Habitat Areas of Particular Concern (EFH – HAPC) for shrimp “include those areas required during shrimp life cycles.” However, under Comprehensive Amendment 6 to the FMP, which was implemented in 1999 and published as a final document by NMFS in 2005, EFH-HAPC was more specifically defined to “include all coastal inlets, all state-designated nursery habitats of particular importance to shrimp and state-identified overwintering areas.” Under this definition EFH-HAPCs do not occur in the project area.

1 Analysis of existing data and field inspections revealed that EFH for white shrimp is present  
2 along the south prong of the Saint Sebastian River, identified as AA7 in **Figure 7-1**. EFH is also  
3 present in AA5 (**Figure 7-1**). The SJRWMD maps both these areas as Mixed Wetland Hardwoods  
4 (FLUCCS 6170) and the USFWS NWI (2016) maps these areas as freshwater forested/shrub  
5 wetlands-palustrine. Because these areas are forested palustrine wetlands they meet the FMP  
6 definitions of EFH for white shrimp.

7 The river in AA7 is relatively narrow and meandering and the river bottom is generally muddy  
8 and appears high in organic content. The majority of the lands immediately north and south of  
9 C.R. 510 containing AA7 are owned by Indian River County and are protected as part of the  
10 South Prong Preserve. Part of AA7 immediately north of C.R. 510 and east of the South Prong  
11 Preserve is privately owned. The outfall of the culvert for the south prong of the Saint Sebastian  
12 River is shown in **Photographs 8-1** and **8-2**. The south prong of the Saint Sebastian River and  
13 associated wetlands on the South Prong Preserve are shown in **Photographs 8-3** and **8-4**.  
14 Photographs of AA5 from the FDOT right-of-way, facing north, are show in **Photographs 8-6** and  
15 **8-6**.

## 16 **POTENTIAL IMPACTS TO ESSENTIAL FISH HABITAT**

17 The “No-Build” and TSM&O Alternatives would have no significant impacts on EFH; however,  
18 the “No-Build” and TSM&O alternatives would not address the needs of the proposed project.  
19 Additionally, the “No-Build” and TSM&O Alternatives would not realize the potential benefits of  
20 replacing the culvert at the south prong of the Saint Sebastian River, which is EFH for white  
21 shrimp, with a bridge. Replacement of the culvert is anticipated to remove a barrier to  
22 migration of invertebrates and other wildlife and restore the site to more natural conditions  
23 and flow regimes.

24 The extent of potential impacts was assessed by mapping EFH in the project area and  
25 overlaying the footprint of the recommended alternative and pond sites. Typical sections for  
26 the recommended alternative along with illustrations and an aerial view of the roadway are  
27 provided in Section 3.0.

28 Potential direct impacts to white shrimp EFH would total 0.65 acres under the recommended  
29 alternative. These impacts would occur to forested palustrine wetlands in AA5 and AA7.  
30 Potential indirect impacts could include displacement of white shrimp during removal of the  
31 culvert or bridge construction as well as shading from bridge. The replacement of the culvert  
32 with a bridge is an improvement over existing conditions because it enhances the flow of water  
33 and movement of wildlife, including white shrimp.

34 Impacts to EFH were sequentially avoided and then minimized by limiting the width of right-of-  
35 way along south prong of the Saint Sebastian River. Minimization measures, which may include  
36 reductions in the typical section, use of retaining walls to minimize roadway embankments and  
37 similar measures will be considered during the project design phase. FDOT *Standards*  
38 *Specifications for Road and Bridge Construction* will be implemented to further minimize  
39 impacts. Because at least part of the project area drains into an OFW, the Indian River Lagoon,  
40 the stormwater management system is being planned to achieve 50 percent greater treatment  
41 of water than under standard specifications, reducing impacts to downstream EFH. Mitigation



- 1 will be provided for impacts to jurisdictional wetlands, as applicable. If future roadway
- 2 improvement projects within the region result in similar levels of disturbance to EFH, no
- 3 significant cumulative impacts would be anticipated.



4  
5 **Photograph 8-1 Outfall of culvert in AA7, south prong of Saint Sebastian River, June 21, 2016**



6  
7 **Photograph 8-2 Culvert Outfall, AA7, south prong Saint Sebastian River, September 28, 2016**



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2  
3

**Photograph 8-3 south prong of Saint Sebastian River, AA7, June 21, 2016**



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**Photograph 8-4 south prong of Saint Sebastian River, AA7, September 28, 2018**





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**Photograph 8-5 Western edge of AA5**



3  
4

**Photograph 8-6 Eastern edge of AA5**

## 9.0 CONCLUSIONS AND COMMITMENTS

The No Build, TSM&O, and the recommended alternative were evaluated for impacts to listed species and habitats, wetlands, and EFH using a review of existing project literature and data, GIS resources, and field surveys. The “No-Build” and TSM&O Alternatives would have no impacts on protected species, wetlands, OSWs, wood stork SFH, or EFH. However, the “No-Build” and TSM&O alternatives would not address the needs of the proposed project and would not improve existing conditions at the south prong of the Saint Sebastian River by replacing the culvert underneath C.R. 510 with a bridge.

Effect determinations for federal and state listed species are reported in **Table 9-1**. Species that may be affected but would not be adversely affected by the proposed project are Audubon’s crested caracara, burrowing owl, eastern diamondback rattlesnake, eastern indigo snake, Florida pine snake, Florida sandhill crane, Florida scrub-jay, gopher tortoise, little blue heron, roseate spoonbill, Southeastern American kestrel, Sherman’s fox squirrel, tricolored heron, and wood stork. Under the recommended alternative 2.983 acres of direct impacts to wood stork SFH are anticipated. Surveys for gopher tortoise are anticipated prior to construction and mitigation for impacts wood stork SFH will be required. Section 7 Consultation with USFWS regarding impacts to Florida scrub-jays is ongoing.

Under the recommended alternative 0.65 acres of direct impacts to Mixed Wetland Hardwoods (FLUCCS 6170) are anticipated. These Mixed Wetland Hardwoods are also considered to be EFH for white shrimp. Impacts were sequentially avoided and minimized and unavoidable impacts to jurisdictional wetlands will be mitigated following SJRWMD and USACE guidelines. Wetland mitigation could potentially be achieved through use of the Senate Bill program in cooperation with the SJRWMD, or through use of a Mitigation Bank. Based upon the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use.



1

**Table 9-1 Effect Determinations**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Effect Determination (Recommended Alternative)</b>
<b>Federally Listed Species</b>		
Audubon's crested caracara	<i>Polyborus plancus audubonii</i>	MANLAA
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>	MANLAA
Eastern indigo snake	<i>Drymarchon corais couperi</i>	MANLAA
Florida scrub-Jay	<i>Aphelocoma coerulescens</i>	MANLAA
Gopher tortoise	<i>Gopherus polyphemus</i>	MANLAA
Wood stork	<i>Mycteria americana</i>	MANLAA
<b>State Listed Species</b>		
Burrowing owl	<i>Athene cunicularia</i>	MANLAA
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	MANLAA
Florida sandhill crane	<i>Grus canadensis pratensis</i>	MANLAA
Little blue heron	<i>Egretta caerulea</i>	MANLAA
Roseate spoonbill	<i>Platalea ajaja</i>	MANLAA
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	MANLAA
Southeastern American kestrel	<i>Falco sparverius paulus</i>	MANLAA
Tricolored heron	<i>Egretta tricolor</i>	MANLAA

2                      MANLAA= May affect, not likely to adversely affect

3

1 A Saint Johns River Water Management District (SJRWMD) Environmental Resource Permit  
2 (ERP) will be necessary and a SJRWMD Dewatering Permit is anticipated for any dewatering  
3 operations during construction. A SJRWMD right-of-way occupancy permit is required for work  
4 in canals and a National Pollution Discharge Elimination System Permit will be necessary. A  
5 USACE Dredge and Fill Permit is anticipated for unavoidable impacts to wetlands.  
6 Environmental and right-of-way permits will be needed from the Sebastian River Improvement  
7 District and the Indian River Farms Water Control District. Because the project area drains into  
8 an OFW, the Indian River Lagoon, the stormwater management system in applicable areas will  
9 be designed to achieve 50 percent greater treatment of water than under standard  
10 specifications, reducing impacts to downstream habitats.

11 FDOT commits to:

- 12 • Minimize adverse impacts to the eastern indigo snake, during construction, the FDOT  
13 will adhere to the *USFWS Standard Protection Measures for the Eastern Indigo Snake*  
14 (USFWS 2004);
- 15 • Actions during the Construction phase, such as implementation of BMPs, to minimize  
16 potential impacts on resources;
- 17 • Mitigate for impacts to wood stork SFH at a USFWS approved mitigation bank.  
18 Mitigation will follow current USFWS protocols such as the USFWS Wood Stork Effect  
19 Determination Key for South Florida;
- 20 • If potential impacts to gopher tortoise exist, prior to construction a gopher tortoise  
21 burrow survey of potential gopher tortoise habitat in the impact area will be conducted  
22 in accordance with FWC guidelines;
- 23 • Restrictions on construction adjacent to WSCA during Florida scrub-jay breeding season  
24 (March 1 through June 30)
- 25 • To minimize impacts to Florida scrub-jay, signage indicating “No Food Trash” to be  
26 installed near dumpsters between 61 Drive and 58 Avenue (Stations 348+67.07 to  
27 373+80.08)
- 28 • Prohibition on staging of equipment or materials in scrub habitat
- 29 • Installation of signs warning motorists of sensitive wildlife
- 30 • Restriction on planting palms or oaks near the WSCA because they may attract scrub-  
31 jays in search of nesting material or acorns

32

33



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**APPENDIX A: USFWS WOOD STORK EFFECT DETERMINATION KEY AND GUIDELINES**



## United States Department of the Interior



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

May 18, 2010

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

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

Dear Mr. Kinard:

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

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

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

Wood stork

### Habitat

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





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

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

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

### Conservation Measures

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

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

In an effort to reduce correspondence in effect determinations and responses, the Service is providing the Wood Stork Effect Determination Key below. If the use of this key results in a Corps determination of "no effect" for a particular project, the Service supports this determination. If the use of this Key results in a determination of NLAA, the Service concurs with this determination<sup>1</sup>. 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)<sup>2</sup> of an active colony site<sup>3</sup> ..... "may affect"<sup>4</sup>
- Project impacts Suitable Foraging Habitat (SFH)<sup>5</sup> at a location greater than 0.76 km (0.47 mile) from a colony site..... "go to B"

<sup>1</sup> 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.

<sup>2</sup> 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).

<sup>3</sup> 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.

<sup>4</sup> Consultation may be concluded informally or formally depending on project impacts.

<sup>5</sup> 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)<sup>6</sup>.....NLAA<sup>1</sup>”

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

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

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

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

Project not as above..... “may affect<sup>4</sup>”

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

<sup>6</sup> 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.

<sup>7</sup> 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.

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



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

Project does not satisfy these elements ..... "may affect<sup>4</sup>"

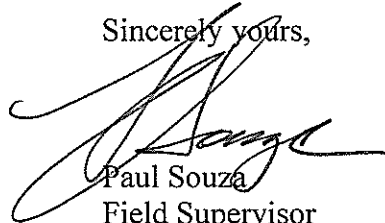
This Key does not apply to Comprehensive Everglades Restoration Plan projects, as they will require project-specific consultations with the Service.

Monitoring and Reporting Effects

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

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

Sincerely yours,



Paul Souza  
Field Supervisor  
South Florida Ecological Services Office

Enclosures

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

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# HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION





**HABITAT MANAGEMENT GUIDELINES  
FOR THE WOOD STORK IN THE  
SOUTHEAST REGION**

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# **HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION**

## **Introduction**

A number of Federal and state laws and/or regulations prohibit, cumulatively, such acts as harrassing, disturbing, harming, molesting, pursuing, etc., wood storks, or destroying their nests (see Section VII). Although advisory in nature, these guidelines represent a biological interpretation of what would constitute violations of one or more of such prohibited acts. Their purpose is to 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 in South Carolina and southeastern North Carolina, and as far west as central Alabama and northeastern Mississippi. Storks from a colony in south-central Georgia have wintered between southern Georgia and southern Florida. This U.S. nesting population of wood storks was listed as endangered by the U.S. Fish and Wildlife Service on February 28, 1984 (*Federal Register* 49(4):7332-7335).

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

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

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

#### **I. Feeding habitat.**

A major reason for the wood stork decline has been the loss and 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 habitat.

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

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

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

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

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

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

Although nesting wood storks usually do most feeding away from the colony site (>5 miles), considerable stork activity does occur close to the colony during two periods in the nesting cycle. Adult storks collect almost all nesting material in and near the colony, usually within 2500 feet. Newly fledged storks, near the end of the nesting cycle, spend from 1-4 weeks during the fledging process flying locally in the colony area, and perched in nearby trees or marshy spots on the ground. These birds return daily to their nests to be fed. It is essential that these fledging birds have little or no disturbance as far 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.

### **III. Roosting habitat.**

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

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

### **IV. Management zones and guidelines for feeding sites.**

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

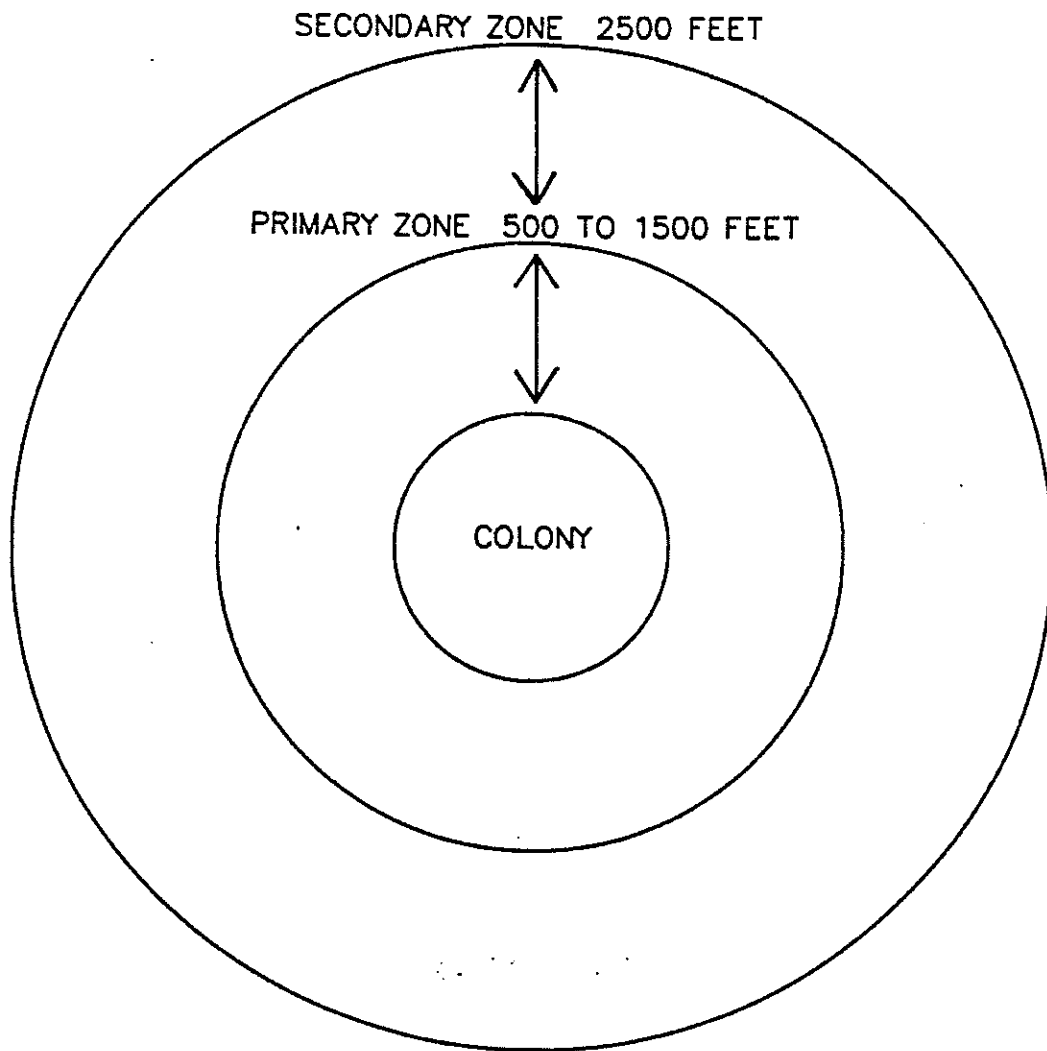
- A. There should be no human intrusion into feeding sites when storks are present. Depending upon the amount of screening vegetation, human activity should be no closer than between 300 feet (where solid vegetation screens exist) and 750 feet (no vegetation screen).

- B. Feeding sites should not be subjected to water management practices that alter traditional water levels or the seasonally normal drying patterns and rates. Sharp rises in water levels are especially disruptive to feeding storks.
- C. The introduction of contaminants, fertilizers, or herbicides into wetlands that contain stork feeding sites should be avoided, especially those compounds that could adversely alter the diversity and numbers of native fishes, or that could substantially change the characteristics of aquatic vegetation. Increase in the density and height of emergent vegetation can degrade or destroy sites as feeding habitat.
- D. Construction of tall towers (especially with guy wires) within three miles, or high power lines (especially across long stretches of open country) within one mile of major feeding sites should be avoided.

**V. Management zones and guidelines for nesting colonies.**

- A. Primary zone: This is the most critical area, and must be managed according to recommended guidelines to insure that a colony site survives.
  - 1. Size: The primary zone must extend between 1000 and 1500 feet in all directions from the actual colony boundaries when there are no visual or broad aquatic barriers, and never less than 500 feet even when there are strong visual or aquatic barriers. The exact width of the primary zone in each direction from the colony can vary within this range, depending on the amount of visual screen (tall trees) surrounding the colony, the amount of relatively deep, open water between the colony and the nearest human activity, and the nature of the nearest human activity. In general, storks forming new colonies are more tolerant of existing human activity, than they will be of new human activity that begins after the colony has formed.
  - 2. Recommended Restrictions:
    - a. Any of the following activities within the primary zone, at any time of the year, are likely to be detrimental to the colony:
      - (1) Any lumbering or other removal of vegetation, and
      - (2) Any activity that reduces the area, depth, or length of flooding in wetlands under and surrounding the colony, except where periodic (less than annual) water control may be required to maintain the health of the aquatic, woody vegetation, and
      - (3) The construction of any building, roadway, tower, power line, canal, etc.
    - b. The following activities within the primary zone are likely to be detrimental to a colony if they occur when the colony is active:
      - (1) Any unauthorized human entry closer than 300 feet of the colony, and





- (2) Any increase or irregular pattern in human activity anywhere in the primary zone, and
  - (3) Any increase or irregular pattern in activity by animals, including livestock or pets, in the colony, and
  - (4) Any aircraft operation closer than 500 feet of the colony.
- B. Secondary Zone: Restrictions in this zone are needed to minimize disturbances that might impact the primary zone, and to protect essential areas outside of the primary zone. The secondary zone may be used by storks for collecting nesting material, for roosting, loafing, and feeding (especially important to newly fledged young), and may be important as a screen between the colony and areas of relatively intense human activities.
- 1. Size: The secondary zone should range outward from the primary zone 1000-2000 feet, or to a radius of 2500 feet of the outer edge of the colony.
  - 2. Recommended Restrictions:
    - a. Activities in the secondary zone which may be detrimental to nesting wood storks include:
      - (1) Any increase in human activities above the level that existed in the year when the colony first formed, especially when visual screens are lacking, and
      - (2) Any alteration in the area's hydrology that might cause changes in the primary zone, and
      - (3) Any substantial (>20 percent) decrease in the area of wetlands and woods of potential value to storks for roosting and feeding.
    - b. In addition, the probability that low flying storks, or inexperienced, newly-fledged young will strike tall obstructions, requires that high-tension power lines be no closer than one mile (especially across open country or in wetlands) and tall 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 500-1000 feet of roost sites during seasons of the year and times of the day when storks may be present. Nocturnal activities in active roosts may be especially disruptive.

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

## VII. Legal Considerations.

### A. Federal Statutes

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

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

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

### B. State Statutes

#### 1. State of Alabama

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

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

#### 2. State of Florida

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



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

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

### 3. State of Georgia

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

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

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

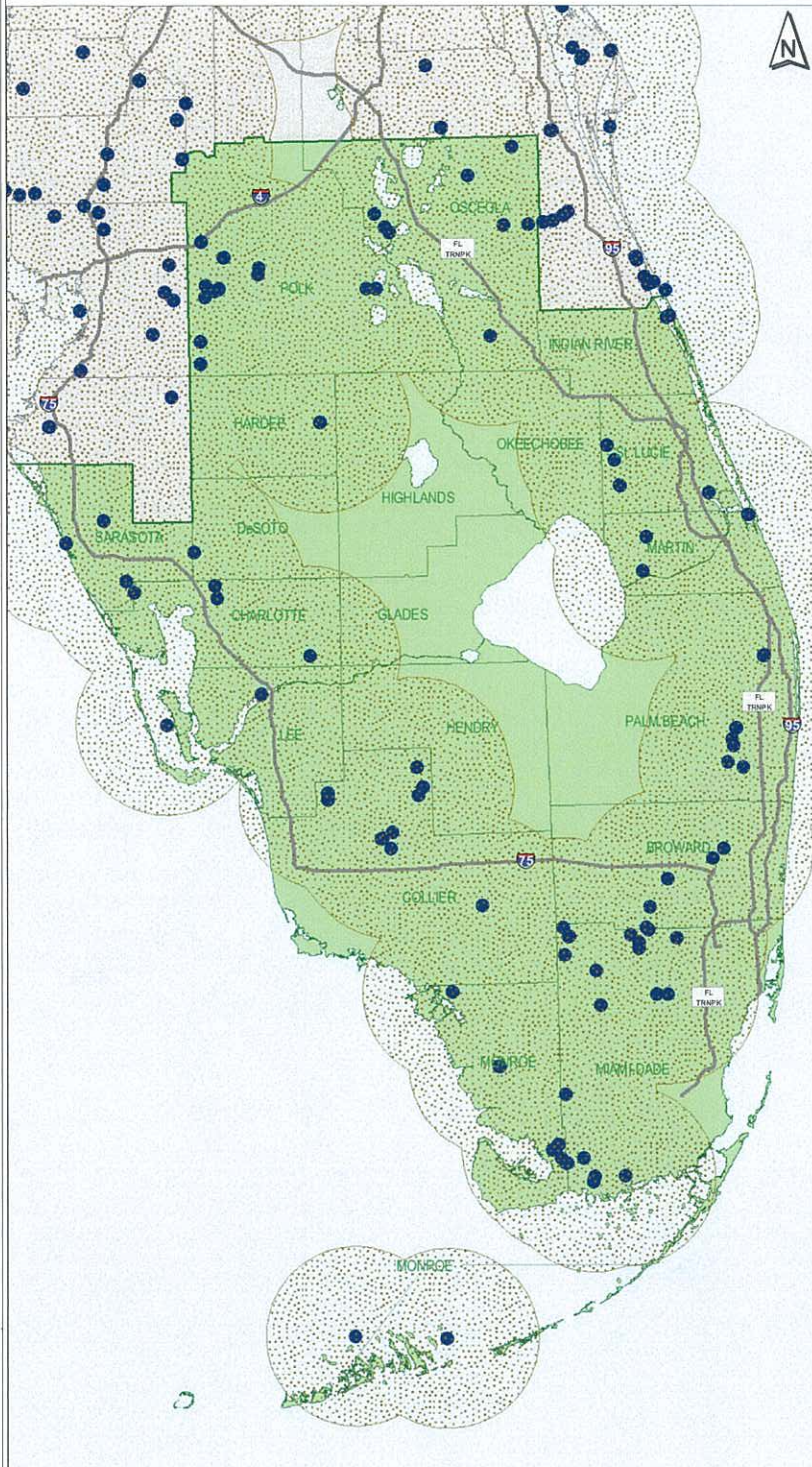
The wood stork is listed as endangered pursuant to the Endangered Wildlife Act of 1973 (Section 27-3-130 of the Code). Section 391-4-13-.06 of the Rules and Regulations of the Georgia Department of Natural Resources prohibits harassment, capture, sale, killing, or other actions which directly cause the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

### 4. State of South Carolina

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

5/21/2010

# Wood Stork



## Nesting Colonies Core Foraging Areas

1999 to 2005

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



Produced by:  
South Florida Ecological Services Office  
<http://verobeach.fws.gov>  
Phone: 772.562.3909





5/21/2010

## Enclosure 3

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

### **Foraging Habitat**

Researchers have shown that wood storks forage most efficiently and effectively in habitats where prey densities are high and the water shallow and canopy open enough to hunt successfully (Ogden et al. 1978, Browder 1984, Coulter 1987). Prey availability to wood storks is dependent on a composite variable consisting of density (number or biomass/m<sup>2</sup>) 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 ( $12 \times 132 = 1584$ ). The results are shown below for each of the cover types in O'Hare and Dalrymple (1997) study (Table 1). As an example, for the P50 cover type, the foraging suitability is calculated by multiplying 11 species times 92 individuals for a total of 1,012. Divide this value by 1,584, which is the maximum number of species times the maximum number of individuals ( $12 \times 132 = 1,584$ ). 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 situations is not definable, therefore unless otherwise noted in the field reports and in our analysis; we consider a suitability value of 3 percent to represent both densities.

**Hydroperiod:** The hydroperiod of a wetland can affect the prey densities in a wetland. For instance, research on Everglades fish populations using a variety of quantitative sampling techniques (pull traps, throw traps, block nets) have shown that the density of small forage fish increases with hydroperiod. Marshes inundated for less than 120 days of the year average  $\pm 4$  fish/m<sup>2</sup>; whereas, those flooded for more than 340 days of the year average  $\pm 25$  fish/m<sup>2</sup> (Loftus and Eklund 1994, Trexler et al. 2002).

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

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

**Table 4. SFWMD Hydroperiod Classes – Everglades Protection Area**

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

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

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

al. (1999 and 2004), they note that electrofishing data provides a useful index of the abundance of larger fish in shallow, vegetated habitat, but length, frequency, and species compositional data should be interpreted with caution. Chick et al. (2004) also noted that electrofishing data for large fish (> 8cm) provided a positive correlation of the number of fish per unit effort (abundance) per changes in 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 Goss (2009) noting a diversity of size ranges of prey available for wading birds to consume, with fish ranging from 6 to 8 cm being the preferred prey for larger species of wading birds, particularly wood storks (Kushlan et al. 1975).

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

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

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

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

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

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

**Table 6. Extrapolated Fish Densities for SFWMD Hydroperiods**

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

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

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

For example, given that a Class 3 hydroperiod has a mean annual fish density of 9 fish/m<sup>2</sup>, with an average weight of 0.26 grams per fish, the biomass of a Class 3 hydroperiod would be 2.3 grams/m<sup>2</sup> (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 <sup>2</sup>
Class 2	60-120	1.0 gram/m <sup>2</sup>
Class 3	120-180	2.3 grams/m <sup>2</sup>
Class 4	180-240	4.2 grams/m <sup>2</sup>
Class 5	240-300	5.2 grams/m <sup>2</sup>
Class 6	300-330	6.0 grams/m <sup>2</sup>
Class 7	330-365	6.5 grams/m <sup>2</sup>

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

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

Common name	Scientific name	Percent Individuals	Percent Biomass
Sunfishes	<i>Centrarchidae</i>	14	44
Yellow bullhead	<i>Italurus natalis</i>	2	12
Marsh killifish	<i>Fundulus confluentus</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 formosa*), bluefin killifish (*Lucania goodei*)] are under-represented, which the researchers believed was probably because their small size did not elicit a bill-snapping reflex in these tactile feeders (Coulter et al. 1999). Their studies also showed that, in addition to selecting larger species of fish, wood storks consumed individuals that are significantly larger (>3.5 cm) than the mean size available (2.5 cm), and many were greater than 1-year old (Ogden et al. 1976, Coulter et al. 1999). However, Ogden et al. (1976) also found that wood storks most likely consumed fish that were between 1.5 and 9.0 cm in length (Figure 4 in Ogden et al. 1976).

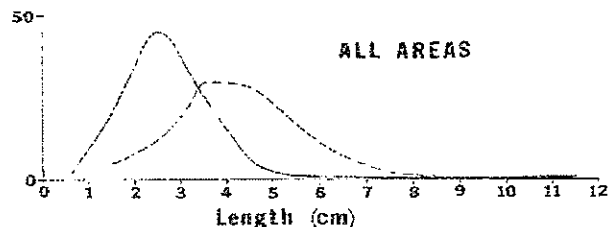


FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

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

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

**Wood stork suitable prey base (biomass per hydroperiod):** To estimate that fraction of the available fish biomass that might be consumed by wood storks, the following analysis was conducted. Trexler et al.'s (2002) 2-year throw trap data of absolute and relative fish abundance per hydroperiod distributed across 20 study sites in the ENP and the WCAs was considered to be representative of the Everglades fish assemblage available to wood storks (n = 37,718 specimens of 33 species). Although Trexler et al.'s (2002) data was based on throw-trap data and representative of fish 8 cm or smaller, the Service believes the data set can be used to predict the biomass/m<sup>2</sup> 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/m<sup>2</sup> 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<sup>2</sup>, the warmouth biomass for long hydroperiod wetlands would be about 0.427 g (Service 2009). However, the size frequency distribution (assumed normal) for warmouth (Kushlan et al. 1986) indicate 48 percent are too large for wood storks and 0.6 percent are too small (outside the 1.5 cm to 9 cm size range most likely consumed), so the warmouth biomass within the wood stork's most likely consumed size range is only 0.208 g ( $0.427*(0.48+0.006)=0.2075$ ) in a 6.5 g/m<sup>2</sup> sample. Using this approach summed over all species in long hydroperiod wetlands, only 3.685 g/m<sup>2</sup> of the 6.5 g/m<sup>2</sup> 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<sup>2</sup> 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<sup>2</sup> 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<sup>2</sup> for long hydroperiod wetlands (3.685 + 2.97 = 6.655/ 2 = 3.33). This proportion of available fish prey of a suitable size (3.33 g/m<sup>2</sup> / 6.5 g/m<sup>2</sup> = 0.51 or 51 percent) was then multiplied by the total fish biomass in each hydroperiod class to provide an estimate of the total biomass of a hydroperiod that is the appropriate size and species composition most likely consumed by wood storks.

As an example, a Class 3 SFWMD model hydroperiod wetland with a biomass of 2.3 grams/m<sup>2</sup>, adjusted by 51 percent for appropriate size and species composition, provides an available biomass of 1.196 grams/m<sup>2</sup>. 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 <sup>2</sup>
Class 2	60-120	0.52 gram/m <sup>2</sup>
Class 3	120-180	1.196 grams/m <sup>2</sup>
Class 4	180-240	2.184 grams/m <sup>2</sup>
Class 5	240-300	2.704 grams/m <sup>2</sup>
Class 6	300-330	3.12 grams/m <sup>2</sup>
Class 7	330-365	3.38 grams/m <sup>2</sup>

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

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



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

Other comments reference the methodology's lack of sensitivity to limiting factors, i.e., is there sufficient habitat available across all hydroperiods during critical life stages of wood stork nesting and does this approach over emphasize the foraging biomass of long hydroperiod wetlands with a corresponding under valuation of short 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 <sup>2</sup>
Class 2	60-120	0.17 gram/m <sup>2</sup>
Class 3	120-180	0.39 grams/m <sup>2</sup>
Class 4	180-240	0.71 grams/m <sup>2</sup>
Class 5	240-300	0.88 grams/m <sup>2</sup>
Class 6	300-330	1.01 grams/m <sup>2</sup>
Class 7	330-365	1.10 grams/m <sup>2</sup>

**Sample Project of Biomass Calculations and Corresponding Concurrence Determination**

*Example 1:*

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

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

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

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

In the example provided, the 5 acres of wetlands, converted to square-meters (1 acre = 4,047 m<sup>2</sup>) 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 Area				Net Change*	
			Pre Enhancement		Post Enhancement			
	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams
Class 1 - 0 to 60 Days								
Class 2 - 60 to 120 Days								
Class 3 - 120 to 180 Days	5	2.92	3	1.75	3	4.74	(5)	0.07
Class 4 - 180 to 240 Days								
Class 5 - 240 to 300 Days								
Class 6 - 300 to 330 Days								
Class 7 - 330 to 365 days								
<b>TOTAL</b>	<b>5</b>	<b>2.92</b>	<b>3</b>	<b>1.75</b>	<b>3</b>	<b>4.74</b>	<b>(5)</b>	<b>0.07</b>

\*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<sup>2</sup> instead of a class 3 hydroperiod with a 0.39 grams/m<sup>2</sup> [Table 10]), there would be a loss of 2.92 kg of short hydroperiod wetlands (as above) and a net gain of 8.62 kg of long-hydroperiod wetlands.

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

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

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

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

Net increase: 8.62 kg-3.19 kg = 5.43 kg

Project Site Balance 5.43 kg- 2.92 kg = 2.51 kg



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

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

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

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**APPENDIX B: 2017 CARACARA NEST SURVEY REPORT**





1     **DRAFT AUDUBON'S CRESTED**  
2     **CARACARA 2017 NEST SURVEY**  
3     **REPORT**

4     PROJECT DEVELOPMENT AND ENVIRONMENT STUDY  
5             COUNTY ROAD 510/85 STREET  
6     From County Road 512 (M.P. 0.0) to 58 Ave (M.P. 5.283),  
7             ETDM Number: 14233

8  
9             Indian River County, Florida  
10     Financial Management Number: 405606-2-22-02  
11     Federal Aid Project No.: 4984-004-S

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15                             Prepared for  
16     Florida Department of Transportation  
17                             District Four  
18     3400 West Commercial Boulevard  
19     Fort Lauderdale, FL 33309-3421

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21                             Metric Engineering, Inc.  
22                             May 2017  
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## **APPENDICES**

2 Appendix A: Caracara Species Conservation Guidelines and Survey Protocols

3 Appendix B: Photographs from Survey Stations

4 Appendix C: Copies of Field Data Sheets and Maps

5 Appendix D: 2016 Caracara Survey Report

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## 1.0 INTRODUCTION

The Florida Department of Transportation (FDOT) is conducting a Project Development and Environment (PD&E) Study to evaluate alternatives for mobility and safety improvements to County Road (C.R.) 510 in Indian River County, Florida. The project extends 5.27 miles along C.R. 510 from its intersection with C.R. 512/Sebastian Boulevard to 58 Avenue. A project location map is provided as **Figure 1-1**. C.R. 510 is primarily a two-lane roadway that is functionally classified as an Urban Principal Arterial for east-west traffic movements. There are three bridge structures along C.R. 510 and an open drainage system.

As part of the PD&E study and in compliance with the Endangered Species Act and the National Environmental Policy Act (NEPA) process, impacts to the federally and state threatened Audubon's crested caracara (*Polyborus plancus audubonii*) (caracara) are being assessed. This report presents the results of caracara nest surveys conducted in 2017 and discusses them along with data from preliminary surveys conducted by FDOT in 2016.

### 1.1 Audubon's Crested Caracara

The caracara is a subspecies of falcon that ranges across the southwestern United States (U.S.) and Central America. A disjunct population also occurs in south Florida and is isolated from the remainder of the caracara populations. In 1987 that Florida population was listed as *threatened* under the Endangered Species Act of 1973 (16 U.S.C 1531 et seq).

Caracaras are large raptors with an unusual and distinct color pattern (**Photograph 1**). Adults bear a black crest atop their head, have a naked face of bright orange skin, a white neck that becomes barred with dark streaks across the upper chest and back, and brownish black wings, back, and lower abdomen. The tail is white with narrow, dark crossbars and a dark terminal band, and their feet and legs are bright yellow. Prominent white patches are visible near the tips of the wings in flight. Juveniles have a similar color pattern but are brownish and buffy with dark streaking. Their facial skin is pinkish in color and their legs are gray.

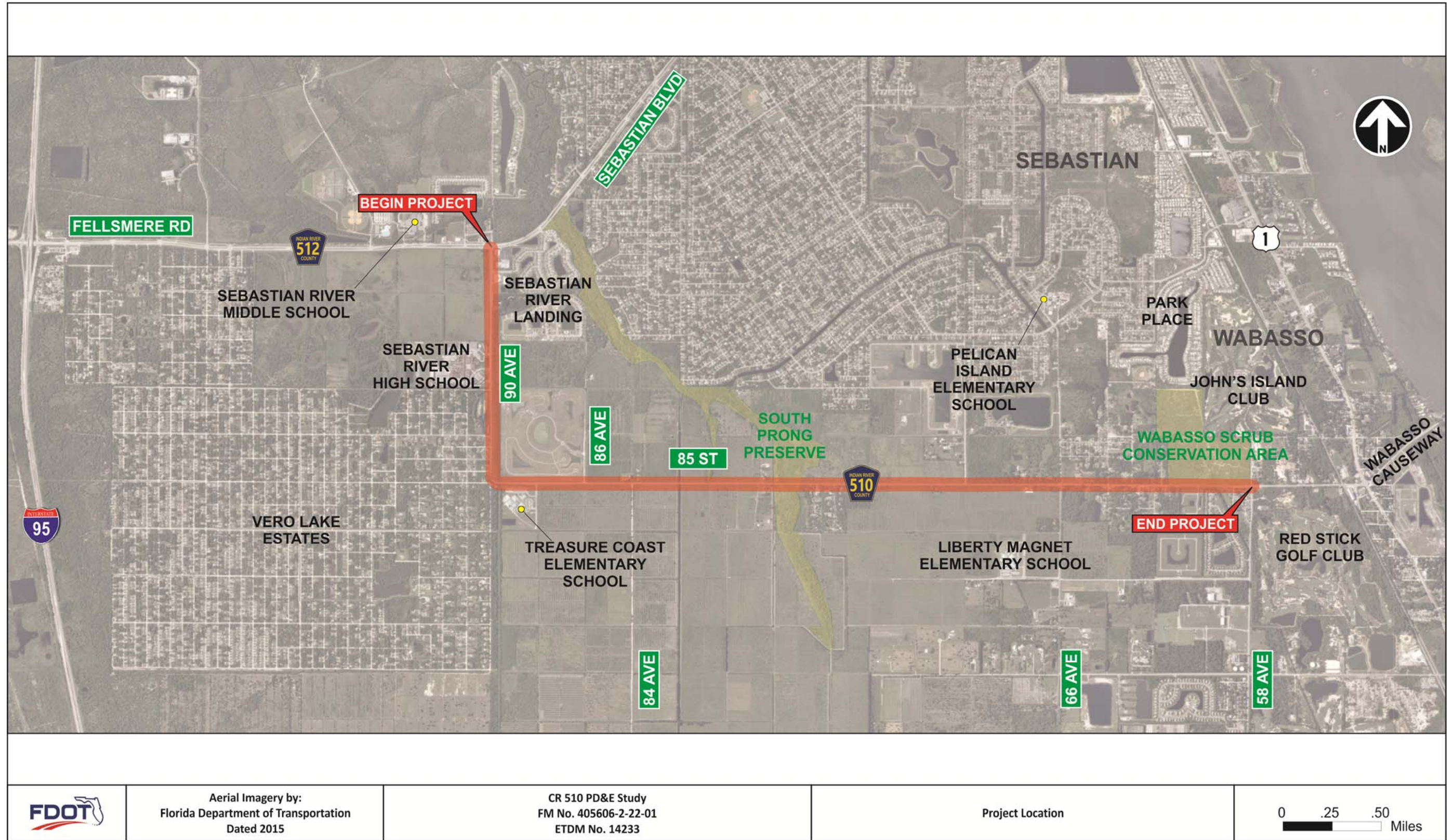


**Photograph 1 Audubon's crested caracara**

Historically, caracaras in Florida ranged from Northern Brevard County south to Fort Pierce, Lake Okeechobee, and Hendry County. Available evidence suggests a long-term contraction in their range and they are now rare as far north as Orlando or Orange County or to the east of



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Figure 1-1 Project Location Map

1 the St. Johns River (USFWS 1999). According to USFWS (1999), there is reportedly little  
2 evidence of breeding in Indian River County; however, this could have changed over the  
3 intervening years since publication. Morrison (2006) notes caracara nests occurring in western  
4 Indian River County. The region of greatest caracara abundance is a five-county area north and  
5 west of Lake Okeechobee and includes Glades, Desoto, Highlands, Okeechobee, and Osceola  
6 counties (USFWS 1999).

7 In Florida, caracaras typically inhabit dry or wet prairies with scattered cabbage palms (*Sabal*  
8 *palmetto*) and can also be found in lightly wooded areas. Because of widespread land use  
9 changes, caracaras now commonly use improved or semi-improved pasture. Studies show that  
10 caracaras in Florida prefer to nest in cabbage palms surrounded by open habitats with low  
11 ground cover and low density of tall or shrubby vegetation (Humphrey and Morrison 1997,  
12 USFWS 1999, Morrison 2007).

13 Caracaras nest in the winter, with peak nesting in January and February. However, evidence  
14 exists of nesting as early as late September and as late as April (USFWS 1999, Humphry and  
15 Morrison 1997). Caracaras construct new nests each breeding season, but they often use the  
16 same nesting tree. Nests are typically well concealed in the tops of cabbage palms, though  
17 other tree species have been documented as nesting sites. Both adults assist in nest  
18 construction and reports indicate that they do not vigorously defend nest sites against intruders  
19 except other caracaras (USFWS 1999). Clutch size is typically two or three eggs, which are  
20 incubated for about 28 days. Both sexes incubate the eggs and young fledge at about eight  
21 weeks. Some double brooding within a single breeding season has been documented for pairs  
22 that initiate nesting early in December or January, but caracaras typically have a single brood  
23 per nesting season.

24 Caracaras eat a wide variety of carrion as well as live prey. They are opportunistic hunters and  
25 will eat insects and other invertebrates, fish, reptiles, birds, and small mammals. They hunt in  
26 flight, from perches, and while on the ground. They are also noted to patrol sections of highway  
27 in search of carrion (USFWS 1999, Palmer 1988).

28 In Florida, adult caracaras are resident and can be found in their home ranges year round,  
29 though juveniles are often nomadic. Reported average home range size is 3,385 acres (USFWS  
30 1999). Habitat loss has been implicated as the leading cause of population declines of  
31 caracaras. Previously, caracaras were routinely captured in vulture traps or killed by humans  
32 who believed them to be a nuisance. Road mortality may also be a significant cause of  
33 population declines (USFWS 1999). One major challenge to research and conservation is that  
34 the majority of caracara nesting and habitat occurs on private lands. Because data from Florida  
35 is limited, little is known about the population size or status of the Florida subpopulation of  
36 caracaras.



## 2.0 METHODS

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Surveys were performed in accordance with the protocols described in *Survey Protocol for Finding Caracara Nests* (USFWS 2004), *Recommended Management Practices and Survey Protocols for Audubon’s Crested Caracara (Caracara cheriway audubonii) in Florida* (Morrison 2001), and in particular with the updates provided in *USFWS Crested Caracara Survey Protocol-Additional Guidance* (USFWS 2015) (**Appendix A**). The survey area encompasses C.R. 510 and a 1,500 meter buffer around the project. Satellite imagery, various GIS layers, and field investigations during this PD&E project were used to evaluate and map suitable caracara nesting and foraging habitat within the survey area. Caracara survey stations were evaluated in the field with input from representatives of USFWS and FDOT on October 13, 2016. A map showing suitable nesting habitat and five survey stations (CC1 through CC5) is provided as **Figure 2-1**. Photographs of the field of view from each survey station are provided as **Appendix B**. Survey stations CC1 through CC4 are located within FDOT right-of-way. CC5 is located adjacent to C.R. 510 where the observer can sit atop a spoil pile for an enhanced view of the surrounding area.

Caracara nest surveys were conducted at each survey station between January 4 and April 21, 2017. Surveys were conducted approximately every two weeks. Surveys began 15 minutes prior to sunrise and continued for at least three hours, except for January 19 when a traffic accident closed the off-ramp on Interstate 95 and surveys did not begin until 0731. During each survey at CC1 through CC4, observers remained in their vehicles at a survey station unless they were pursuing a caracara or standing outside their vehicle to gain a better view of a bird. At CC5 observers were either in their vehicle or sat atop a large spoil pile that offered enhanced views of the surrounding habitat.

All surveyors had bachelor’s degrees in a natural science and at least four years professional experience conducting field surveys, as well as previous experience specifically performing caracara nest surveys (**Table 2-1**). Field personnel carried binoculars, aerial photographs showing the survey area, and datasheets. Weather conditions, survey times, and a description of sightings were recorded on the datasheets and caracara sighting locations and flight paths were recorded on aerial photographs.

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**Table 2-1 Surveyor Experience**

<b>Name</b>	<b>Hours Previous Experience</b>	<b># Previous Nests Located</b>	<b>Primary or Secondary Observer</b>
Rob Myers	40+	1	Primary
Daniel Parabok	40+	1	Primary
Caitlin Hill	40+	1	Primary



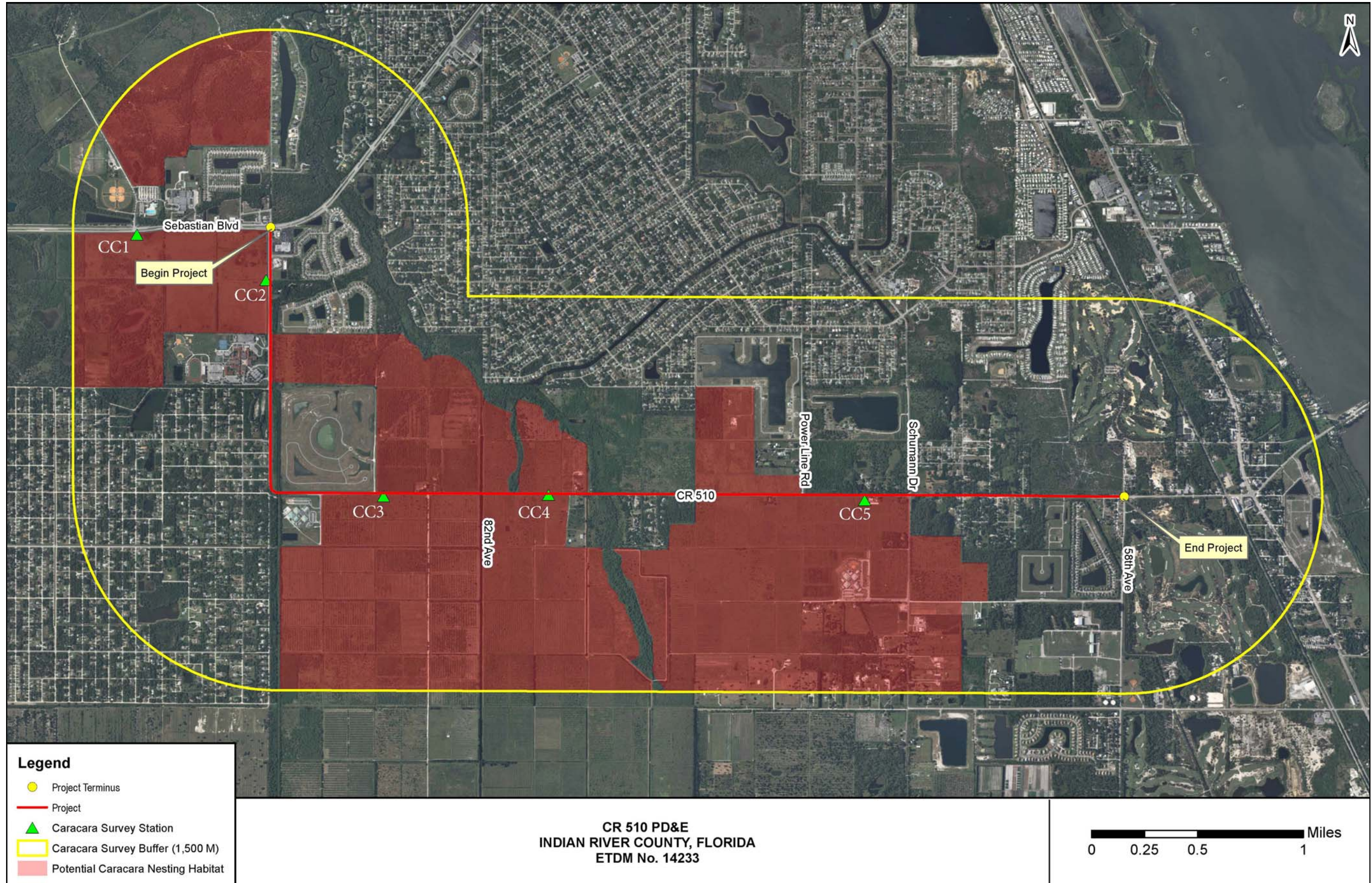


Figure 2-1 Suitable Habitat and Caracara Nest Survey Stations



## 3.0 RESULTS

### 3.1 Potential Caracara Habitat in the Survey Area

Determinations of suitable caracara habitat were guided by habitat descriptions from USFWS (2004 and 2015) and Morrison (2001). Suitable foraging habitat for caracaras occurs throughout the survey area. The potential foraging habitat includes open, vegetated areas as well as some developed areas, such as roadways and dumpsters where caracara may find roadkill or discarded food. The southeast quadrant of the intersection of C.R. 510 and C.R. 512 contains a shopping center with a Publix and many other retailers, including a Papa John's Pizza (9360 90<sup>th</sup> Avenue) where caracaras were observed feeding. Relatively dense residential areas like Vero Lake Estates or Sebastian River Landing (**Figure 1-1**) are not considered potential habitat, though roadkill or trash could provide for rare opportunistic feeding. Drainage structures and furrows in agricultural fields that hold water occur throughout the survey area and are also suitable foraging habitat for caracara.

Suitable nesting habitat requires a mixture of open pasture or prairie with isolated trees, particularly cabbage palm. Survey stations were selected that provided the most effective views of potential nesting habitat and photographs of the habitat surrounding each survey station are provided as **Appendix B**. Large expanses of protected potential nesting habitat exists on St. Sebastian River Preserve State Park, to the northwest of the project. A small portion of the state park falls within the caracara survey area, north of C.R. 512. The pastures immediately south of C.R. 512 and west of C.R. 510 also appear to be suitable nesting habitat. They are predominantly used for grazing cattle and contain open pasture with occasional cabbage palms. Denser vegetation grows along the fence lines and is encroaching into the pasture immediately west of Sebastian River High School. Stadium lighting by the high school athletic field and lighting in the parking lots associated with the Publix shopping center offer perches to caracaras.

The central portion of the project, east of the 90 degree bend in C.R. 510 and extending to Schumann Drive, contains large swaths of potential nesting habitat. These areas are predominantly former citrus groves that have been abandoned in the past 15 years. They contain potential nest trees and are a mosaic of areas with standing dead wood, cleared fields, and areas with significant regrowth of natural vegetation. The wetlands associated with the south prong of the Saint Sebastian River and areas of dense Brazilian pepper in the middle of the project are not potential nesting habitat because the vegetation is too dense. Near the eastern end of the project the landscape is either too wooded or under residential or other use that makes it unsuitable for nesting.



### 1 **3.2 Caracara Nest Survey Results**

2 Caracaras were observed on multiple occasions from survey stations CC1, 2 and 3. Sightings of  
3 caracaras were most frequent at CC2. Adult and juvenile caracaras were observed on multiple  
4 occasions and sightings occurred most frequently near Sebastian River High School, the  
5 pastures immediately to the north, and around the Publix shopping center.

6 Survey dates and results are summarized in **Table 3-1** and narrative descriptions of caracara  
7 survey results are provided by survey date below. Field data sheets are included as **Appendix C**.  
8 Caracara sightings and flight tracks throughout the project area are presented in **Figure 3-1**.  
9 During surveys, no significant rain, high winds, or other weather events were encountered that  
10 might have substantially decreased the probability of detecting caracaras, though there were  
11 occasional periods of brief, light rain or fog.

#### 12 **January 4, 2017**

13 Surveys at CC3 began at 0700 and ended at 1000. Surveys at CC4 began at 0658 and ended at  
14 1007. No caracaras were sighted.

#### 15 **January 5, 2017**

16 Surveys at CC1 began at 0658 and lasted until 0958. From CC1 an adult caracara was observed  
17 flying near the intersection of C.R. 510 and C.R. 512. Surveys at CC2 began at 0656 and lasted  
18 until 1002. Multiple caracara sightings occurred from CC2 on this date, including an adult and a  
19 juvenile. The initial sighting, at 0725, was of a caracara flying from near Sebastian River High  
20 School east, then north, towards the intersection of C.R. 510 and C.R. 512. An adult and a  
21 juvenile were sighted perched on light poles and at dumpsters behind the Papa John's Pizza  
22 (**Photographs 1 and 2**) near the southeast corner of the intersection of C.R. 510 and C.R. 512.

#### 23 **January 6, 2017**

24 Surveys at CC5 began at 0650 and ended at 1000. No caracaras were sighted.

#### 25 **January 18, 2017**

26 Surveys at CC3 began at 0658 and ended at 0958. One adult caracara was observed flying from  
27 north to south across C.R. 510, then turning west. Surveys at CC4 began at 0656 and ended at  
28 1002. No caracaras were observed at CC4.

#### 29 **January 19, 2017**

30 Surveys at CC2 began at 0659 and ended at 1030. Surveys at CC1 began at 0731 and ended at  
31 1101. Surveys were initiated later than usual because a traffic accident closed the I-95 exit ramp  
32 nearest the survey station. Because of a late start, and because a light fog was present at the  
33 very beginning of surveys, surveys times were extended and lasted longer than the typical three  
34 hours. An adult and juvenile caracaras were observed flying above the field between the high

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**Table 3-1 Caracara Survey Station Dates and Observations**

Date	Survey Stations (CC)	Caracaras Observed (Y/N)
January 4	3	N
	4	N
January 5	1	Y
	2	Y
January 6	5	N
January 18	3	Y
	4	N
January 19	1	Y
	2	Y
January 20	5	N
February 1	1	Y
	2	Y
February 2	3	N
	4	N
February 3	5	N
February 20	5	N
February 21	1	Y
	2	Y
February 22	3	N
	4	N
March 7	4	N
March 8	3	Y
	5	N
March 9	1	N
	2	N
March 21	3	Y
March 22	1	Y
	2	Y
March 23	4	N
March 24	5	N
April 5	4	N
April 6	3	Y
	5	N
April 7	1	N
	2	Y
April 18	4	N
April 19	3	N
April 20	2	N
	1	N
April 21	5	N

2

3



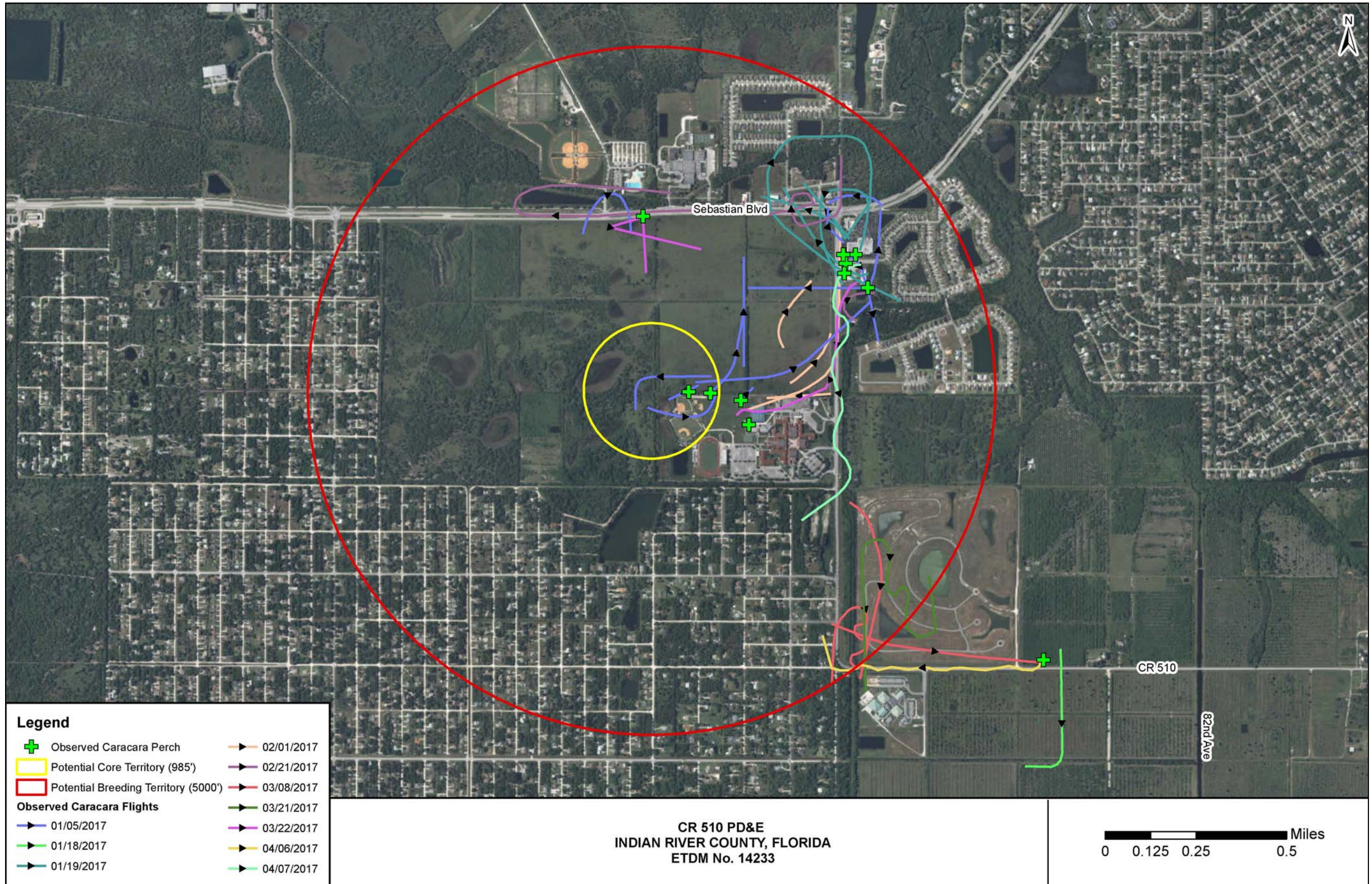


Figure 3-1 Caracara Movements and Potential Territory





1  
2 **Photograph 2- Adult and juvenile caracara perched at Publix shopping center, January 5, 2017**



3  
4 **Photograph 3- Juvenile caracara perched at dumpster at Papa John's Pizza, January 5, 2017**





1

2 **Photograph 4- Adult caracara on ground behind Papa John's Pizza, January 5, 2017**

3 school and the Publix shopping Center as well as perched on light poles in that shopping center  
4 and at the high school.

5 **January 20, 2017**

6 Surveys at CC5 began at 0657 and ended at 1005. No caracaras were observed.

7 **February 1, 2017**

8 Surveys at CC1 began at 0657 and ended at 1025. One caracara was observed at 0706 flying  
9 north-northeast across the pasture immediately north of Sebastian River High School.  
10 Approximately 20 minutes later a caracara was observed flying west from C.R. 510, immediately  
11 north of Sebastian River High School. That bird flew low and went out of sight. Surveys at CC2  
12 began at 0650 and ended at 1002. From CC2 a caracara was observed over the field  
13 immediately north of Sebastian River High School.

14 **February 2, 2017**

15 Surveys at CC3 began at 0650 and ended at 1000. Surveys at CC4 began at 0646 and ended at  
16 1000. No caracaras were sighted at either survey station.

17

1 **February 3, 2017**

2 Surveys at CC5 began at 0645 and ended at 1000. No caracaras were observed from this survey  
3 station.

4

5 **February 20, 2017**

6 Surveys at CC5 began at 0640 and ended at 1000. No caracaras were observed.

7 **February 21, 2017**

8 Surveys at CC1 began at 0630 and ended at 1000. An adult caracara was observed flying west  
9 then east above C.R. 512, just west of C.R. 510. Surveys at CC2 began at 0638 and ended at  
10 0938. An adult caracara was observed in flight just south of the Publix shopping center and also  
11 around the intersection of C.R. 510 and C.R. 512. On one occasion the caracara was observed  
12 flying with food before being lost from sight.

13 **February 22, 2017**

14 Surveys at CC3 and CC4 began at 0638 and ended at 0940. There were brief periods of  
15 intermittent light rain, but not heavy enough that appeared as if it would affect bird behavior.  
16 No caracaras were observed.

17 **March 7, 2017**

18 Surveys at CC4 began at 0624 and ended at 0930. No caracaras were observed.

19 **March 8, 2017**

20 Surveys were conducted at CC3 from 0624 to 0935. An adult caracara was observed three times  
21 from 0730 to 0852. Once it was observed flying south over the area that had been cleared for  
22 residential development northeast of the 90 degree bend in C.R. 510. On a second occasion it  
23 was observed flying east, just north of C.R. 510, and on a third occasion it was observed flying  
24 above the lateral D canal, near the 90 degree bend in C.R. 510. On one of those occasions the  
25 caracara appeared to be carrying something, but the observed could not determine if it was  
26 food or nest material. Surveys at CC5 were conducted from 0624 to 0939. No caracaras were  
27 observed at CC5.

28 **March 9, 2017**

29 Surveys at CC2 started at 0621 and ended 0930. Surveys at CC1 started at 0624 and ended at  
30 0940. No caracaras were observed.

31 **March 21, 2017**

32 Surveys at CC3 began at 0705 and ended at 1015. An adult caracara was observed in flight just  
33 east of the Lateral D Canal. It flew north, across C.R. 510 and meandered in flight above a large  
34 area that was previously cleared for residential development. It flew north and was lost from  
35 sight.

1 **March 22, 2017**

2 Surveys began at CC2 at 0703 and ended at 1010. An adult caracara was observed carrying  
3 something from just south of the Publix shopping center south along C.R. 510 then west  
4 towards the high school. Surveys began at CC1 at 0708 and ended at 1010. A juvenile caracara  
5 was observed perched on a light pole near the high school. That individual flew into an adjacent  
6 field where it fed on a cow carcass. After feeding it flew to the east-southeast, carrying food,  
7 and was lost from view.

8 **March 23, 2017**

9 Surveys began at CC4 at 0705 and ended at 1015. No caracaras were observed.

10 **March 24, 2017**

11 Surveys began at CC5 at 0705 and ended at 1005. No caracaras were observed.

12 **April 5, 2017**

13 Surveys at CC4 began at 0652 and ended at 1000. No caracaras were observed.

14 **April 6, 2017**

15 Surveys at CC3 began at 0650 and ended at 1000. One adult caracara was observed flying west  
16 along C.R. 510, then turning north around the 90 degree bend in C.R. 510 and was lost from  
17 sight. Surveys at CC5 began at 0650 and ended at 1008. No caracaras were observed at CC5. A  
18 light rain began at CC5 at approximately 0945 but the survey area remained visible.

19 **April 7, 2017**

20 Surveys at CC2 began at 0649 and ended at 1000. One adult was observed in flight carrying an  
21 unidentified object from just south of the Publix shopping center south along C.R. 510. Surveys  
22 at CC1 began at 0650 and ended at 1005. No caracaras were observed from CC1.

23 **April 18, 2017**

24 Surveys at CC4 began at 0638 and ended at 0940. No caracaras were observed.

25 **April 19, 2017**

26 Surveys at CC3 began at 0637 and ended at 0940. No caracaras were observed.

27 **April 20, 2017**

28 Surveys at CC2 began at 0636 and ended at 0940. Surveys at CC1 began at 0640 and ended at  
29 1000. No caracaras were observed at either station.

30



1 **April 21, 2017**

2 Surveys at CC5 began at 0630 and ended at 0945. No caracaras were observed.

3

## 4.0 DISCUSSION

### 4.1 Caracara Sighting Clusters and Flight Tracks

Out of a total of 40 surveys across five survey stations, caracaras were observed during fifteen surveys and at three different survey stations (CC1, CC2, CC3). Caracaras were observed most frequently from CC2 (detected during six surveys) and almost as frequently at CC1 (detected during five surveys). Sightings of caracara from CC1 and CC2 included an adult and a juvenile caracara. A single caracara was observed from CC3 during four surveys. No caracaras were observed from CC4 or CC5.

Caracara survey data shown in **Figure 3-1** reveals clusters of sightings and flight tracks that appear to converge on or depart from similar locations. Caracara sightings and perches clustered in two places, the Publix shopping center in the southeast corner of the intersection of C.R. 510 and C.R. 512, and Sebastian River High School. Caracaras were seen by the Publix shopping center on six different occasions and were repeatedly observed there perched for extended periods on light poles (**Photograph 2**). On January 5, 2017 an adult and a juvenile caracara were observed at the dumpster (**Photograph 3**) behind the Papa John's Pizza, located just south of the Publix. This clustering of observations and scavenging dumpsters at the Publix shopping center support the conclusion that this area is regularly used for foraging by caracara.

Sightings of caracara also cluster around Sebastian River High School and the flight tracks show multiple trips leaving from or flying towards the school. During four of the six days where caracaras were detected from CC1 or CC2 there were flights beginning or ending in the vicinity of the northwest corner of Sebastian River High School. Caracaras were repeatedly observed perched on the light poles by the athletic fields at Sebastian River High School. In addition, multiple observations were made very early in the morning (before 0730) of a caracara flying from the area of Sebastian River High School towards the Publix shopping center. This evidence suggests that a roost or potentially a nest may exist in the vicinity of the northwest corner of Sebastian River High School; however, insufficient information exists to conclude with confidence that a nest is present.

Besides the Publix Shopping Center and Sebastian River High School there were two other areas where caracara were repeatedly observed, though with less frequency. On three different days a caracara was observed flying along C.R. 512 west of the intersection with C.R. 510, near CC1. On two of those occasions the caracara arrived from the south, in the direction of Sebastian River High School, and twice a caracara was observed to fly from CC1 towards the Publix shopping center. The only time a caracara was observed perching in the vicinity of CC1 was on March 22, when a nearby cow carcass was available in the pasture south of C.R. 512.

1 The second area where caracara were repeatedly observed, but with less frequency than at the  
2 Publix shopping center or Sebastian River High School, is around CC3. Surveys at CC3 detected  
3 caracaras on four different dates. On two of these dates (March 8 and April 6) the flight tracks  
4 show the area of Sebastian River High School as being on the likely flight route. During the  
5 other two surveys the caracara turned and flew in the general direction of Sebastian River High  
6 School before it was lost from sight.

7 Separate caracara nest surveys were performed in 2016 and results are presented in a report  
8 included as **Appendix D**. During 2016, three caracaras were observed together, including two  
9 adults and a juvenile. The 2016 surveys did not locate any active caracara nests. Analysis of  
10 observations and flight tracks recorded in 2016 reveals extremely similar patterns to those  
11 observed in 2017. Caracara observations clustered in the vicinity of the Publix shopping center  
12 as well as near the northwest corner of Sebastian River High School.

#### 13 **4.2 Caracara Habitat Near Sighting Clusters**

14 Observations indicate that the Publix shopping center is regularly used for foraging by caracara.  
15 This area is not traditional foraging habitat because it has been developed for commercial use  
16 but food waste is available at dumpsters and roadkill may be available along C.R. 512 and C.R.  
17 510. Potential nesting habitat for caracaras does not occur on or adjacent to the Publix  
18 shopping center or anywhere in the survey area east of C.R. 510 and north of Sebastian River  
19 High School. These areas are too densely forested or have been converted to residential or  
20 commercial uses.

21 High Quality potential nesting habitat occurs in the survey area west of C.R. 510 and north and  
22 west of Sebastian River High School, near CC1 and CC2. Surveys of this area from 2016 and 2017  
23 show repeated occupation by caracaras. These pastures are predominantly open and contain  
24 isolated cabbage palms, with denser vegetation along the fence lines and in the pasture west of  
25 Sebastian River High School. Caracara activity in the pastures immediately south of C.R. 512 or  
26 immediately west of C.R. 510 was easily observable from CC1 or CC2, respectively. However,  
27 increased distance and vegetation along fence lines made observations of the further removed  
28 pastures and the western half of the school grounds more difficult.

29 Caracara were also observed southeast of Sebastian River High School, near CC3. The area  
30 immediately northwest of CC3, between C.R. 510 and 86<sup>th</sup> Avenue, was previously cleared for  
31 residential development and now contains roads, ponds, and utilities but no houses. Because  
32 there are no mature trees this area is not potential nesting habitat; however, it is potential  
33 foraging habitat. Potential nesting habitat east of 86<sup>th</sup> Avenue and north of C.R. 510 is generally  
34 of low or medium quality because shrubby vegetation, including Brazilian Pepper, has become

1 too dense. South of C.R. 510, near CC3, the potential nesting habitat is high quality and contains  
2 cleared citrus fields and open pasture with occasional mature cabbage palms and other trees.

### 3 **4.3 Likelihood of Caracara Nesting**

4 No caracara nests were found in 2016 or 2017 and no evidence was found strongly suggesting  
5 that a nest, instead of a roost, existed in the survey area in 2017. However, because caracara  
6 are cryptic around their nests and the nests are extremely difficult to see they may go  
7 undetected. If a nest did exist in 2017, the survey data suggests that the most likely location is  
8 in pastures near the northwest corner of Sebastian River High School.

9 The area immediately surrounding a caracara nest is considered to be its core nest territory and  
10 includes everything within 985 feet of the nest tree. The larger breeding territory includes  
11 everything within 5,000 feet of a nest tree. **Figure 4-1** shows a hypothetical potential core nest  
12 territory and potential breeding territory centered in a pasture near the northwest corner of  
13 Sebastian River High School.

### 14 **4.4 Potential Project Impacts**

15 If a nest were to occur near the northwest corner of Sebastian River High School, the proposed  
16 project would not be anticipated to directly impact any of the core nesting territory. Direct  
17 impacts to the larger breeding territory would result from either build alternative. Long term  
18 impacts would result from the conversion of previously unpaved areas to roadway or sidewalks.  
19 Under the TS E East Alignment alternative, approximately 7.16 unpaved acres within the  
20 potential breeding territory would be paved. That impacted area represents approximately  
21 0.00397 percent of the potential breeding territory. Under the TS G East Alignment alternative  
22 approximately 8.93 previously unpaved acres within the potential breeding territory would be  
23 paved. That represents approximately 0.00495 percent of the potential breeding territory.

24 These direct impacts to the potential breeding territory would predominantly occur to  
25 previously disturbed areas like existing FDOT right of way or lands cleared for residential  
26 development. These impacted areas are potential foraging habitat for caracara, but are  
27 generally not potential nesting habitat due to a lack of suitable nesting trees with sufficient  
28 isolation. Because caracaras are known to feed on roadkill, impacted areas such as new  
29 roadways are anticipated to remain potential caracara foraging habitat, despite being paved  
30 and removed from primary productivity.

31 No caracaras were observed entering or exiting a potential nest tree or focusing on any specific  
32 group of trees in the survey area. However, the repeated observations and flight tracks suggest  
33 that a roost or a nest could occur in the pastures near the northwest corner of Sebastian River  
34 High School. Multiple potential nest trees occur in this area and direct observations of localized  
35 nesting behavior were difficult due to the distance from observation points and vegetation that



1 obscured views. It is unlikely that an undetected nest exists in the pastures immediately west of  
2 C.R. 510 because very clear views of these pastures were afforded from CC2 and observations  
3 indicated a locus of activity further west. Thus, survey data suggest that if a nest were present  
4 in 2017, it is most likely further than 985 feet from the proposed project.

5

6

7

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26

1

## **Appendix A: Caracara Species Conservation Guidelines and Survey Protocols**

2

## USFWS Crested Caracara Survey Protocol – Additional Guidance (November 2015)

The northern crested caracara (*Caracara cheriway*) is a resident, diurnal, and non-migratory species that occurs in Florida as well as the southwestern U.S., Cuba, Mexico, Central America and the northern portions of South America. Only the Florida population, which is isolated from the remainder of the species, is listed as threatened under the Endangered Species Act. The Florida population commonly occurs in dry or wet prairie areas with scattered cabbage palms (*Sabal palmetto*). It may also be found in lightly wooded areas. Scattered saw palmetto (*Serenoa repens*), scrub oaks (*Quercus geminata*, *Q. minima*, *Q. pumila*), and cypress (*Taxodium* spp.) may also be present. Widespread changes in land use may have caused a change in habitat use in this species. Morrison and Humphrey (2001) found a strong association of caracara home ranges with improved pasture. The presence of seasonal wetlands, which serve as foraging habitat, may be an important factor in the attractiveness of these pastures to caracaras (Service 1999). Project sites within the caracara consultation area (Figure 1) containing some or all of the habitats described above will require a formal caracara survey to determine the extent of utilization of the site by caracaras. The intent of caracara surveys is two-fold: (1) to determine the location of active caracara nest(s) that could be impacted by the proposed project, and (2) to determine the use of the project area by breeding and non-breeding caracaras, including the approximate boundaries of breeding territories if possible.

### Survey Design and Planning

The protective area for a caracara nest is a radius of about 1,500 meters (m) (4,920 feet) around the nest. Therefore, the survey area should include the project area and a 1,500-m buffer to account for off-site territories that might overlap onto the project area. All efforts should be made to obtain access to non-project property within the survey area where suitable habitat is present. Efforts made to contact these property owners should be documented (*e.g.*, copy of letter, email, etc.). If permission cannot be obtained, contact the Service for additional guidance prior to initiating surveys. If an area is deemed suitable for caracaras but cannot be properly surveyed, the Service will assume that area to be occupied.

A recent aerial photograph depicting the project boundary and buffer zone should be used to identify all areas of suitable habitat and to preliminarily map observation blocks. An observation block is defined as an area easily observable from one vantage point. Enough observation blocks must be identified to cover all suitable habitat within the project boundary and 1,500-m buffer. Prior to the first survey session, a site visit must be conducted to confirm suitable habitat and the location of observation blocks – based on the site assessment (*e.g.*, presence of visual obstructions), observation blocks may need to be revised. During the site visit, also identify observer survey stations (at least one per observation block). Survey stations should be located to allow full, unobstructed view of the observation block – strategic points are those where caracaras are more likely to be seen going to and from potential nesting or foraging sites. Based on the site assessment, update the aerial photo to show suitable habitat, and labeled observation blocks and their respective survey stations. The location of survey stations may be adjusted if needed based on initial survey results in order to obtain a different/better view of caracara activity. Any adjustments to the survey design should be documented via revised maps.



## USFWS Crested Caracara Survey Protocol – Additional Guidance (November 2015)

### Observer Qualifications

Information from a recent study (Dwyer *et al.* 2012) suggested that the probability that a visit or series of visits (*i.e.*, a survey) would lead to the discovery of an existing caracara nest is highly dependent on observer experience. Due to their cryptic nest site locations and unorthodox method of foraging (walking on the ground), successful nest site surveys require a specific skillset acquired by conducting numerous surveys under the supervision of an experienced caracara surveyor. In addition, caracaras can be hard to find and identify at long distances. Most caracaras are also very wary of humans and will change their behavior in the presence of people, which can make locating nests extremely difficult for unqualified observers. Due to these factors, surveys must be conducted by a qualified biologist having at least two to three years experience conducting bird surveys and at least 40 hours of caracara survey experience under the supervision of an experienced caracara surveyor. If an observer does not meet these minimum qualifications, the observer should be accompanied by an experienced caracara surveyor (who will serve as the primary observer). Even in cases of qualified biologists, and where staff resources allow it, having two observers at the same station can increase the probability of finding a nest.

### Conducting Surveys

There is the highest probability of success in finding caracara nests during the period of January through March. This period covers the time when most birds are feeding the nestlings and become more visible to observers. As such, surveys must start no later than early January (within the first 10 days) and continue through April 30 to provide adequate data to conclude whether or not the site contains an active caracara nest and/or foraging habitat. Surveys should not be conducted in November or December without additional coordination with the Service to avoid disturbing nesting caracaras during nest initiation or incubation, when they are more prone to disturbance.

A complete survey of the project area consists of one survey session every two weeks from early January through April 30 of each observation block within the project area and the 1,500-m buffer. A survey session is defined as a single survey within an identified observation block initiated at least 15 minutes prior to sunrise and lasting 3 hours. The entire 3-hour survey session must be spent viewing the one observation block – observers cannot rotate between stations, cruise roads, or leave the observation block unless following a flying caracara. If the survey area is large or includes obstructed views, and multiple observation blocks are required, multiple observers (preferred) or additional survey sessions will be needed to complete the survey of the entire project area. Afternoon or evening surveys are optional, but cannot be substituted for early morning surveys (in the event of not finding a nest). More frequent morning surveys (*i.e.*, more than one during a two-week period) of an observation block are also optional, and can increase the probability of finding a nest (more quickly/at all), but cannot be substituted for the required surveys every two weeks through April 30 in the event of not finding a nest.

## USFWS Crested Caracara Survey Protocol – Additional Guidance (November 2015)

Surveys must be conducted from a vehicle (preferred; best options are trucks or similar vehicles to maximize height above ground and minimize view obstructions) or an appropriate wildlife blind using high-power binoculars. A spotting scope is also useful when documenting behavior of caracaras and confirming nest tree locations that are far away. Staying inside the vehicle/blind is essential, as it minimizes caracara disturbance and behavior alteration and increases the probability of finding nest locations. If this cannot be accomplished (*e.g.*, due to visibility or vehicle access restrictions), the Service should be contacted to provide site-specific guidance.

Weather conditions must be adequate to clearly view the whole area. Surveys should not be conducted when it is rainy or foggy. Weather conditions and other important information must be recorded on field data sheets as itemized below (see Reporting).

During the survey, from a stationary position, search for caracara activity, including birds perched in trees or on sentinel posts, flying along roads or levees, or carrying nesting material or food. Watch for other birds, such as American crows (*Corvus brachyrhynchos*), red-tailed hawks (*Buteo jamaicensis*), red-shouldered hawks (*Buteo lineatus*), bald eagles (*Haliaeetus leucocephalus*), and turkey vultures (*Cathartes aura*), that might elicit an aggressive response from caracaras. Nesting caracaras will often chase potential predators away from the nest, thus revealing their presence. Also, circling vultures can indicate the presence of carrion that may attract caracaras. If the observer is near or on a road, pay attention to road-killed animals that may serve as forage for caracaras. If in a pasture, look for cow or calf carcasses on which caracaras may forage.

If a caracara is sighted, document its activity (*i.e.*, foraging, roosting, preening, territorial behavior, etc.) and location on an aerial map. If a caracara is in flight, document on the aerial map the direction the bird came from, the direction it is flying in, and if it is carrying nesting material or food. Make all reasonable efforts to track the bird to a potential nest location. If a potential nest tree is detected, then the observer can reposition to improve observation of the bird's behavior. All observer locations during a survey should be marked on the aerial. All caracara observations must be recorded on the field data sheets, including time of observation, number of birds, plumage (adult/juvenile), activity/behavior (*e.g.*, perching, foraging, feeding, preening, courtship or territorial display, etc.), and nest stage (building, incubating, nestlings, fledglings) if applicable. Corresponding caracara locations and flight paths must be marked and labeled on the aerial map. Also mark any potential or confirmed nest tree locations on the aerial photo, with GPS coordinates of the observation site and an estimate of the direction and distance of the nest from the observation point (a rangefinder may help to measure distance). Do not try to approach the nest as this may cause the caracara to abandon their nesting attempt. It may be possible to use a compass bearing from two different locations to triangulate the location of a nest tree that may be too far away and not near recognizable landmarks.

If no nests are found during the initial survey session then return and repeat the survey at two week intervals. Once a nest tree location is confirmed (or at least highly suspected), contact

## USFWS Crested Caracara Survey Protocol – Additional Guidance (November 2015)

the Service for additional guidance. If the survey starts after January and no nests are found, the site will be presumed occupied if the habitat is appropriate until the site can be resurveyed beginning January of the following nesting season to ensure that early nesting birds were not missed.

In addition to location of nest trees, the survey data described above can be used to understand the use of the survey area (*e.g.*, as foraging or roosting habitat) by both breeding and non-breeding caracaras. Non-breeding caracaras can include both juveniles and adults. Detailed survey data are also useful in approximating boundaries of breeding territories, which is typically important to identifying the number of territories that may be impacted by a proposed project and the anticipated effect that proposed activities may have on a breeding caracara pair. This is especially true for projects which are large in size or include habitat conversion.

For more details on caracaras, see Service (1999) and Morrison (2001).

### Reporting

Requirements for final reports are as follows:

1. Map of field-verified habitat types within the project area and 1,500-m buffer
2. Copies of marked aerial photo(s) showing all suitable habitat, with labeled observation blocks and their respective survey stations (including any alternate station locations used)
3. For each survey station, copies of photos documenting the field of view
4. Documentation of efforts to contact adjacent landowners, and copies of access agreements, if applicable
5. A summary table with the following information for each observer: name, hours of experience conducting caracara surveys (as of January 1), number of caracara nests previously found, and whether the observer served as a primary or secondary observer
6. Copies of all individual field data sheets which include the following information for each survey:
  - observation block/survey station ID
  - survey date
  - observer name(s)
  - observer location (*e.g.*, in a vehicle, blind, on foot)
  - start and end times
  - start and end weather conditions (temperature, wind speed and direction, cloud cover, visibility, and precipitation)
  - caracara location/activity details including (for each observation):
    - time of observation
    - number of birds
    - plumage
    - activity/behavior

## USFWS Crested Caracara Survey Protocol – Additional Guidance (November 2015)

- nesting stage, if applicable
  - aerial map showing all observed caracara locations and flight paths (labeled to correspond with activity details) and any potential/confirmed nest tree locations
7. Location data (*e.g.*, latitude/longitude) for all caracara observations and potential/confirmed nest trees in Excel, projected shapefile or .kml/.kmz format and attributed to include the information in (6) above.

Additional survey or reporting requirements may exist if the caracara surveys are required by a Service Biological Opinion (in this event, refer to the BO's Terms and Conditions).

For questions or additional guidance regarding the above survey protocol, please contact the Service's caracara lead, Heather Tipton, at 772-469-4296.

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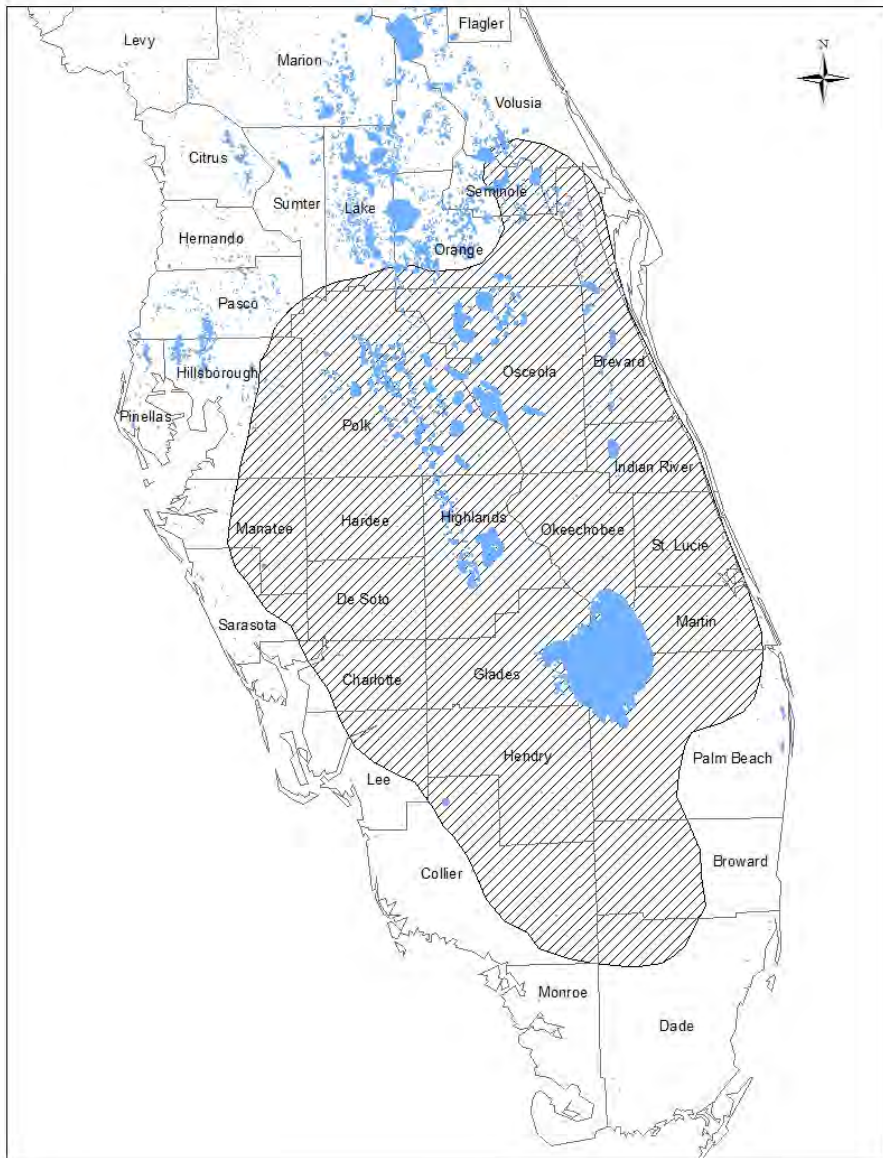
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# USFWS Crested Caracara Survey Protocol – Additional Guidance (November 2015)

Figure 1. USFWS consultation area for crested caracara



Species Conservation Guidelines  
South Florida

**Audubon's Crested Caracara**

The Species Conservation Guidelines (Guidelines) for Audubon's crested caracara (*Polyborus plancus audubonii* (= *Caracara cheriway audubonii*)) (caracara) provides a tool to assist the user in determining if their project may adversely affect caracaras. Here we describe actions which might have a detrimental impact on the caracara and how these effects can be avoided or minimized.

The Fish and Wildlife Service (Service) suggests review of the following papers for synopses of caracara ecology: *South Florida Multi-Species Recovery Plan* (Service 1999) and the *Recommended Management Practices and Survey Protocols for Audubon's Crested Caracara* (*Caracara cheriway audubonii*) (Morrison 2001). Below is a summary of some life history aspects of this species which are pertinent to the Guidelines process.

**Life History**

The caracara is a resident, diurnal, and non-migratory species that occurs in Florida as well as the southwestern U.S. and Central America. Only the Florida population, which is isolated from the remainder of the species, is listed as threatened under the Endangered Species Act. This large long-lived raptor breeds from September through June with the primary season being November through April (Morrison 1999). Morrison and Humphrey (2001) found that caracaras prefer to nest in cabbage palms (*Sabal palmetto*) surrounded by open habitats with low ground cover and low density of tall or shrubby vegetation in Florida. Peak egg laying takes place from late December through early February (Morrison 1999). Incubation lasts for about 32-33 days and young fledge at 43-56 days after hatching (Layne 1996, Morrison 1996). Juveniles leave the natal area and can be found roosting in large groups (50 or more) in large palm and oak trees (Morrison 2001).

Habitat

The Florida population commonly occurs in dry or wet prairie areas with scattered cabbage palms (*Sabal palmetto*). It may also be found in lightly wooded areas. Scattered saw palmetto (*Serenoa repens*), scrub oaks (*Quercus geminata*, *Q. minima*, *Q. pumila*), and cypress (*Taxodium* spp.) may also be present. Widespread changes in land use may have caused a change in habitat use in this subspecies. Morrison and Humphrey (2001) found a strong association of caracara home ranges with improved pasture. The presence of seasonal wetlands may be an important factor in the attractiveness of these pastures to caracaras (Service 1999). There is no critical

habitat designated for this species.

### Distribution

Historically, this subspecies was a common resident in Florida from northern Brevard County, south to Lake Okeechobee. It has been reported as far north as Nassau County, and as far south as Collier County and the lower Florida Keys in Monroe County. Caracara may be found in Charlotte, Collier, Hardee, Hendry, Martin, Monroe, Palm Beach, Polk, and St. Lucie Counties, but the region of greatest abundance for this subspecies is a five-county area north and west of Lake Okeechobee, including Desoto, Glades, Highlands, Okeechobee, and Osceola Counties. Figure 1 shows the consultation area where we primarily expect projects to impact the caracara.

Telemetry data (Morrison, unpubl. data) show several communal gathering areas for juvenile caracaras in south-central Florida. These gathering areas are not always at the same location, but are known to occur in a several general areas marked on Figure 1. The largest gathering area includes the floodplains and adjacent pasture lands on both sides of the Kissimmee River. Other smaller areas were identified in Highlands and Glades Counties (Fig. 1). Both the consultation and gathering areas are important in determining whether a project may affect caracaras.

### Determination

A flowchart is provided to guide you in determining your project's impacts on the caracara (Fig. 2). You should have a project description and a habitat maps. The map should have the project boundaries and a 1,500-m (4,920 ft) buffer surrounding the property. This buffer will help identify any off-site caracara territories that may overlap onto the property. Compare your project location with the consultation area map (Fig. 1). If the project is not in the caracara consultation area then the project should have no effect on the caracara and the Federal action can proceed.

Within the consultation area, there are special gathering areas used by juvenile caracara (Fig. 1). If the project is within a gathering area, then activities may affect the caracara and conservation measures may be needed (see below). Major habitat modification in these areas may require formal consultation.

It is important to determine whether a project site has suitable habitat. Suitable habitat for the caracara includes wet and dry prairies with scattered saw palmetto, scrub oak, or cypress. In addition, improved and semi-improved pastures and range lands may be considered suitable habitat. Heavily forested areas are not considered a suitable habitat. If the project is within the consultation area, and no suitable habitat is present, then no effect is anticipated to the caracara and Federal action can proceed.

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If the project occurs within the consultation area, and suitable habitat is present, the Service presumes the habitat is occupied and activities in this area may affect the caracara. In this case a caracara nest survey will confirm whether or not caracaras nest on the property. Guidelines on how to survey for caracara nests can be found in Appendix B. If the survey does not detect caracara nests, then no effect from the project is anticipated on the caracara.

If the surveys detected a caracara nest or available information indicates the presence of a nest at the project site, then the project may affect the caracara and further consultation with the Service is warranted. If appropriate conservation measures are implemented by the project then the project is not likely to adversely affect the caracara. If conservation measures can not be implemented or take of a caracara may occur then the project is likely to adversely affect the caracara and formal consultation should be initiated.

### **Conservation Measures**

When a nest is present a series of conservation measures for activities in primary and secondary zones are provided below. These Guidelines can be used to modify project activities to avoid or minimize impacts and result in the project not likely adversely affecting the caracara.

#### **Management Zones**

In evaluating project impacts to the caracara in south Florida, the Service defines a primary zone as 300 m (985 ft), and a secondary zone as 1,500 m (4,920 ft) outward from the nest tree. Protection of the primary zone is very important particularly during the nesting season, and must be maintained in order to provide conditions for successful reproduction. Impacts during the active nesting period can be avoided by timing of activities near the nest site. Conservation measures that help reduce the impact of a project on the caracara and that are compatible with caracara survival are as follows:

#### **Non-nesting Season (May to October)**

- Maintain nest tree and other trees in the zone. This should include dead trees that are often used for perching and roosting. The nest and the nest tree are protected year-round by both Federal and State law and removal or other means of physical damage is prohibited.
- Maintain ground vegetation to provide cover for fledglings as they learn to fly.
- Maintain pasture, grassland, and wetlands that are necessary for caracara foraging. Typical land management practices, such as, cattle grazing, burning, and mowing are allowed during the non-nesting season. Man-made wetlands, such as, ditches and canals, are important feeding sites and also should be maintained. New construction that will increase the level of



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disturbance may adversely affect caracaras.

- Avoid use of chemicals toxic to wildlife, including pesticides, fertilizers, or herbicides.

Nesting Season (November to April)

Caracaras are most sensitive to disturbance during nest building, incubation, and early nestling stages (first 3 to 4 weeks). There are additional conservation measures during this time to minimize impacts to the caracara.

- Normal agricultural activities should be limited during this season. Once the nestlings fledge normal activities can resume.
- In general, human activities in this zone should be limited including low flyovers by aircraft.

Secondary Zone - The secondary zone encompasses an area extending outward from the end of the primary zone (300 m (984 ft) from the nest) to 1,500 m (4,920 ft). This zone is generally defined as the foraging territory in which the nest site is located. This secondary zone is used by caracaras for the collection of nest material, roosting, and feeding. The average caracara home range is 1250 ha (Humphrey and Morrison 1997). This amount of suitable habitat contiguous to the nest site may be required to maintain the ecologic function of the nesting territory.

Conservation measures for this zone are directed at maintaining the foraging capacity of the area.

- Maintain pasture, grassland, and wetlands that are necessary for caracara foraging. Typical land management practices, such as, cattle grazing, burning, and mowing can be done throughout the year. Man-made wetlands, such as, ditches and canals, are important feeding sites and also should be maintained. Conversion of pasture and wetland habitats in this zone to row crops, sugarcane, citrus groves, pine plantations, or hardwood forest may adversely affect caracaras. Normal ranching and agricultural operations (including sod farming), hiking, bird watching, fishing, camping, picnicking, hunting, and recreational off-road vehicle use are allowed in the secondary zone.
- Limit use of chemicals toxic to wildlife, including pesticides, fertilizers, or herbicides, as they may impact the caracara through it's food supply.

Habitat Enhancements

If potential nest trees are lacking in an otherwise suitable habitat, planting of cabbage palms can improve the habitat for caracaras. Caracaras prefer open grasslands or unimproved pasture. Tall, thick, or scrubby ground cover can be improved through prescribed burning or mechanical vegetation removal.

## Gathering Areas

Though no specific locations within these gathering areas are used continuously, they are important staging areas for caracaras during the first year after leaving their natal territory. The following are recommended guidelines for activities within these areas:

- habitat conversion other than traditional agricultural and ranching activities should be limited within the gathering area;
- large trees, both living and dead, should be retained as roost and perch trees;
- incorporate land management practices that keep ground cover vegetation short, which may include cattle grazing, burning, mowing, or roller chopping; and
- plant cabbage palm tree clusters (minimum of three trees spaced close together) in areas lacking potential nest and perch trees.

Examples of how conservation measures may be implemented are as follows:

### Non-nesting Season

The project avoids habitat modification in the primary and secondary zones, with any acceptable land uses in these zones occurring outside the nesting season. These zones were formulated to protect the caracara from excessive human disturbance. Ideally the project footprint can be modified not to impact the conservation zones. If the primary zone can be set aside by conservation easement, or other protective covenant as an environmentally sensitive area then we can assure the use of the site by the caracara throughout its life. Within the primary zone, it is important to retain suitable trees for nesting, such as cabbage palms, and other large trees for perching and roosting. Also, maintain natural ground cover that can be used by fledglings as cover.

In both zones, suitable habitat such as grasslands, pasture, and man-made wetlands (ditches and ponds) within pastures, should be maintained. New buildings, roads, power lines or canals, in the zones may adversely affect caracaras. As the secondary zone is important to foraging, conversion of pasture and wetland habitats to row crops, sugarcane, citrus groves, pine plantations, or hardwood forest may adversely affect caracaras. Chemicals harmful to wildlife should be avoided in the conservation zones. During the non-nesting season, normal agricultural operations, exotic species control, and other wildlife enhancement activities can occur in both zones. If the above conservation measures are incorporated into a caracara management plan the project is not likely to adversely affect the caracara.

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### Nesting Season

Caracaras are most sensitive to human disturbance during the nesting season between November and April (Morrison 2001). As such, unnecessary human entry and aircraft flyovers should be avoided within the primary zone and flyovers should be prohibited during this period. If necessary, project activities can occur during the nesting season, after the hatchlings have fledged. It can take as little as 11 weeks from egg laying to fledging. A site monitor should be used to determine when fledging occurs and project activities can begin. During the nesting season, normal agricultural operations, exotic species control, and other wildlife enhancement activities can occur in the secondary zone. If the above conservation measures are incorporated into a caracara management plan the project is not likely to adversely affect the caracara.

### Modifications to Conservation Measures

The Service believes that there are very few circumstances that biologically justify modification of the conservation measures. However, some caracaras are very tolerant of human activity. In these cases, biological data, such as habitat use, flight patterns, and foraging areas can be used to justify modifications to conservation measures. This data must include a biological evaluation of the monitoring data and why the proposed modifications would not adversely affect the nesting caracaras. This information should be incorporated as a component of the caracara management plan. If the data in the caracara management plan biologically support the request to modify the conservation measures, then the project is not likely to adversely affect the caracara and concurrence of this determination may be requested from the Service.

### On-site Habitat Enhancement

For projects that propose modification to habitat in the primary or secondary zones, the Service would normally require formal consultation. But if surveys indicate that the habitat quality has degraded as a result of exotic species invasion, lack of fire, or other anthropogenic actions, then on-site habitat enhancement may be possible to offset loss of function that would result from project impacts.

If the habitat modification is small, and on-site habitat enhancements are proposed to improve habitat quality in the remainder of the zones, then a determination could be made that the project is not likely to adversely affect the caracara. Proposed modifications and enhancements should be incorporated in a caracara management plan. This plan also needs a monitoring program to document the success of the enhancement actions.

### Nest Abandoned or Blown Down

Caracara nests are protected both by Federal and State laws. In situations where nests are blown down, or damaged during storm events, the caracara will usually rebuild the nest during the next

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nesting season in the same tree or in an adjacent tree. In certain circumstances, several years may pass before a new nest is constructed. A nest should not be considered abandoned until it is not used for three consecutive breeding seasons or no other active nests are found within 0.5 km (0.31 mi) of the nest. The nest site should be protected as per the non-nesting season conservation measures. These should be documented in a caracara management plan. If a nest is found to be abandoned by the above criteria, then the project is not likely to adversely affect the caracara.

#### Nest off-site, but secondary zone overlaps onto the project

Caracaras may nest off-site but within 1,500 m (4,920 ft) of the project boundary. The secondary zone area that overlaps onto the site should be protected by measures listed above. If possible, the off-site management zone area should be protected through conservation easements. A survey of activity patterns could be completed to determine if the birds make use of resources on the property. If the birds do not make use of the project area or if conservation measures for the area of overlap were included in a caracara management plan, then the project is not likely to adversely affect the caracara.

#### Habitat Protection in Gathering Areas

Within gathering areas, if the conservation measures listed above are incorporated into a caracara management plan then the project is not likely to adversely affect the caracara. Major habitat modification such as conversion of pasture and wetland habitats to row crops, sugarcane, citrus groves, pine plantations, or hardwood forest may be harmful and therefore warrant formal consultation. Prudent modification of the project with the aforementioned conservation measures will reduce the potential for harm to the point that formal consultation will not be necessary. The Service recommends early consultation to identify issues and options available to reduce the project's impact on the caracara.

#### Habitat Modification in the Conservation Zones

If the project:

- modifies substantial habitat within the conservation zones;
- requires intrusion into the primary zone; or
- could result in loss of eggs in the nest, nestlings, or nest tree, then formal consultation is required.

During construction, an on-site monitor will be required to determine if project activities are disturbing the caracara. There are many options to minimize adverse effects and reduce incidental take. Actions that may be appropriate to minimize harmful effects could include habitat enhancement, muffling of equipment, less intrusive construction methods, and other project-specific recommendations. Prudent modification of the project with these



recommendations can avoid formal consultation and expedite the project's completion. The Service recommends early consultation to identify issues and options available to reduce the project's impact on the caracara.

## Reports

### Survey Report

Survey protocols for caracara can be found in Appendix B and Morrison (2001). The goal of the survey is to provide a complete count of all caracara nesting pairs within the project area and develop an approximate territory or home range map for each nesting pair. The survey report should include the following, as applicable:

- A. Field data sheets with:
  - 1. dates with starting and ending times of all surveys conducted;
  - 2. weather conditions during all surveys, including average temperature, wind speed and direction, visibility, and precipitation; and
  - 3. total number of caracara nests found and number of caracaras observed in each location.
  
- B. An aerial photograph or vegetation map depicting:
  - 1. the entire area of interest;
  - 2. nest locations, primary and secondary zones;
  - 3. habitat descriptions; and
  - 4. locations of all caracaras seen or heard while conducting the survey or at any other time, including flight direction.

### Biological Evaluation Report

If the project may affect the caracara, a biological evaluation will be helpful for determining whether formal consultation is necessary. Guidelines for this report can be found in Service (2004).

### Caracara Management Plan

If a project may adversely affect the caracara, a management plan can identify conservation measures, habitat enhancements, and monitoring that will help minimize adverse effects to caracaras. The following should be considered when assessing project effects to the caracara:

- What is the level of use of the project area by the caracara? You may need to conduct surveys.

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- How is the area used? Why is the caracara there? Are they transient, foraging, perching, roosting, or nesting, etc?
- What effect will the project have on the caracara's foraging areas in all areas influenced by the project?
- What actions are proposed to minimize potential effects to the caracara? This should include monitoring and enhancement actions, if any.

The management plan should be a component of the initiation package (Service 2004).

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## GIS Layers

Consultation Area	Caracara_ca	shape file
Gathering Areas	Caracara_ga	shape file

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**APPENDIX A**

**Recommended Management Practices and Survey Protocols  
for Audubon's Crested Caracaras (*Caracara cheriway audubonii*) in Florida**



**Recommended Management Practices  
and Survey Protocols for Audubon's  
Crested Caracara (*Caracara cheriway  
audubonii*) in Florida**

**TECHNICAL REPORT NO. 18**

**Joan L. Morrison**



**September 2001**



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**Recommended Management Practices  
and Survey Protocols for Audubon's  
Crested Caracara (*Caracara cheriway  
audubonii*) in Florida**

**TECHNICAL REPORT NO. 18**

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## **INTRODUCTION**

This document was published and issued by the Florida Fish and Wildlife Conservation Commission (FFWCC) but was prepared in consultation with experts on the crested caracara and with biologists from both the FFWCC and the U.S. Fish and Wildlife Service. The purpose of this document is to provide recommendations for management practices that would benefit the caracara in Florida by developing, maintaining, and/or enhancing environmental conditions required for the species' survival and well being. The management practices recommended here are advisory in nature, to be used by a variety of constituents including private landowners and land managers who may have an interest in managing their lands in ways compatible with the caracara's survival. These management practices, if carried out, should avoid or minimize detrimental human-related impacts on crested caracaras and should foster persistence of the species in Florida. This document also provides general biological information about the species and protocols for surveying for nests and for monitoring known nest sites.

## BIOLOGICAL INFORMATION ABOUT THE SPECIES

The crested caracara (*Caracara cheriway*; hereafter, caracara), is a unique raptor/scavenger from the family Falconidae that reaches the northern limit of its geographic range in the southern U.S. (Fig. 1). The subspecies occurring in the U.S. is Audubon's crested caracara (*C. c. audubonii*) (Brown and Amadon 1968, American Ornithologists' Union 1983). In Florida, this raptor occurs as an isolated population in the south-central region of the state.

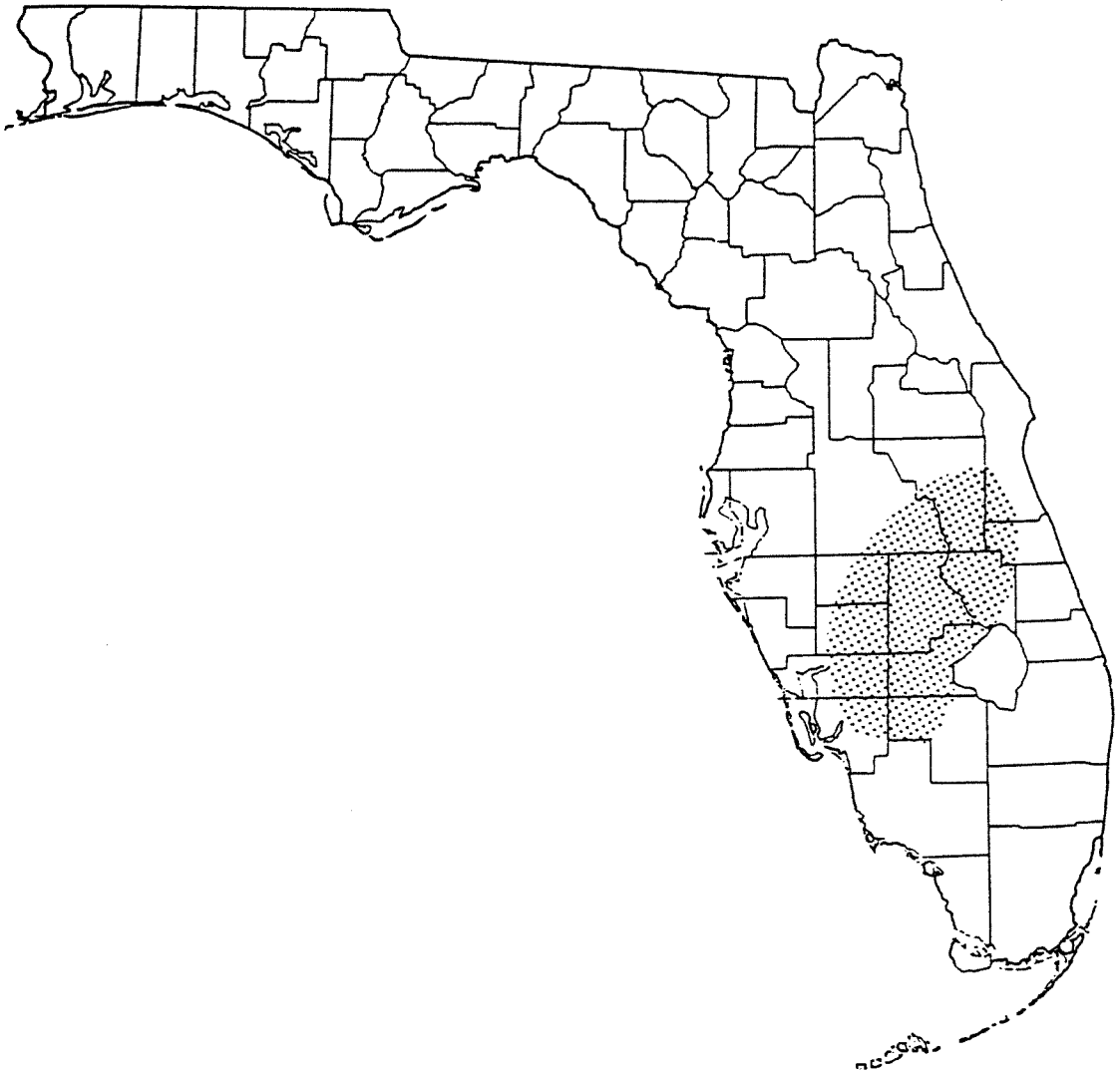


Fig. 1. Currently known breeding range of the crested caracara in Florida.

Caracaras in Florida were formerly documented to inhabit native prairie in Florida's central region. The species has been reported from the Kissimmee, Caloosahatchee, and upper St. Johns river basins, and the Kissimmee prairie (Bryant 1859, Scott 1892, Phelps 1912, Bailey 1925, Nicholson 1929, Howell 1932, Bent 1938, Sprunt 1954). Few historic nesting records are available, however. Notable changes in land use patterns have occurred throughout central Florida in recent years and, as a result, the status of this population has become a subject of concern. The caracara's range in Florida is now considerably smaller than was historically reported (Stevenson and Anderson 1994, Layne 1996), and this raptor apparently now occurs almost exclusively on privately owned cattle ranches in the south-central part of the state (Morrison and Humphrey 2001). The size of this population is unknown but is probably at least 500 (Layne 1996) or greater (J. Morrison, unpublished data). Populations comprised of 500 or fewer individuals may be more susceptible to extinction due to stochastic demographic or environmental events (Shaffer 1981).

All available evidence suggests that the most serious threat to Florida's caracara population is loss or degradation of nesting and feeding habitat. Such loss is most commonly due to conversion of pasture and other grassland habitats and wetlands to citrus, sugar cane, other agriculture, and urban development. Adult caracaras exhibit high site- and mate-fidelity; therefore, extensive loss of habitat within the home range, particularly of the nesting site itself, may cause the pair to abandon that home range, or at least the nesting site. Caracaras use some agricultural lands for foraging (J. Morrison, unpublished data); however, these habitats will not support resident, breeding caracaras if nesting habitat is not available. It is currently not known what degree of nesting or foraging habitat loss within a home range will cause permanent movement of a pair out of their home range.

### **Home Range**

Florida's caracaras are resident, remaining year-round on home ranges that consist of the nesting territory and feeding habitat. Home ranges of caracaras in Florida average approximately 1,200 ha (3,000 acres) in size (Morrison 1997a) and represent an area within a radius of approximately 2–3 km (1.2–1.9 miles) from the nest. Adult caracaras typically forage throughout their home range during both nesting and non-nesting seasons. The nesting territory itself may be considered to be approximately the 25% core area of the home range, within an average radius of 1.0 km (0.6 mile) from the nest. This core area is where the resident pair spends most of its time during the nesting season (Morrison 1997a). The nesting territory is strongly defended by the pair during the nesting season. Adult caracaras spend more time farther from the nest and are rarely defensive around the nesting site during the non-nesting

season (Morrison 1997a). Other areas within the home range that are not near the nest itself are regularly used by the caracaras for collecting nesting material, roosting, loafing, and feeding.

### **Nesting**

The crested caracara has a nesting ecology similar to that of bald eagles (*Haliaeetus leucocephalus*). Caracara pairs are generally monogamous and highly territorial, and exhibit strong fidelity to their breeding site, even nesting in the same tree year after year. Long-term observational data on occupancy of home ranges by caracaras in Florida indicate that as long as the nesting site and surrounding feeding habitat are not substantially altered, the home range will remain continuously occupied (J. Layne, unpublished data) and the pair will make an annual breeding attempt (Morrison 1999). Adult caracaras are highly intolerant of other adult caracaras within the nesting territory and particularly near the nest site, although caracaras of the juvenile age classes (fledgling to 3 years of age) may be tolerated at feeding areas that are not near the nest tree.

**Timing.**—Breeding activity can occur from September through June in Florida, with the primary season being November through April. Peak egg laying occurs from late December through early February, and incubation ranges from 31 to 33 days (Morrison 1999). The total breeding cycle (nest building, egg laying, incubation, nestling, and post-fledging dependency periods) is approximately 25 weeks in length, although sometimes up to 2 months elapse between completion of nest building and commencement of egg laying. The nestling period covers approximately 7–8 weeks, and the post-fledging dependency period is approximately 8 weeks (Morrison 1999).

Crested caracaras are capable of making more than 1 nesting attempt during a single breeding season. Pairs frequently produce a replacement clutch following nest failure in the incubation or early nestling stages (Morrison 1999). Early-season nesting pairs (those that lay their first clutch before March 1) may raise a second brood, but this occurs in less than 10% of the population, annually (Morrison 1998). Second-brood clutches may be laid as late as March and April. Second-brood young fledge as late as July and may remain with their parents through the rest of the summer and into the fall.

**Nesting Habitat.**—The crested caracara is primarily a bird of open habitats. Its nesting habitat in Florida consists of large expanses of pastures, grasslands, or prairies dotted with numerous shallow ponds and sloughs and single or small clumps of live oaks (*Quercus virginiana*), cabbage palms (*Sabal palmetto*), and cypress (*Taxodium* spp.). Cabbage palms are favored as



nest trees; equally chosen are single, isolated trees or trees within a group of 3–10. Caracaras nest only occasionally in oak and cypress trees. Most striking about caracara nesting habitat is the physical structure of the landscape—low, short, ground vegetation; scattered trees; and minimal or absent understory or shrub layer. Caracaras in Florida historically nested in native wet prairie habitat, particularly adjacent to marshes associated with the Kissimmee and St. Johns rivers (Nicholson 1929, Bent 1938). Caracaras are now found regularly in “improved” pastures, grasslands heavily managed for forage production for cattle (Morrison 1997a). Exotic forage grasses dominate these improved pastures, and regular mowing, burning, and high-density grazing maintain the low vegetative structure.

*The Nest.*—Caracara nests can generally be seen by looking up directly into the nest tree from alongside the trunk. Nests are bulky, loosely woven structures typically composed of long, slender, dried pieces of vines, weed stalks, briars, twigs, and fruiting clusters of palm. Nests are round or oval in shape and are about 2 feet in diameter. Nests typically face south to southeast within the nest tree.

*Number of Nest Trees Used.*—The nest site that originally attracts the pair of breeding caracaras is of critical importance. Pairs may use the same tree year after year, even if the old nest is lost. It is not uncommon for nests to be blown from trees by storms, after which the resident pair typically rebuilds a new structure in the same tree. If an old structure remains, the pair typically builds a new structure on top of it. Caracara pairs sometimes have 2 or 3 alternate nest trees that may be used in different years or for a second nesting effort within the same year. All nest trees used by a given pair are typically situated in the same general vicinity (usually within 0.5 km [0.3 mile] of each other). A new pair will often use one of the originally used nest trees when a member of a pair dies or is replaced (J. Morrison, unpublished data).

## **Feeding**

Crested caracaras obtain their food from a variety of habitats, including improved pastures, newly plowed or burned fields, dairies, and around dwellings and farm buildings. They scavenge along roads and at slaughterhouses, poultry houses, and urban dumps. Caracaras also forage regularly in a variety of wetland habitats. The types of wetlands that provide good feeding conditions for caracaras include the extensive networks of drainage ditches and small ponds and wetlands found within improved pastures, drying marshes or stock ponds, shallow roadside or agricultural ditches, and marshes associated with river oxbows. Caracaras occasionally forage in agricultural lands including sod and cane fields and citrus groves but

do not spend most of their foraging time in these habitats (J. Morrison, unpublished data). Groups of up to 20 juvenile caracaras are often seen feeding in citrus groves during the fall, although the seasonality of this behavior is not understood.

The crested caracara is considered a scavenger because it is most easily observed feeding on carrion along roadsides. However, this raptor actually exhibits a broad diet, feeding on insects associated with carrion and dung in pastures as well as on a wide variety of vertebrate and invertebrate prey, much of which it captures live. Prey includes rats, mice, skunks, rabbits, squirrels, piglets, snakes, frogs, lizards, sirens, nestling birds, birds' eggs, turtles, fish, crayfish, beetles, grasshoppers, and worms.

### **Roosting**

Adult caracaras frequently perch on the tallest trees or snags or on telephone poles within their home range. Breeding adult caracaras typically roost in trees near or within the nest stand. Groups of up to 50 or more juvenile caracaras roost in groups of palm and oak trees. These roosts occur on ranches or they may be near gathering areas (see below), particularly along the Kissimmee River floodplain. During the non-breeding season, roosts containing up to 30 juveniles may even be found within the home range of a nesting pair, although not generally within the nesting territory itself.

### **The Juvenile Period**

Young caracaras fledge from January through July with the peak of fledging occurring in March and April. Juvenile caracaras have a long fledgling dependency period, remaining dependent on their parents for the first 2–3 months after fledging from the nest (Morrison 1996). Beginning about 3 months post-fledging, juveniles begin to explore locations outside the natal home range but continue to return to that home range. Following the exploratory phase, juveniles become nutritionally independent but are tolerated by the adults and may remain on their natal home range until the adults begin another breeding effort the following year. The home range used by juvenile caracaras until permanent departure mirrors that of their parents. Permanent departure from the natal home range can occur from 11 to 45 weeks post-fledging.

Age at first reproduction for Florida's crested caracaras is 3 years, although probably not all 3-year-olds attain a territory and begin breeding. Juvenile caracaras are characterized by a medium to dark brown and buffy white plumage (Wheeler and Clark 1995). They do not attain the black and

white adult plumage until about 4 years of age. Juvenile caracaras primarily use improved pasture and grassland habitats and associated wetlands for foraging.

### **Gathering Areas**

After departing from their natal home ranges, young caracaras are nomadic throughout the population's range in south-central Florida, but they regularly use temporary settling areas called gathering areas. Juvenile caracaras typically travel between gathering areas and may remain for days to weeks at any one site (J. Morrison, unpublished data). Juvenile caracaras explore throughout the population's range, then return to spend varying lengths of time in the gathering areas. Even individuals from home ranges on the periphery of the population's range eventually find their way to these gathering areas. Because individuals move between areas it is difficult to monitor numbers at the gathering areas; therefore, the numbers of juveniles and floaters (adult non-breeders) in this population are not known.

### **Tolerance of Human Activity and Disturbance**

Caracaras exhibit a wide range of tolerance of human activities. Some may be quite tolerant of buildings and of the occasional presence of people, livestock, machinery, and vehicles in their home range. Particular pairs may endure a wide range of potential impacts to their habitat resulting from altered patterns of human activity. The nature and extent of impacts on nesting and feeding habitat or on the birds themselves will depend largely on the current situation within each home range and on previous exposure of the resident pair to human activity. Whether or not a caracara pair will be affected by an activity generally depends on the patterns of activity. Some human influence may already be present in any particular home range. If the caracaras have been nesting successfully at these sites, it would be mainly altered patterns of activity that might impact their nesting behaviors and success.

Caracaras are most sensitive to human disturbance during the nesting season, particularly during the late incubation and early nestling stages, although pairs may abandon a nest if disturbed frequently during the nest-building stage. More nests fail during the last week of incubation and the first 2 weeks of the nestling stage than at any other time during the nesting cycle, at least prior to fledging (Morrison 1999). Nests may be abandoned if disturbed during hatching. Increased activity around the nest at hatching may also attract predators such as American crows (*Corvus brachyrhynchos*), which can take small chicks.

Nesting occurs during the winter months; therefore, eggs and small chicks may die quickly from exposure if adults are frequently forced off the nest or are kept off for long periods. Adults are more tolerant of human activity occurring near the nest after the chicks have hatched and become partially feathered than during the period between nest construction and the third or fourth week of the nestling stage. Adult caracaras are particularly sensitive to human disturbance when attempting to deliver food to nestlings. They will not approach the nest if human activity is occurring nearby. Prevention of food deliveries has the most potential for serious consequences when nestlings are very young and must be fed frequently.

Caracaras generally flush from nests during incubation or early nestling stages when the disturbance source is within 300 m (1,000 feet) of the nest (J. Morrison, unpublished data). Flushing occurs at greater distances as the amount and frequency of disturbance increases, for example with subsequent visits to the nest area. If certain activities occur within approximately 300 m of the nest during the nesting season (November through April), they may have detrimental impacts on caracara nesting activities and success. Significant changes in activity levels or in habitat near the nest could result in the breeding pair leaving that nest site and moving to another site, even if these activities occur during the non-breeding season. If habitat changes occur over a wide area within the overall home range, the breeding pair might abandon the home range altogether.



## RECOMMENDED MANAGEMENT PRACTICES FOR CRESTED CARACARA HABITAT IN FLORIDA

Following are recommendations for management practices that would benefit the crested caracara in Florida. These practices could be used by landowners and land managers interested in developing, maintaining, and enhancing habitat suitable for caracaras, and they pertain to habitat both near the nest site and throughout the home range. Objectives of these management practices are to (1) protect the nest site itself, (2) minimize disturbance around the nest that might compromise the nest site, (3) conserve important feeding areas nearby and away from the nest site, (4) protect important areas of cover for the fledglings during the post-fledging dependency period, and (5) improve and enhance habitat, when possible.

- 1) Retain pasture and grassland habitats and natural and man-made wetlands (i.e., ditches and ponds) within pastures.
- 2) Do not remove nest trees or other live trees within 300 m (1,000 feet) of a nest tree. Harvest of palm trees for human consumption should occur farther than 300 m from a known nest tree.
- 3) Retain dead trees, which are often used for perching and roosting, within 300 m (1,000 feet) of a nest tree.
- 4) Planting palm trees in areas lacking potential nest trees might attract new caracara pairs into an area. Potential nest trees should be at least 5 m (16 feet) in height and have full, closed crowns. At least 3 trees should be planted close together in a group.
- 5) Retain ground vegetation within 300 m (1,000 feet) of a nest tree. Clumps of taller grasses and small shrubs are regularly used as cover by chicks after they fledge from the nest. Chicks are vulnerable for the first few weeks after fledging because they do not fly well. They spend most of their time on the ground hiding under vegetation and perching on low branches in trees. Limiting disturbance to ground vegetation near a nest tree will ensure adequate cover for fledglings.
- 6) Cattle grazing, burning, mowing, and roller chopping are land management activities that are compatible with caracara survival. These activities keep ground cover vegetation short, which allows the caracaras to easily walk through grassland habitats when foraging. Caracaras are quite terrestrial compared to other raptors and frequently walk in grassland and along wetland habitats in search of food. Caracaras frequently walk behind tractors during plowing and feed on insects disturbed by the activity. They follow the front of grass fires and remain at burned sites for several days, feeding on animals killed by the fire. Continuing the above

management activities will enhance foraging habitat by limiting growth of tall, thick, or shrubby ground vegetation that is not used as frequently by foraging caracaras. Reductions in these management activities may cause widespread growth of thick, tall, or shrubby ground vegetation.

- 7) Wetland maintenance and ditch cleaning are management activities compatible with caracara survival. Caracaras are attracted by ditch-cleaning operations and feed on fish, turtles, sirens, and other animals exposed by these activities. They also steal food from wading birds that feed along these ditches.
- 8) In a known home range, particularly near a nest site, care should be taken to avoid use of chemicals toxic to wildlife, including pesticides, fertilizers, or herbicides. Care should also be taken to keep these chemicals from being introduced into wetlands and waterways.
- 9) Construction activities (including increased vehicle traffic other than normal agricultural operations; earth stockpiling; vehicle parking; equipment or materials storage; or development of new agricultural, commercial, industrial, or residential sites) typically cause changes in human activity levels and in habitat that may affect nesting caracaras. Although roads, canals, and some agricultural lands may provide seasonal food resources, their construction near the nest, particularly during the early phases of the nesting cycle (nest building, egg laying, incubation, early nestling), could disturb the pair and cause them to abandon the nesting territory.
- 10) Some activities such as fence-building, moving cattle, and normal vehicle and agricultural operations can occur in the home range year-round. Careful timing of these activities within 300 m (1,000 feet) of the nest can minimize the impacts of such activities during the nesting season. These activities should be limited near the nest, particularly during nest building, incubation, and early nestling (first 2–3 weeks) stages.
- 11) Mortality of juvenile caracaras is particularly high along roads, which they frequent in search of carrion. Increasing the number of roads within a home range increases risk of collision with vehicles. Care should be taken along all roads to minimize mortality of caracaras by posting signs, lowering speeds, and watching for birds.

## **SURVEY PROTOCOL FOR FINDING CARACARA NESTS**

As land use changes continue in south-central Florida, the need increases for a standardized and effective protocol for assessing the presence of nesting caracaras or of gathering areas at targeted project sites. Survey techniques for caracaras must provide accurate information on territorial occupancy and breeding. This protocol is intended for use by individuals required to survey new habitat for breeding pairs.

Caracaras are not often visible to a casual observer even in known occupied, active, nesting territories, particularly during certain times of the day and of the year. Casual roadside surveys can grossly underestimate occupancy rates for caracara territories. The probability of seeing a caracara on a roadside survey in a known occupied territory can be as low as 30%, even during the breeding season (Morrison 1995). This protocol is intended to assist individuals in maximizing opportunities for finding nesting pairs and determining breeding status. If possible, surveys should be conducted by a qualified biologist, hereby defined as one who has had previous experience with caracaras, including observations and, preferably, radio tracking. Ideally, this person will have been trained by a qualified caracara researcher in monitoring, observation, and data collection techniques for caracaras, so that surveys will be carried out in a standardize manner.

### **Timing of Surveys**

The timing of nesting activity can vary greatly from year to year; nesting can occur any time during September through June. Surveys for territory occupancy or to find new breeding pairs are best conducted during the months of January, February, and March, when nesting within the overall population is at its peak and adults are most likely to be feeding nestlings. Surveys made earlier than January could unduly disturb the birds and result in nest abandonment. Caracaras are most sensitive during the nest building, incubation, and early nestling stages of the nesting cycle. Caracaras can also be easily observed in the territory after the chicks fledge from the nest. The peak of fledging for this population occurs during March and April.

Surveys are best conducted early in the morning or late in the afternoon. Caracaras are most actively nest building, foraging, and feeding young between sunrise and about 1100 hours, and again, between about 1600 hours and sunset. Caracaras are rarely active during the heat of midday, especially in the summer months. They roost in trees that are often far from the nest site; thus they are rarely visible. Surveys conducted from May through October, particularly in new habitat for the purpose of finding new breeding pairs, are

not likely to be productive because of the caracaras' reduced activity levels during these months. Nests from even the most recent nesting season may be hard to find because they may have blown out of the nest tree. Any rain that occurred after nesting season would likely destroy most signs of activity around the nest tree. Also, after the chicks fledge, the family spends less time near the nest site, making them more difficult to find and observe. Surveys conducted during November and December may be productive, but probably will be more so in known territories. Pairs are most likely to be building nests during these months, but do not spend as much time near the nest as they do after egg laying. Additionally, pairs are quite sensitive to disturbance during the nest building and incubation stages, so surveys conducted early in the breeding season have the potential to excessively disturb nesting pairs.

### **Duration of Surveys**

When surveying for caracaras in areas where the nest site is not known, observers should remain in each area for 2–4 hours during each visit. Observers should remain in the vehicle and watch for caracaras over a wide area of suspected habitat. Observations may be made on consecutive days, but ideally should be conducted at least 2 weeks apart and during the months of January through March. Observations made in this manner will usually yield information on territorial occupancy and even the nest site after only 3 visits, if the site is active. If the entire territory cannot be surveyed from a road, areas containing palm trees should be searched by foot if access is feasible. Observations should be conducted in an area at least twice a month for at least 3 consecutive months before it is considered to be unoccupied by caracaras.

### **Searching for Nests**

Caracaras are very site faithful, even to particular nest trees. Most caracaras nest in cabbage palms (Morrison 1997*b*). The nest structure can easily be seen by looking up directly into the palm from alongside the trunk. Signs that a suspected nest is active are feces and prey remains below the nest, chicks calling from the nest, or defensive behavior by the adults when the observer is near the tree. Nests will most likely be facing south to southeast within the nest tree. Nest trees are generally over 5 m (16 feet) in height; have large, full, closed crowns; and are typically on the southeastern to southwestern edge of a group of trees. Nests may also be in lone, free-standing palm trees, in groups of 2–10 palms, or (rarely) in tall, emergent palms in the middle of a large hammock. Oaks and cypress should be checked also, but these are likely to be used as nest trees only if few palms are available within a large area of otherwise suitable pasture and wetland habitat.



When searching for new breeding pairs, efforts should first concentrate on areas of large contiguous pasture habitat containing scattered palms and oaks and numerous wetlands. Observations should be conducted from a position where a large area of suitable habitat can be viewed. If possible, observations should also be made from cover, such as a vehicle, so that disturbance to the pair can be minimized. Searching should focus on observing adult behavior (e.g., carrying sticks or food) that would suggest nesting activity. Caracaras exhibit little size and no plumage dimorphism (Morrison and Maltbie 1999), and these behaviors are not gender specific.

Other behaviors of adults can be used to find nests. During incubation, the adult not currently incubating often will perch high and visibly in a tall tree within 300 m (1,000 feet) of the nest. Adult caracaras exhibit little defense behavior near their nest, but if the chicks are large (5–8 weeks), adults may remain close to the nest and exhibit rattle and cackle vocalizations and the head-throwback display (Morrison 1996). Nest searching using playback tapes, a technique used successfully for surveys of other raptors, is not likely to be effective for caracaras because they do not respond to such tapes. Their vocalizations do not carry far in open habitats. Most vocalizations are used in situations of immediate contact or proximity of individuals, such as copulation, aggression towards a nest predator, or when feeding alongside other caracaras or vultures.

When a nest is found, the contents can be checked using an extendible pole with a mirror attached or by direct observation. If a nest is not found immediately in an area where adult caracaras are known to occur, another visit should be made to that territory within 1 month after the first visit. Use of carrion as bait can also facilitate nest finding, determining territory occupancy, and determining the breeding status of a known pair. A carcass or other large piece of carrion can be set in a suspected area the night before a planned observation period. If caracaras are in the area, they will usually find and begin feeding upon the carcass just after sunrise the following morning. Individuals can then be observed when they return to the nest site.

### **Nest Monitoring**

Subsequent to finding a caracara nest in a new area, monitoring of the nest may be required to obtain information on breeding chronology and reproductive success. If a monitoring program is initiated in conjunction with a land development program, refer to the monitoring protocol which follows.

## **MONITORING PROTOCOL FOR KNOWN CARACARA TERRITORIES**

Because a major management goal is to monitor the status of Florida's caracara population, it is important to monitor known caracara territories as well as attempt to find new ones. Objectives of monitoring known territories are (1) determining whether territories remain occupied year after year, (2) determining whether the same individuals occupy and breed in the same territories year after year, (3) determining whether pairs successfully fledge young year after year, (4) determining how many young are fledged per pair per year, and (5) for long-term monitoring programs, evaluating any changes in habitat use by resident caracaras in conjunction with habitat changes in their home range. Procedures for monitoring in known territories are similar to those for surveying for nesting pairs in new habitat, but the difference is that monitoring occurs in areas where nest and foraging locations may already be known.

For any monitoring program for crested caracaras in Florida, a qualified biologist should visit the territory on a regular basis (i.e., at least once per month). A qualified biologist is one who has had previous experience with caracaras, including observations and, preferably, radio tracking. Ideally, this person would be trained by a qualified caracara researcher in monitoring, observation, and data collection techniques for caracaras, so that any monitoring program initiated in conjunction with a land development project would be standardized with respect to other ongoing long-term monitoring of crested caracaras in south-central Florida.

### **Nest Finding and Monitoring Reproductive Success**

*Timing of Monitoring to Determine Territorial Occupancy and Breeding Status.*—Monitoring at known caracara territories is best conducted during January, February, and March, when nesting within the overall population is at its peak and adults are most likely to be feeding nestlings. Caracaras can also be easily observed in the territory after chicks fledge from the nest, which peaks for this population during March and April.

Monitoring is best conducted early in the morning or late in the afternoon. Caracaras are most actively nest building, foraging, and feeding young between sunrise and about 1100 hours and again between about 1600 hours and sunset. Caracaras are rarely active during the heat of midday, especially during the summer months. They roost in trees and often far from the nest site, thus they are rarely visible. Monitoring conducted from May through October may be more difficult because of the caracaras' reduced activity levels during

these months. After the chicks fledge, the family spends less time near the nest site so the observer may have to visit more areas within the home range to find and observe the caracaras. Whereas surveying for new nests is not likely to be as productive in November and December, monitoring during these times may be productive in territories with known nest locations. Pairs are most likely to be building nests during these months.

*Duration of Monitoring Sessions.*—To find active nests in known territories, all known nest trees should be checked first. If a nest is not immediately found, observers should position themselves where known nest trees can be observed and then remain in the vehicle while watching for caracaras over a wide area of suspected habitat. Observations made in this manner will usually yield information on territorial occupancy and even the nest site after only 3 visits, if the site is active. When a nest is found, nest contents can be checked using an extendible pole with a mirror attached or by direct observation.

Additional monitoring sessions may be needed if the nest is not found during the first monitoring session. Each session should span approximately 2–4 hours and ideally should be conducted at least 2 weeks apart from December through March. During the second visit, the search area for the nest should be broadened to include all potential nest sites within 0.5 km (0.3 mile) of the traditional site. Sometimes a pair moves its nest site, particularly if habitat degradation has occurred within the nesting territory or near the traditional nest site, or if one member of the pair dies. Usually, however, if the home range remains occupied, adults will be seen within 3 visits to the nesting territory. A third visit should be made, if necessary, within 2 weeks of the second visit. If no adults are seen or no nest is found after 3 visits, with at least 1 visit made in each of 3 consecutive months from November through April, the home range may be considered temporarily unoccupied. However, if both members of a pair die, the site would likely be taken over by another pair if no habitat degradation occurs, so an apparently unoccupied site should be monitored the following breeding season.

### **Monitoring for Habitat Use**

To evaluate habitat use by caracaras in known territories, monitoring sessions should occur at least monthly year-round for a minimum of 3 years when associated with habitat conversion or a land development project. Because caracaras are site faithful, responses to habitat changes or noticeable changes in nesting behaviors or success may not become apparent within only 1, 2, or even 3 years of observation. During each visit the biologist should remain in the territory for at least 4 hours beginning at sunrise, or beginning in

late afternoon and extending into early evening, but before dark. Any radio-tagged individuals should be tracked during this period and foraging activity, habitats used, and locations recorded. If no individuals are radio tagged, the observer should search for caracaras within the project area. These individuals should be followed and observed during the monitoring period and their foraging activity, habitats used, and locations recorded.

### **Other Monitoring Considerations**

The major limitation to finding new nesting territories and monitoring known nests is the fact that most caracaras in Florida now occur on privately owned land. Permission must always be obtained from the landowner before entering the property of interest. Private lands and the requests of landowners, such as not driving in certain areas and observing gate closures, must always be respected. Less restricted access facilitates nest searching on public lands, but searching may be more difficult because of habitat differences such as smaller areas of short-grass pasture habitats and larger areas of thick, tall, or shrubby ground vegetation, which caracaras typically do not use.

### **Reporting Banded Individuals**

Sightings of banded caracaras made during any survey or monitoring period provide valuable information regarding individual survival and habitat use. Sightings, along with supporting information, may be reported to the Florida Fish and Wildlife Conservation Commission or the U.S. Fish and Wildlife Service. If a banded caracara is found dead, the band number and color combination should be reported to the U.S. Fish and Wildlife Service.



## **CURRENT STATUS OF THE CRESTED CARACARA IN FLORIDA**

Currently, Florida's population of Audubon's crested caracaras is listed as Threatened both federally (U.S. Fish and Wildlife Service 1987) and by the state of Florida (Logan 1997). This listing was afforded primarily because this population is believed to be isolated from any other caracara populations and of small size, therefore is of evolutionary and conservation concern, and because suitable caracara habitat in Florida has been declining rapidly in recent years. Under this listing, the caracara is protected from activities that would directly harm an individual or its habitat.

Persons with further interest in the legal statutes that afford protection for Florida's crested caracaras should review the federal Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.); the federal Migratory Bird Treaty Act (16 U.S.C. 703-711); and Rules 68A-4.001 and 68A-27.011 of the state of Florida Wildlife Code.

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**APPENDIX B**

**Survey Protocol for Finding Caracara Nests**



## **SURVEY PROTOCOL FOR FINDING CARACARA NESTS**

This supplemental information is provided for further guidance on surveying for caracara nest based on the protocol in Morrison (2001). There is the highest probability of success in finding caracara nests during the period January to April. This period covers the time when most birds are feeding the nestlings and become more visible to observers. Surveys should start in January and continue through April to provide adequate data to conclude that a caracara nest does not occur on site. Once all nests on the site are found the survey can be terminated. Surveys should be conducted by a biologist with caracara experience as the birds can be hard to find and identify at long distances. The protective area for the caracara is 1,500 m (4,920 ft) around the nest. The area surveyed should include the project area and a 1,500-m buffer to account for off-site territories that might overlap onto the project area. All areas of suitable habitat within the project area and buffer should be initially surveyed for 1 day. If the area is large or the view obstructed more than 1 day or multiple observers may be needed to completely survey the area.

The observer should position themselves in a location where the largest open area (unobstructed by trees) can be viewed. The survey area should be no more than about 500 ha, which is the largest area easily observable from one point. An aerial photograph of the property and buffer zone can be used to identify areas of suitable habitat and map observation blocks to facilitate surveying the whole area. Use the map and a site visit to select strategic points where caracaras are more likely to be seen going to and from potential nesting sites. From a stationary position search for caracara activity, especially birds moving to the nest tree carrying sticks or food. Watch for other birds, such as American crows (*Corvus brachyrhynchos*), red-tailed hawks (*Buteo jamaicensis*), and turkey vultures (*Cathartes aura*), that might elicit an aggressive response from caracaras present. Nesting caracaras will often chase potential predators away from the nest; thus, revealing their presence. Also circling vultures can indicate the presence of naturally occurring carrion that may attract caracaras. If a potential nesting tree is detected then the observer can reposition to improve observing the bird's behavior. Weather condition should

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be adequate to clearly view the whole area. The area should be viewed from sunrise to 11AM and again 3 hours before sunset. During midday potential nest trees can be examined close up for evidence of nests (Morrison 2001). The area viewed during each survey should be marked on a site map. All caracara activity observed should be recorded by time of day and distinguished between juvenile and adult birds. Record flight direction to identify foraging areas and the nesting tree. Mark any nesting tree locations on a map and obtain GPS coordinates. Weather conditions including temperature, wind speed and direction, cloud cover, visibility, and precipitation, should be recorded at the start and end of each survey period.

If no nests are found during the initial survey then return and repeat the survey in 2 weeks. Continue to repeat the survey at a 2-week interval through the end of April or until a nest is found. If the survey starts after January and no nests are found the earlier part of the survey should be completed during the next nesting season to insure that early nesting birds are not missed.

The opportunity for caracara observation can be enhanced by placing fresh meat (or road kills) along the property border overnight and observing the bait site during the morning survey. These birds can be followed back to their nest trees. For more details on caracara activities and habits see Morrison (2001).

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# Crested Caracara

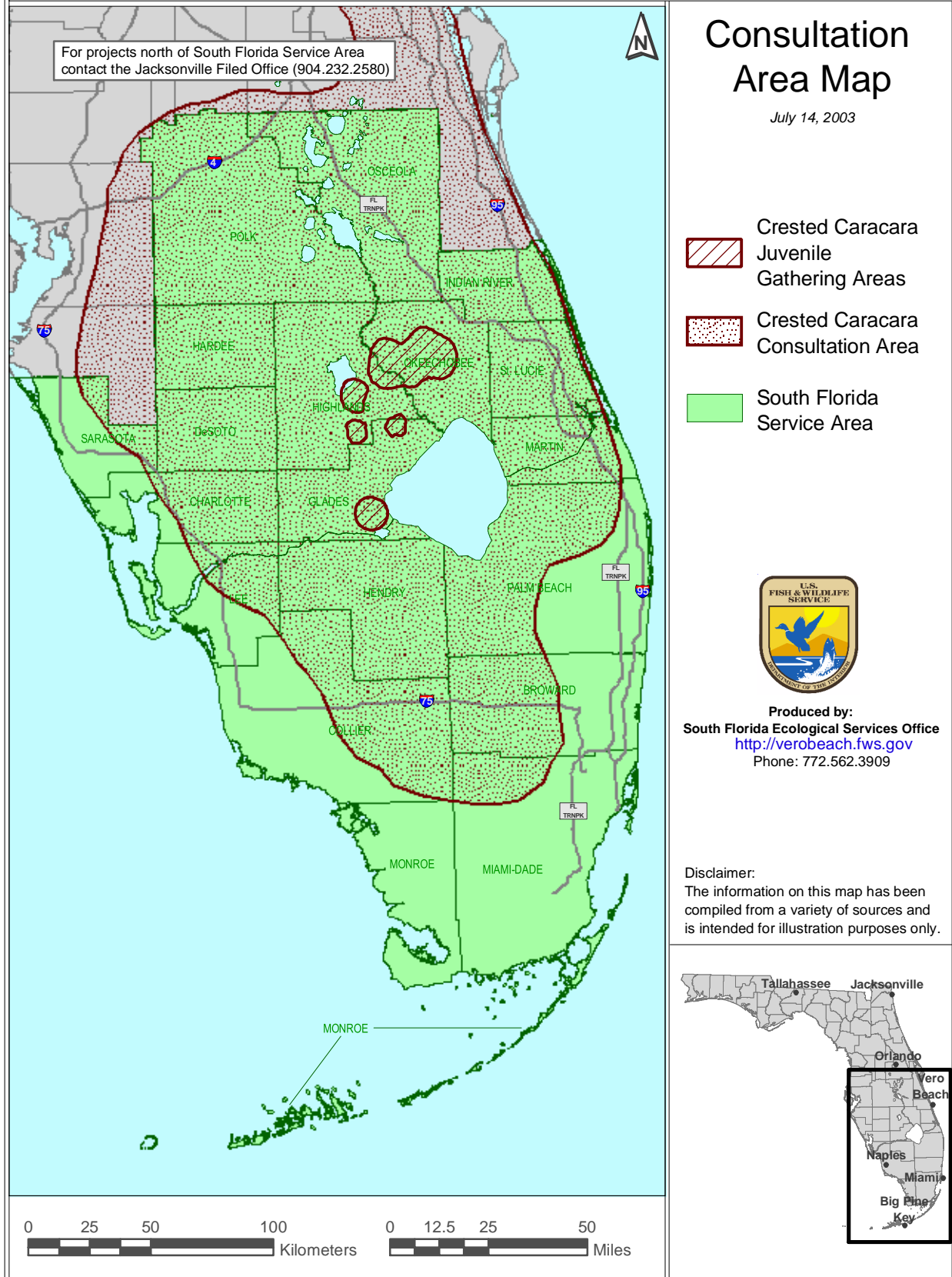


Figure 1.

## Crested Caracara Monitoring Field Data Form

Date: \_\_\_\_\_ Start Time \_\_\_\_\_ Stop Time \_\_\_\_\_ Monitor \_\_\_\_\_

Site Name and Location: **Include latitude and longitude**, section, township, and range, and county.

### Weather Data

Time	Temp	Wind Speed/Direction	% Cloud Cover	Cloud Type	Rain
Start					
Finish					

### Flight Data

#	Age A/Im	Time	Description

### Nesting Data: Observed Activity

(perching, preening, courtship, feeding, nest building, incubation, head color change, head throwback, diving)

#	Age A/Im	Time	Description

### General Observations

(crested caracara reaction to passing planes, trains, trucks, pedestrians, other birds, etc.)

#	Age A/Im	Time	Description



**Standard Local Operating Procedures for Endangered Species  
Audubon's Crested Caracara**



**Start Here**

**STEP 1**

- Project Description
- Habitat Description
- Checked County List?

**STEP 2**

- ✓ Check Consultation Area Map
- ✓ Check Suitable Habitat

**STEP 4**

**No Effect**

Inside Consultation Area

**STEP 3**

Suitable Habitat

Nest within 1,500 m / 4,920 ft or Aggregation Present

Survey Habitat For Nests and aggregations.

Recommended Management Practices for Caracaras (Morrison 2001)

Can not avoid or implement Conservation Measures

Likely to Adversely Affect

Formal Consultation

**Conservation Measures**

- Conservation measures implemented.
- Actions proposed outside nesting season.

- Conservation measures implemented.
- During nesting season.
- Site monitor.

- Conservation measures modified with supporting data

- Minimal habitat modification in primary or secondary zones.
- On-site enhancement and restoration.

Not Likely to Adversely Affect  
Request Concurrence

Service Response

Likely to Adversely Affect

Formal Consultation

No Effect

Proceed with Action

Proceed with Action

Figure 2.

1

## **Appendix B: Photographs from Survey Stations**

2

**This appendix contains photographs of the view from each survey station used for caracara nest surveys in 2017. Five survey stations (CC1 through CC5) are represented.**



**CC1 Facing North**



**CC1 Facing East**





**CC1 Facing South**





**CC1 Facing West**



**CC 2 Facing North**



**CC2 Facing East**





**CC2 Facing South**



**CC2 Facing West**





**CC2 Facing Southwest**



**CC3 Facing North**



**CC3 Facing East**





**CC3 Facing South**





**CC3 Facing West**



**CC4 Facing North**



**CC4 Facing East**



**CC4 Facing South**





**CC4 Facing West**



**CC5 Facing North**



**CC5 Facing East**



**CC5 Facing South**





**CC5 Facing West**



**CC5 Spoil Pile Survey Station, Facing Southwest**

1

## **Appendix C: Copies of Field Data Sheets and Maps**

2

3

4









CR 510 PD&E Study  
Caracara Nest Survey Field Data Sheet

Date: JAN 5 2017 Observer Name: Rob Myers

Survey Start Time: 6:56 AM Survey End Time: 10:02

Observer Location (vehicle, foot, blind): Vehicle

Survey Station #: <sup>cc</sup> 2

	Temp.	Wind Spd/Dir	Cloud Cover %	Visibility (clear, impaired)	Precip Y/N?
Start	68	1 WNW	15	clear	N
Stop	66	6 W	5	clear	N
Weather Notes (optional)					

Time	# of Individual Caracaras	Plumage (Adult/Juvenile)	Description of Activity (Foraging, Eating, Flying, Perched, Preening, Courtship, Territorial Display) (Flight direction, Nest/perch locations) (Mark movements on map)
0725	1	Adult.	Flying from near school to E of CR510 then North to CR 512, perched in multiple location near Mobil & 510/512 intersection
0732	2	1 ADULT, 1 JUVENILE	2 birds perched atop light pole SE of Mobil in SE quadrant of CR 510/CR 512 intersection in strip center, pole heavily marked w/ droppings photos taken
0745	2	1 AD; 1 JUV	Flew SE to dumpster behind anytime fitness observed @ dumpster (photos), then rooftop then adult flew S & juvenile flew west
0822	1	ADULT?	Caracara flying low S to N over tree line in pasture W of CC2
0830	2	??	2 Caracaras, 1 perched on structure W of bleachers @ school Flew to the ground; another flew north along tree line (low) & out of sight
1041	1	JUV	Perched on stadium light

Notes: Killdeer, WH Shrike,  
Sandhill crane flying N over center of pasture W of CC2 & in pasture W of CC2  
Pedestrians common (walking to school); Pursued caracara behind anytime fitness  
where they were on a dumpster; relocated CC2 slightly South so E-W tree line  
doesn't block view

ACTIVE OSPREY NEST across 510 from 87<sup>th</sup> ST by canal, next building observed

Photos Taken: Photo on light pole (732) & Dumpster (745)  
Photos of revised CC2 location 5774 (N) 5777 (S) 5778 (W) 5779 (E)









**CR 510 PD&E Study  
Caracara Nest Survey Field Data Sheet**

Date: 1-19 2017 Observer Name: Daniel Pearson

Survey Start Time: 6:59 Survey End Time: 10:30

Observer Location (vehicle, foot, blind): Vehicle

Survey Station #: 2

	Temp.	Wind Spd/Dir	Cloud Cover %	Visibility (clear, impaired)	Precip Y/N?
Start	67	0	70%	Low fog early	N
Stop					
Weather Notes (optional)	dense low fog from 7-7:45 am, then clear.				

Time	# of Individual Caracaras	Plumage (Adult/Juvenile)	Description of Activity
			(Foraging, Eating, Flying, Perched, Preening, Courtship, Territorial Display) (Flight direction, Nest/perch locations) (Mark movements on map)
7:05	1	A	perched on light pole
7:08	1	J	perched on light pole
7:15-18	2	A, J	fly NW and circle back to perch
7:22	2	A, J	fly from perch to behind publix building
7:45	2	A, J	fly from behind building headed NW
8:30	1	A	perched on light pole
8:36	1	A	fly from perch NW
8:45	2	A, J	perched on stadium light

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Photos Taken: \_\_\_\_\_

























**CR 510 PD&E Study  
Caracara Nest Survey Field Data Sheet**

Date: 2-21 2017 Observer Name: Daniel Parker

Survey Start Time: 6:38 am Survey End Time: 9:38 am

Observer Location (vehicle, foot, blind): vehicle

Survey Station #: 2

	Temp.	Wind Spd/Dir	Cloud Cover %	Visibility (clear, impaired)	Precip Y/N?
Start	58°	0	60	clear	N
Stop	69°	SSE 0-5mph	90	clear	N
Weather Notes (optional)					

Time	# of Individual Caracaras	Plumage (Adult/Juvenile)	Description of Activity (Foraging, Eating, Flying, Perched, Preening, Courtship, Territorial Display) (Flight direction, Nest/perch locations) (Mark movements on map)
7:59	1	A	flying with food (scatter on lizard)
8:19	1	A	flying

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Photos Taken: \_\_\_\_\_























































1

## **Appendix D: 2016 Caracara Survey Report**

2

**CRESTED CARACARA  
SPRING 2016 SURVEY REPORT**

**County Road (CR) 510/85<sup>th</sup> Street from CR 512 to 58<sup>th</sup> Avenue  
Project Development and Environment (PD&E) Study**

Indian River County, Florida  
Financial Management ID No. FM 405606-2-22-01

Prepared for:



**Florida Department of Transportation**

District Four  
3400 West Commercial Boulevard  
Fort Lauderdale, Florida 33309

Prepared by:  
Atkins North America, Inc.  
4030 West Boy Scout Boulevard  
Suite 700  
Tampa, Florida 33607

**July 2016  
(revised August 2016)**

**Florida Department of Transportation District 4  
County Road (CR) 510/85th Street from CR 512 to 58th Avenue  
Project Development and Environment (PD&E) Study**

Indian River County, Florida

**Crested Caracara Survey Report – Spring 2016 (January 8 through April 28)**

Florida Department of Transportation, District 4 (FDOT) is conducting a Project Development and Environment (PD&E) Study to evaluate proposed improvements to County Road (CR) 510 from CR 512/Sebastian Boulevard south to 85<sup>th</sup> Street and then east to 58<sup>th</sup> Avenue in Indian River County, Florida (**Figure 1**).

In addition to the No-Build Alternative, the project is evaluating four viable alternatives and alignments to increase the level of service (LOS) for CR 510 from CR 512 to 58<sup>th</sup> Avenue. The purpose of the PD&E Study is to study the following alternatives:

1. Maintaining the northern right-of-way line and widening (from 2 to 4 lanes to the south)
2. Maintaining the southern right-of-way line and widening (from 2 to 4 lanes to the north)
3. Maintaining the centerline of construction and widening north and south (from 2 to 4 lanes)
4. A Combination of #1, #2 and #3 above.

The purpose of this project is to provide additional capacity on CR 510 from CR 512/Sebastian Boulevard to 58<sup>th</sup> Avenue in order to achieve an acceptable LOS on the facility in the future condition. Included in the study will be consideration of a 4-lane corridor, with additional lanes at major intersections, and widening of crossroads up to 200 feet in each direction where necessary to provide intersection operation at LOS D or higher. There are three bridges within the project limits (Bridge Numbers 880047, 880063, 880044). The widening or replacement of these structures will be evaluated as deemed necessary to add capacity to the corridor.

The National Environmental Policy Act requires surveys to determine potential impacts to federally-listed species including the Audubon's Crested Caracara (*Caracara cheriway*, hereafter caracara). Atkins scientists were contracted to complete a caracara nest survey within the proposed project corridor. The U.S. Fish and Wildlife Service's (FWS) April 2004 *Survey Protocol for Finding Caracara Nests* (Protocol) dictates that surveys should be conducted from January through the end of April at two-week intervals until

a nest is found. This report presents the results of the caracara survey conducted from January through April 2016.

## **Caracara Nest Survey Methodology**

Qualified and experienced Atkins scientists conducted caracara nest surveys in accordance with the FWS's November 2015 Expanded Protocol on January 8, January 22, February 5, February 18, March 3, March 17, March 31, April 14, and April 28. The surveys began 15 minutes prior to sunrise and lasted for at least three hours. Atkins selected the specific monitoring stations so that the suitable caracara nesting and foraging habitat could be observed. Observations were made with the aid of a high-power Leica spotting scope from the observation station location. **Figure 1** shows the locations of the monitoring stations.

## **Caracara Nest Survey Results**

This section presents the results of the survey by date, time, and monitoring station. Photographs of each survey station are provided in **Appendix A**. Field data sheets with accompanying field maps detailing the caracara observations comprise **Appendix B**.

### **January 8, 2016**

Station 1 - No caracaras observed

Station 2 - 1000 – Caracara observed flying west to east

Station 3 - 1002 – Caracara flew north from Sebastian River High School (SRHS) and then turned east and flew across CR 510 before circling back to the pasture near Station 3.

Station 4 - No caracaras observed

### **January 22, 2016**

Station 1 - No caracaras observed

Station 2 - No caracaras observed

Station 3 - No caracaras observed

Station 4 - 0710 – Adult caracara carrying nest-building material observed flying west to east to the cabbage palm area located southwest of the CR 510/CR 512 intersection.

0815 – Adult caracara flew west to east before disappearing behind oak tree.

0820 – 0910 – Two subadult caracaras observed perched on shopping center light poles east of CR 510 and both caracaras foraged at the Publix trash bins with vultures. Several times the caracaras flew to and from the shopping center area to the cabbage palm area southwest of the intersection.

0958 – Caracara observed flying within the intersection

### **February 5, 2016**

Station 1- No caracaras observed

Station 2 - 0739 – Caracara flew toward the station from the southwest across the pasture and then flew across CR 510 and perched on light pole at Publix parking lot. It then flew west along CR 512 before visual was lost.

Station 3 - No caracaras observed

Station 4 - Adult caracara observed flying from the east across the pasture northwest of the SRHS stadium. It flew over the pasture and then flew back toward the east before flying south (west of the stadium). Visual was lost at 0730.

### **February 18, 2016**

Station 1- No caracaras observed

Station 2 - 0834 – Adult caracara observed flying toward the station from the west before turning north toward Publix where it perched on a light pole. It then flew north over the intersection of CR 510/CR 512 and then visual was lost.

Station 3 - No caracaras observed

Station 4 - 0705 – Two caracaras, one adult and one unknown age, were observed perched on SRHS baseball field light poles.

0710 - Both birds flew west out of sight.

0745 – One caracara, probably a subadult, flew from the south and perched on a utility pole at the CR 510/CR 512 intersection.

0750 - It flew north to a utility pole located adjacent to the gas station.

0754 - It flew west out of sight.

### **March 3, 2016**

Station 1- No caracaras observed

Station 2 - 0659 – Two caracaras flew into the Publix parking lot and perched on light pole.

0704 – Both caracaras flew north to another light pole.

0708 – Both caracaras flew north to the CR 510/CR 512 intersection and turned to the west and flew west along CR 512.

0725 – Two caracaras flew south along CR510 from the CR 510/CR 512 intersection until visual was lost.



- Station 3 - 0730 – Three caracaras were observed perched in snag near the intersection of 85<sup>th</sup> Street and 85<sup>th</sup> Place before they flew east.  
0810 – One caracara flew north across pasture.  
0935 – One caracara approached from the north flying south until it turned to the east and flew across the abandoned development.
- Station 4 - 0634 – Caracara flew from the south across the pasture and perched on a power pole south of CR 512.  
0655 – The bird flew south and east out of sight.  
0702 – Two caracaras, one adult and one subadult, perched on light pole south of the Publix shopping center.  
0715 – They flew west and perched at the North County Regional Park, and then flew east along CR 512 before turning south along CR 510.  
0735 – The two caracaras were observed perched in a pine snag at the CR 510 bend northwest of the Sebastian River Middle School.  
0738 – Both caracaras flew east along CR 510 and were joined by a third caracara (unknown age group) before all three flew out of sight.

### **March 17, 2016**

- Station 1- No caracaras observed
- Station 2 - 0855 – Adult caracara observed flying from the north and then when near the Publix it flew to the southwest and out of sight.
- Station 3 - 0845 – Caracara perched on a snag near the bend in CR 510, then moved to another snag.  
0859 – The caracara left the snag and flew north.
- Station 4 - 0850 – Adult caracara flew northeast to southwest across pasture and perched in a pine northwest of the SRHS baseball field.  
0856 – A second caracara, unknown age group, arrived from the southeast and perched in the same pine.

### **March 31, 2016**

- Station 1- No caracaras observed
- Station 2 - No caracaras observed
- Station 3 - No caracaras observed
- Station 4 - Adult caracara flew in from the east over the pasture south of Station 4, circled south and then back to the east and then to the southeast over the tree line out of sight. It flew low and fast

and was mobbed by crows when it flew over the tree line. It appeared above the tree line briefly flying southeast before dropping below the tree line again and out of sight.

#### **April 14, 2016**

- Station 1- No caracaras observed
- Station 2 - No caracaras observed
- Station 3 - No caracaras observed
- Station 4 - No caracaras observed

#### **April 28, 2016**

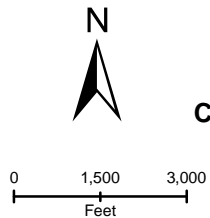
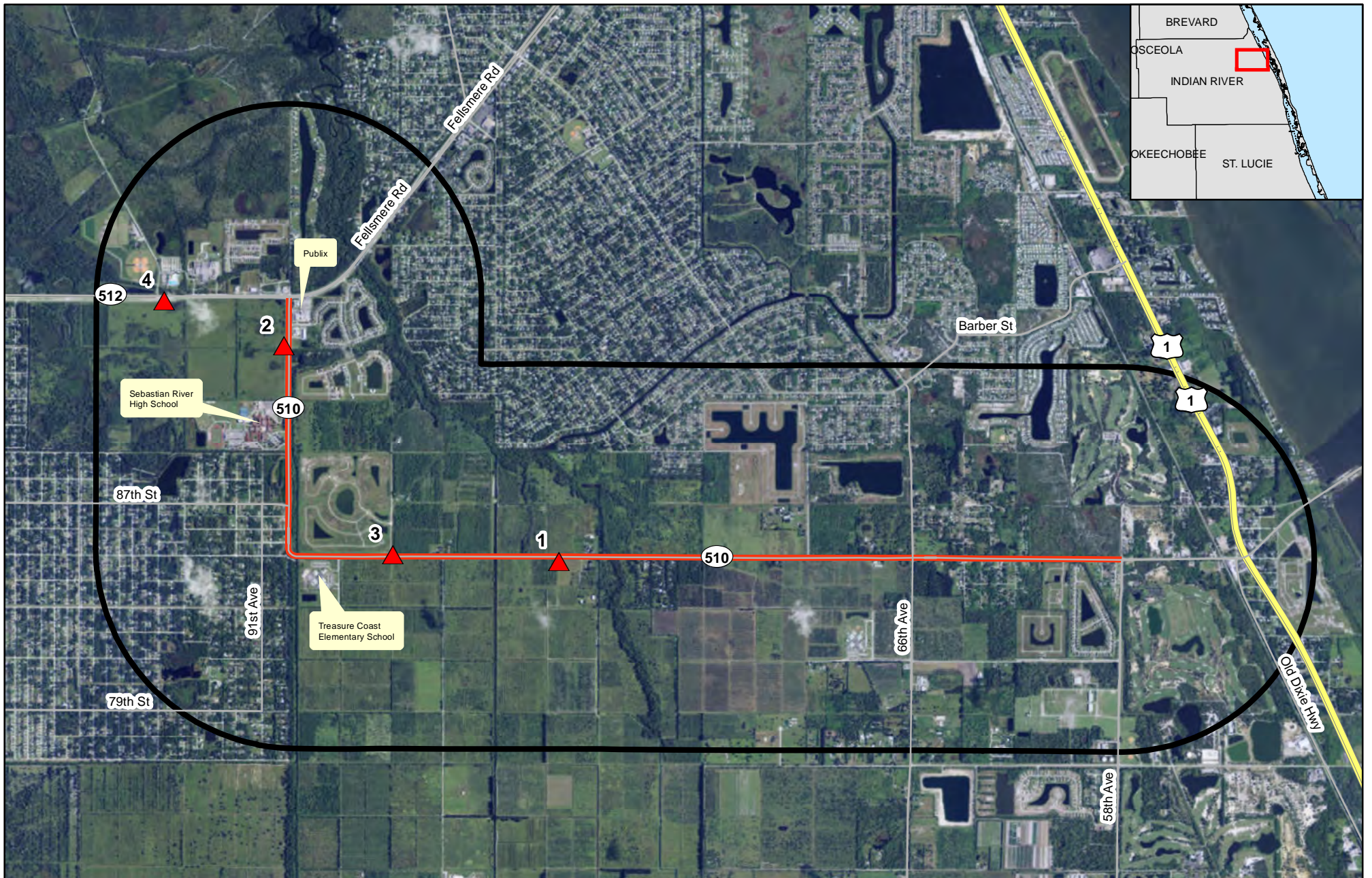
- Station 1- No caracaras observed
- Station 2 - 0708 – Two adult caracaras perched on light pole at the SRHS athletic fields to the southwest and one flew east over CR 510.  
0720 – The other caracara flew south beyond the tree line and out of sight.
- Station 3 - No caracaras observed
- Station 4 - 0708 – Caracara flew in from the south near the SRHS along CR 510 and landed on a light pole at the Publix.  
0725 – This individual flew west beyond the Burger King.  
0744 – Caracara flew in from the south near the SRHS along CR 510, approached the CR 510/CR 512 intersection and then flew north out of sight.

#### **Conclusion**

Atkins scientists found no active caracara nests during the surveys of the CR 510 PD&E corridor. The presence of at least one subadult bird and the observations of three caracaras together indicate the possibility of a recent nesting (e.g. last season) in the area.




Based on the confirmed observations of individual caracara and the negative findings of active nests during the Spring 2016 survey season, the FDOT understands that the proposed CR 510 improvements “*may affect, but is not likely to adversely affect*” the Audubon’s Crested Caracara. However, as the future improvements have not been completely identified as this time, impact assessment and coordination will be deferred to a later date. The timing of this deferral may result in the need to conduct additional caracara survey(s) to verify nest potential nest locations which may be applicable at that time.





**FDOT DISTRICT 4**  
**INDIAN RIVER COUNTY, FL**  
**County Road (CR) 510/85th Street from CR 512 to 58th Avenue**  
**Project Development and Environment (PD&E) Study**  
**FM# 405606-2-22-01**  
**2016 CRESTED CARACARA SURVEY**

**Figure 1**

-  Survey Station
-  Project Corridor (FM# 405606-2)
-  1,500 Meter Project Area Corridor Buffer

# **APPENDIX A**

**FM# 405606-2-22-01, County Road (CR)  
510/85<sup>th</sup> Street from CR 512 to 58<sup>th</sup> Avenue  
Project Development and Environment (PD&E)  
Study**

**Spring 2016 Crested Caracara Survey Report –  
Observation Station Photos**





Station 1 looking north



Station 1 looking east



Station 1 looking south





Station 1 looking west



Station 2 looking north





Station 2 looking east



Station 2 looking south





Station 2 looking west



Station 3 looking north





Station 3 looking south



Station 4 looking north





Station 4 looking east



Station 4 looking south





Station 4 looking west

## **APPENDIX B**

**FM# 405606-2-22-01, County Road (CR)  
510/85<sup>th</sup> Street from CR 512 to 58<sup>th</sup> Avenue  
Project Development and Environment (PD&E)  
Study**

**Spring 2016 Crested Caracara Survey Report –  
Field Data Sheets**





FDOT D4 (FPID 230879-1/2): 82nd Avenue- Indian River County, Florida

Site Assessment: Suitable Caracara Foraging/Nesting Habitat

CR 510

Date: 1/8/14 Survey Block ID: Station ID: 3  
 Atkins Scientists: DL/MS Start: 7:00 AM End:  
 Weather Conditions: 65°F winds = 3 mph south; visibility 10.0 miles;  
 P° = LIGHT RAIN  
 AT 10:00 AM 70°F, winds = 8 mph S

Observation Block/Survey Station	Location	Habitat Type	Notes
		OPEN PASTURE	GREAT EGRET
		WITH FRINGE	CATTLE EGRET
		OF MIXED	
		HARDWOOD	
		CONIFER	
			CANACARA @ 10:02 AM
			FLY IN FROM
			SEBASTIAN HIGH
			SCHOOL FLEW
			NORTH, THEN TURNED
			EAST CROSSING
			CR 510 WHEN <del>ARRIVED</del>
			CIRCLED BACK
			TO PASTURE
			NEAR STA 3.





512

Burger King

Sebastian River Middle School

County of Hendon River North Church

North County Regional Park

Publix Super Market

Anytime Fitness

510

Sebastian River High School

512

Google

1/16/16  
1/16/16

















North County Regional Park

County of Indian River North County

Sebastian River Middle School

Burger King

Public China Market at Clippings of Sebastian

Anytime Fitness

Sebastian River High School

NO CAROLAN M/ NB PARKWAY  
0710 1/22/16  
0815 1/22/16

*[Large handwritten scribble]*

512

510

512

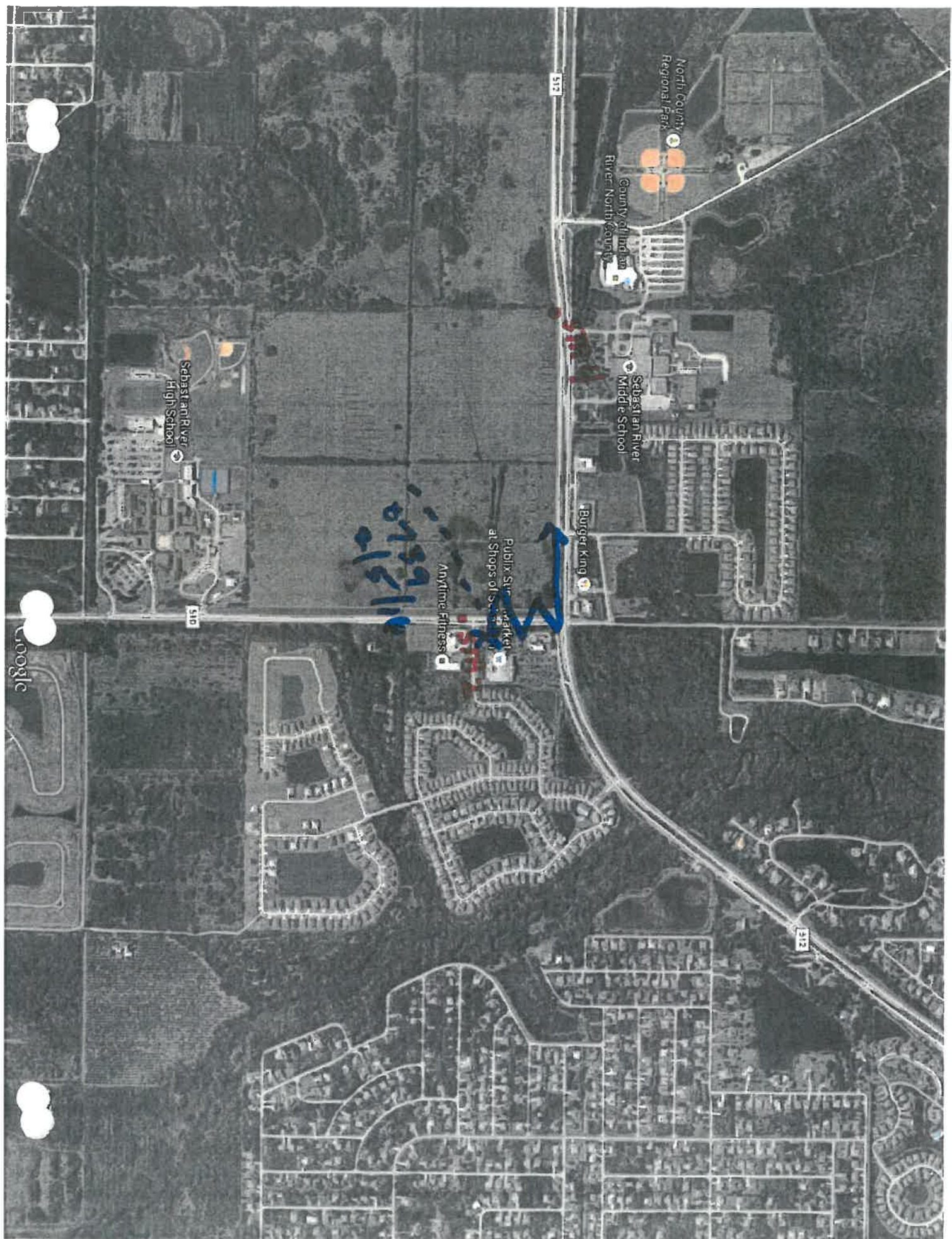
Google



















North County Regional Park

County of Indian River North County

Sebastian River Middle School

Burger King

Publix Super Market at Shops of Sebastian

Anytime Fitness

Sebastian River High School

512  
Sebastian River Middle School

512

Google





Species	Count	Observation date	Start Time	Duration
Wood Stork	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Great Blue Heron	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Great Egret	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Cattle Egret	7	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Black Vulture	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Turkey Vulture	3	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Osprey	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Red-tailed Hawk	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Sandhill Crane	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Mourning Dove	2	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Red-bellied Woodpecker	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Downy Woodpecker	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
American Kestrel	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Eastern Phoebe	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Blue Jay	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Fish Crow	2	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Tree Swallow	2	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Common Yellowthroat	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Palm Warbler	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Yellow-rumped Warbler	1	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Northern Cardinal	2	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)
Boat-tailed Grackle	2	18-Feb-16	6:50 AM	3 hour(s), 25 minute(s)

510 Sta # 1











North County Regional Park

County of Indiana River North County

Sebastian River Middle School

Burger King

Publix Super Market at Shops of Sebastian

Anytime Fitness

Sebastian River High School

512

510

512

Google

9/8/12  
540  
→

540  
CALIFORNIA  
→

STOP





Species	Count	Observatio	Start Time	Duration
Wood Stork	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Great Egret	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Cattle Egret	5	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Turkey Vulture	2	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Osprey	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Swallow-tailed Kite	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Cooper's Hawk	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Bald Eagle	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Mourning Dove	4	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Red-bellied Woodpecker	2	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Yellow-bellied Sapsucker	2	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Downy Woodpecker	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Eastern Phoebe	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Loggerhead Shrike	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Blue Jay	2	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Fish Crow	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Tree Swallow	5	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Blue-gray Gnatcatcher	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Gray Catbird	2	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Northern Mockingbird	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Palm Warbler	5	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Yellow-rumped Warbler	10	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Eastern Towhee	1	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)
Northern Cardinal	2	3-Mar-16	6:30 AM	3 hour(s), 23 minute(s)

510 STA # 1





North County Regional Park

County of Indian River North County

Sebastian River Middle School

Burger King

Publix Super Market at Shops of Sebastian

Anytime Fitness

Sebastian River High School

512

510

512

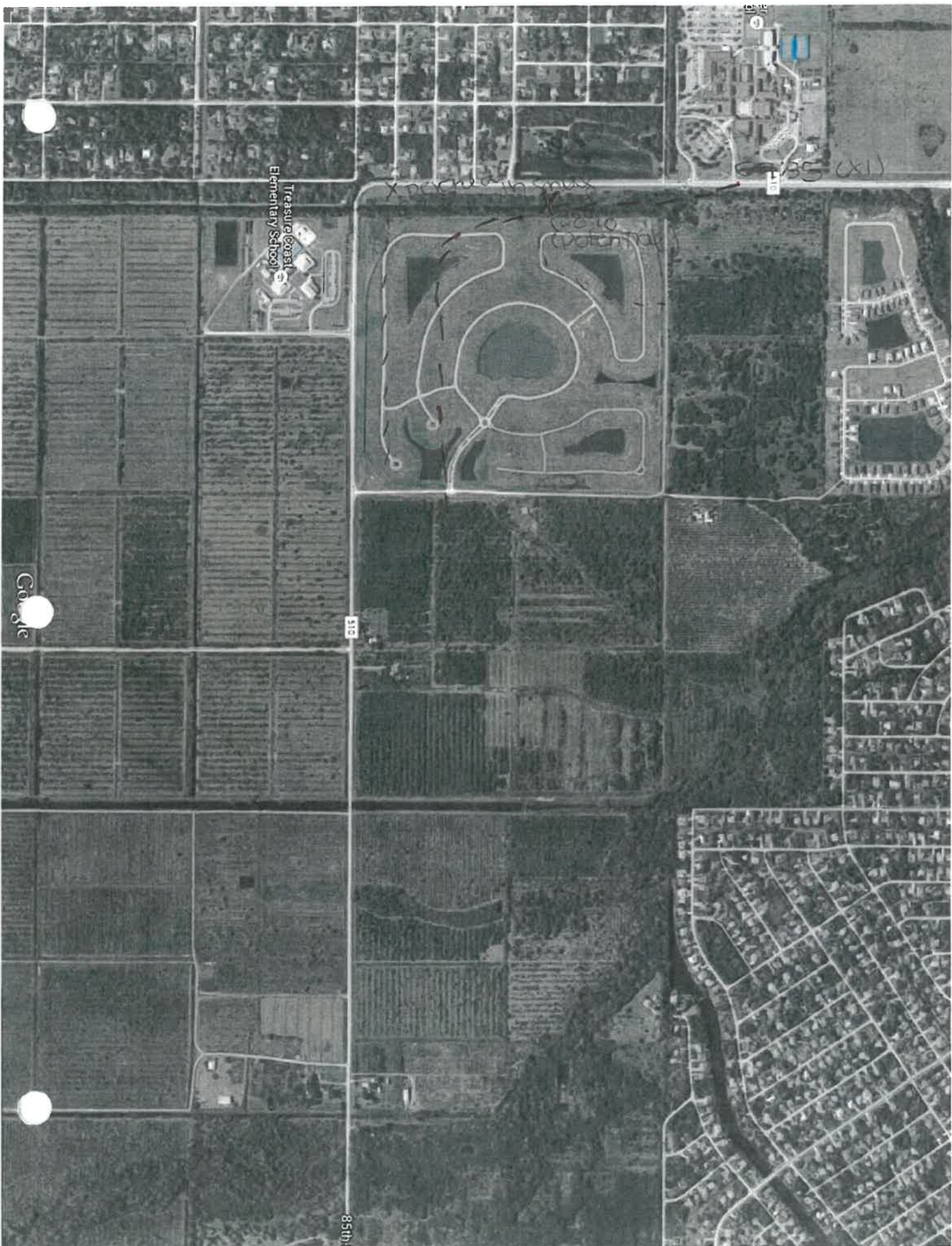
Google











Treasure Coast  
Elementary School

35 (X1)

X mark with map  
Go to (watch map)

513

85th S

Google







Species	Count	Observation date	Start Time	Duration
Mallard (Domestic type)	2	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Great Egret	2	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Cattle Egret	2	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
White Ibis	10	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Black Vulture	3	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Turkey Vulture	2	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Swallow-tailed Kite	1	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Greater Yellowlegs	1	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Mourning Dove	10	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Downy Woodpecker	1	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Great Crested Flycatcher	1	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Loggerhead Shrike	1	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Blue Jay	4	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Carolina Wren	1	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Blue-gray Gnatcatcher	1	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Gray Catbird	1	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Northern Mockingbird	1	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Eastern Towhee	2	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)
Northern Cardinal	2	17-Mar-16	7:20 AM	2 hour(s), 59 minute(s)

510 STA# 1







North County Regional Park

County of Indian River North County

Sebastian River Middle School

Burger King

Publix Super Market at Shops of Sebastian  
Anytime Fitness

Sebastian River High School

515

510

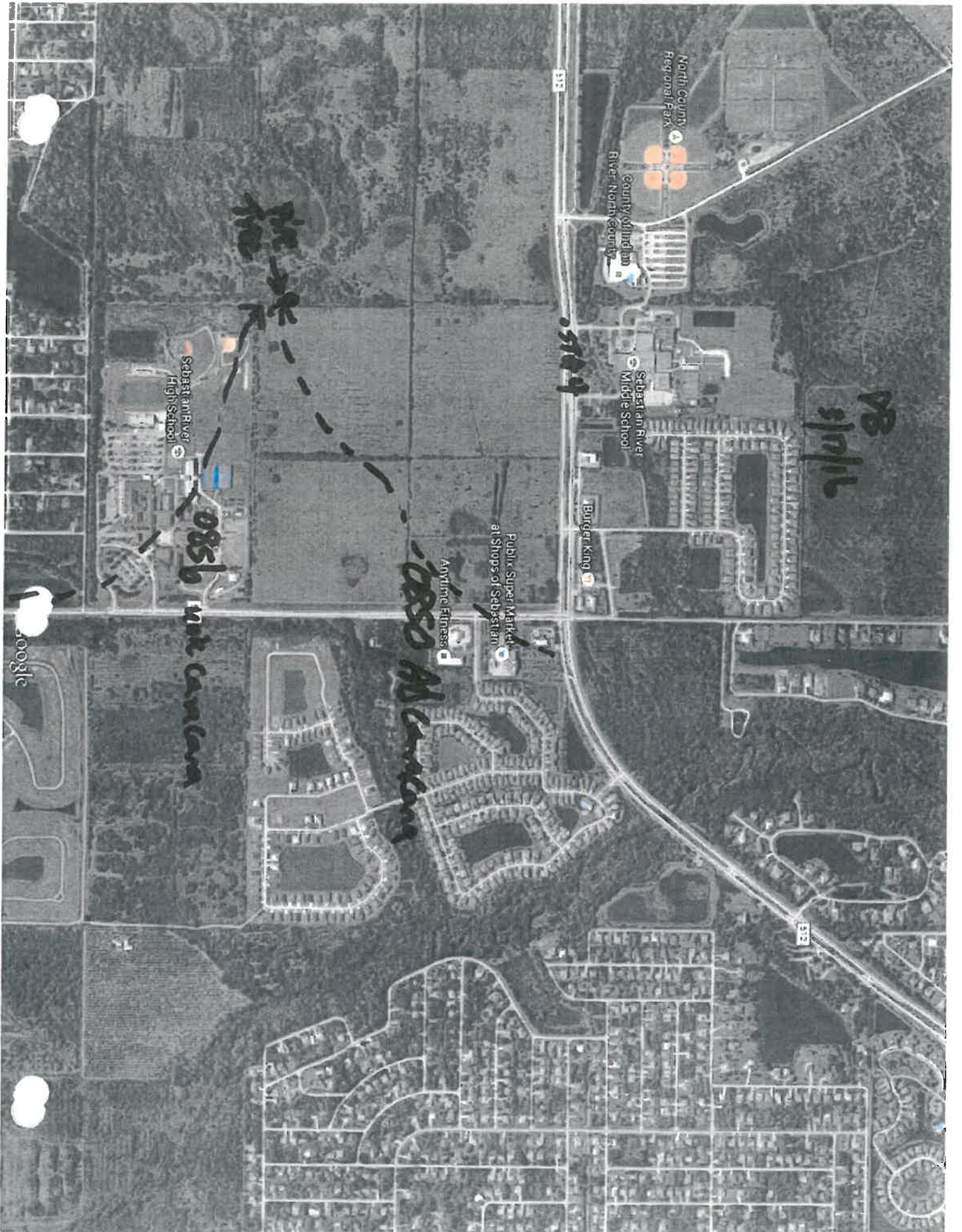
523

Google









VB split

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0856 mit camera

0850 mit camera

North County Regional Park

County of Indian River North County

Sebastian River Middle School

Burger King

Publix Super Market at Shoppes of Sebastian

Anytime Fitness

Sebastian River High School

Google





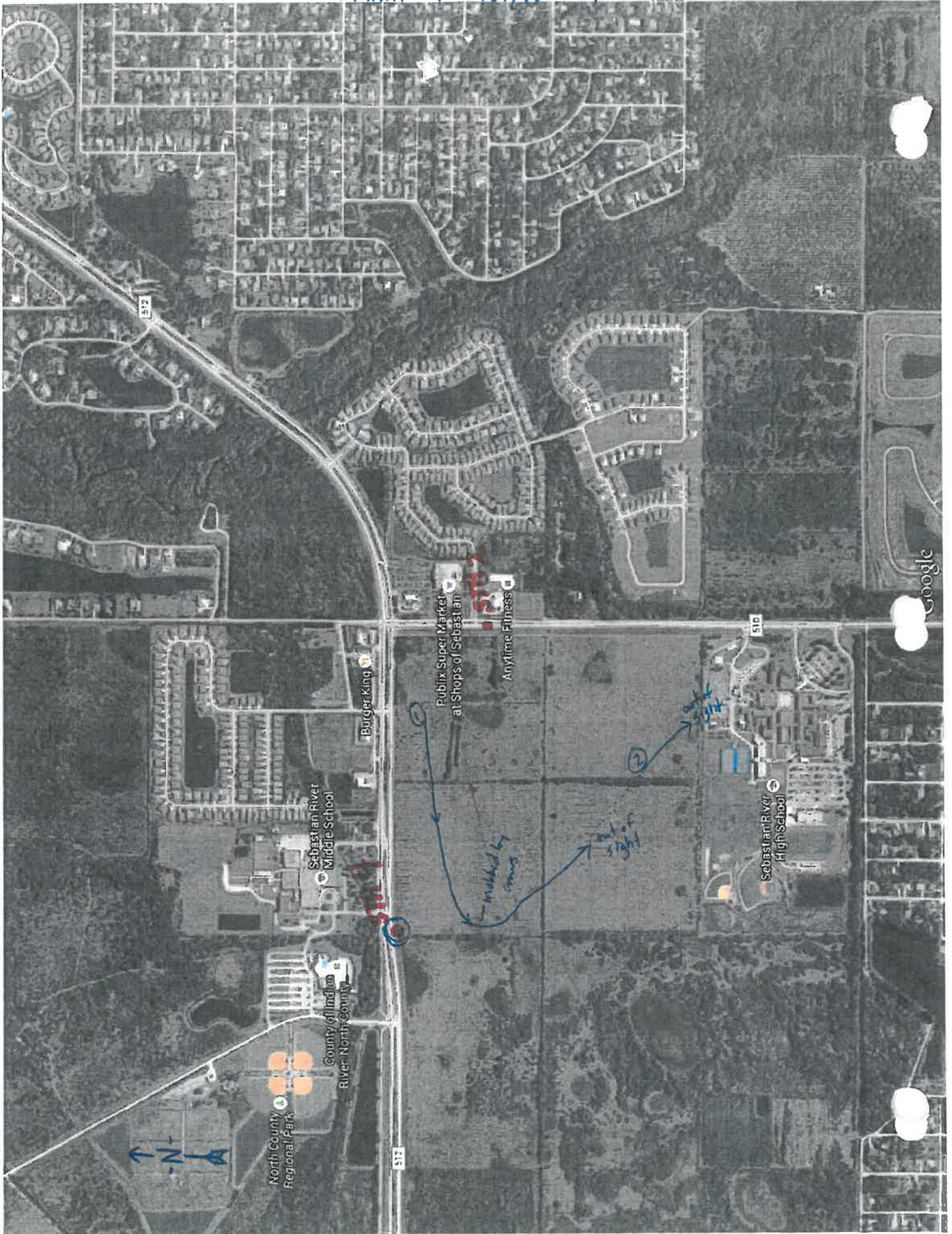








Station #4 3/31/16 R. Fowler









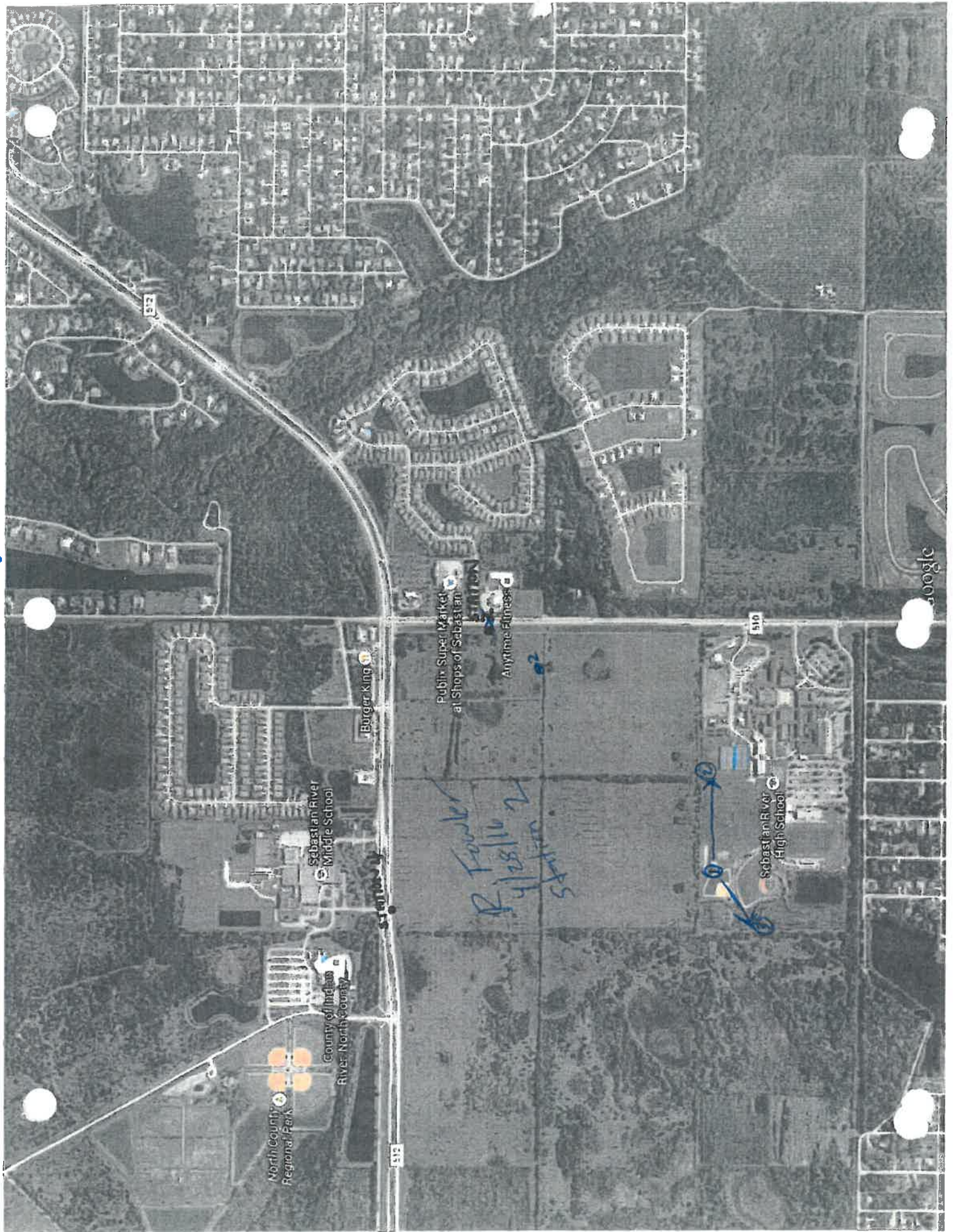












North County Regional Park

County of Inland Empire River-North County

Sebastian River Middle School

Burger King

Publix Super Market at Shops of Sebastian

Anytime Fitness

Sebastian River High School

R Fowler  
4/28/16  
STATION

Google









North County Regional Park

County of Indian River North County

Sebastian River Middle School

Burger King

Public Super Market at Shops of Sebastian

Anytime Fitness

Sebastian River High School

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510

312

*Habitat (2700)*  
*K. Jones*

Google



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**APPENDIX C: 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](mailto:jaxregs@fws.gov); South Florida Field Office: [verobeach@fws.gov](mailto:verobeach@fws.gov); Panama City Field Office: [panamacity@fws.gov](mailto:panamacity@fws.gov)). As long as the signatory of the e-mail certifies compliance with the below Plan (including use of the attached poster and brochure), no further written confirmation or “approval” from the USFWS is needed and the applicant may move forward with the project.

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

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

**POSTER INFORMATION**

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

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

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

**LIFE HISTORY:** The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands

and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

**PROTECTION UNDER FEDERAL AND STATE LAW:** The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. “Taking” of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. “Take” is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of \$25,000 for civil violations and up to \$50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

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

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

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

- Cease clearing activities and immediately notify supervisor or the applicant’s designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

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

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

## **PRE-CONSTRUCTION ACTIVITIES**

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

## **DURING CONSTRUCTION ACTIVITIES**

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

## **POST CONSTRUCTION ACTIVITIES**

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

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**APPENDIX D: ETDM COMMENTS**



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**Degree of Effect:** 2 *Minimal* assigned 02/18/2016 by Luis D Lopez, Federal Highway Administration

**Coordination Document:** PD&E Support Document As Per PD&E Manual

**Direct Effects**

**Identified Resources and Level of Importance:**

No additional resources.

**Comments on Effects to Resources:**

Any effects on recreational resources need to be mitigated. Section 4(f) needs to be evaluated as needed.

**Additional Comments (optional):**

**CLC Commitments and Recommendations:**

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## ETAT Reviews and Coordinator Summary: Natural

### Wetlands and Surface Waters

#### Project Effects

**Coordinator Summary Degree of Effect:** 3 *Moderate* assigned 04/22/2016 by FDOT District 4

**Comments:**

The National Wetlands Inventory ETDM GIS report indicates that there are a total of 23 acres of palustrine wetlands and 2.3 acres of riverine wetlands within the 500-ft buffer of the proposed project. The project area is within the Saint Johns River Water Management District (SJRWMD). The analysis report of the 2009 SJRWMD Wetlands ETDM GIS layer identifies 2 acres of freshwater marshes and 10.8 acres of mixed wetland hardwoods within the 500-ft buffer of the proposed project. Avoidance and minimization along with mitigation strategies will be evaluated through the PD&E process, in order to avoid wetland impacts to the South Prong Slough Conservation Area. Further assessment of wetland impacts will be evaluated in accordance with Executive Order 11990 entitled "Protection of Wetlands" and procedures outlined in Part 2, Chapter 18 of the FDOT Project Development and Environmental Manual. These results will be documented in a Wetlands Evaluation Report. FDOT concurs with FHWA, USACE, SJRWMD, USFWS and NMFS and assigns a degree of effect of MODERATE for Wetlands and Surface Waters.

**Degree of Effect:** 3 *Moderate* assigned 02/18/2016 by Luis D Lopez, Federal Highway Administration

**Coordination Document:** PD&E Support Document As Per PD&E Manual

**Direct Effects**

**Identified Resources and Level of Importance:**

No additional comments.

**Comments on Effects to Resources:**

No additional comments.

**Additional Comments (optional):**

**CLC Commitments and Recommendations:**

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**Degree of Effect:** 3 *Moderate* assigned 02/18/2016 by Tarrie L Ostrofsky, US Army Corps of Engineers

**Coordination Document:** Permit Required

**Coordination Document Comments:**

It is likely that a Corps permit would be required for this projects, as the amount of aquatic resources within the project area is high. The project may be evaluated under a Nationwide Permit, SAJ-92, or Individual Permit. It is difficult to determine without understand the amount of proposed impacts.

**Direct Effects**

**Identified Resources and Level of Importance:**

According to the information provided, the National Wetlands Inventory ETDM GIS report indicated that there are a total of 23 acres of palustrine wetlands and 2.3 acres of riverine wetlands within the 500-ft buffer of the proposed project. also, the project area is within the Saint Johns River Water Management District (SJRWMD), and the analysis report of the 2009 SJRWMD Wetlands ETDM GIS layer identifies 2 acres of freshwater marshes and

10.8 acres of mixed wetland hardwoods within the 500-ft buffer of the proposed project. Depending on the proposed design, and the functional assessment of existing resources, the level of importance is anticipated to be moderate.

**Comments on Effects to Resources:**

The effects on the resources would depend on the proposed design and functional assessment of resources. Wetlands adjacent to the existing roadway may be assessed at a lower quality than wetlands further away from the existing roadway, but still within the project area.

**Additional Comments (optional):**

It is likely that a Corps permit would be required for this project, as the amount of aquatic resources within the project area is high. The project may be evaluated under a Nationwide Permit, SAJ-92, or Individual Permit. It is difficult to determine without understanding the amount of proposed impacts.

**CLC Commitments and Recommendations:**

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**Degree of Effect:** 3 Moderate assigned 01/14/2016 by John Wrublik, US Fish and Wildlife Service

**Coordination Document:** To Be Determined: Further Coordination Required

**Direct Effects**

**Identified Resources and Level of Importance:**

Wetlands

**Comments on Effects to Resources:**

Wetlands provide important habitat for fish and wildlife, and are known to occur within the project area. We recommend that these valuable resources be avoided to the greatest extent practicable. If impacts to these wetlands are unavoidable, we recommend the FDOT provide mitigation that fully compensates for the loss of important resources.

**Additional Comments (optional):**

**CLC Commitments and Recommendations:**

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**Degree of Effect:** 3 Moderate assigned 02/10/2016 by Nathan Ottoson, Saint Johns River Water Management District

**Coordination Document:** Permit Required

**Coordination Document Comments:**

ERP/permit from SJRWMD needed for this project

**Direct Effects**

**Identified Resources and Level of Importance:**

Wetlands and surface waters within limits of this project will need to be evaluated and reviewed by SJRWMD (as part of ERP/application process.)

**Comments on Effects to Resources:**

effects to resources should be addressed

**Additional Comments (optional):**

ERP/permit from SJRWMD needed for this project

**CLC Commitments and Recommendations:**

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**Degree of Effect:** 3 Moderate assigned 02/10/2016 by Brandon Howard, National Marine Fisheries Service

**Coordination Document:** Tech Memo Required

**Coordination Document Comments:**

EFH assessment

**Direct Effects**

**Identified Resources and Level of Importance:**

Magnuson-Stevens Act and Fish and Wildlife Coordination Act: The portion of the project that crosses the South Prong of the St. Sebastian River is essential fish habitat (EFH) for white shrimp (*Litopenaeus setiferus*). A future interagency site visit will be conducted to verify this determination. The South Atlantic Fishery Management Council (SAFMC) designates forested palustrine wetlands as EFH for juvenile white shrimp. The project would impact moderate to low quality freshwater marsh.

**Comments on Effects to Resources:**

Impacts to these wetlands should be sequentially avoided, minimized, and compensated with mitigation. FDOT should explore expanding only within the right-of-way. This would demonstrate that adequate avoidance measures have been taken. If the project continues to PD&E without this sequential mitigation, NMFS would likely find it necessary to issue EFH conservation recommendations, assuming the site inspection confirms EFH is present.

With expansion of the road, impervious surface area will be replaced or expanded. Surface and stormwater runoff into the surrounding waters may result. The discharge of hydrocarbons and other contaminants may degrade water quality. Subsequently, NOAA trust resources located in the receiving waters could be adversely affected. To the extent practicable, runoff from the new roads should be treated before being discharged into the canal.

**Additional Comments (optional):**

EFH assessment

**CLC Commitments and Recommendations:**

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**Water Quality and Quantity**

**Project Effects**

**Coordinator Summary Degree of Effect:** 2 Minimal assigned 04/22/2016 by FDOT District 4

**Comments:**

The existing drainage consists of swales collecting the sheet flow runoff and conveying the runoff to nearby irrigation ditches and canals. Currently, there are multiple culverts, cross drains, and side drains throughout the project corridor. Future drainage features will depend on the recommended drainage system and may require ponds to accommodate the additional runoff which will result from the added impervious area. This project is not located within the boundaries of a sole source aquifer or an Outstanding Florida Waters (OFW). However, the Indian River Lagoon (IRL) is ultimately the receiver of all drainage waters from the project corridor. The IRL is an Aquatic Preserve therefore under Florida Administrative code 62-302.700 (9) is considered an OFW. A Water Quality Impact Evaluation (WQIE) will be completed as per Chapter 20 of the FDOT PD&E manual. The WQIE will comply with the goals of the Clean Water Act (CWA). FDOT concurs with FHWA and SJRWMD and assigns a degree of effect of MINIMAL to Water Quality and Quantity.

**Degree of Effect:** 2 Minimal assigned 02/10/2016 by Nathan Ottoson, Saint Johns River Water Management District

**Coordination Document:** Permit Required

**Coordination Document Comments:**

ERP/permit needed from SJRWMD prior to start of construction of planned improvements

**Direct Effects**

**Identified Resources and Level of Importance:**

For portions of the project that discharge to an OFW or aquatic preserve, an additional 50 percent stormwater treatment will be needed (supplemental to minimum requirements).

**Comments on Effects to Resources:**

Minimal effects to resources if adequate stormwater treatment facilities and measures are proposed

**Additional Comments (optional):**

ERP/permit needed from SJRWMD prior to start of construction of planned improvements

**CLC Commitments and Recommendations:**

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**Degree of Effect:** 2 Minimal assigned 02/18/2016 by Luis D Lopez, Federal Highway Administration

**Coordination Document:** PD&E Support Document As Per PD&E Manual

**Direct Effects**

**Identified Resources and Level of Importance:**

No additional comments.

**Comments on Effects to Resources:**

No additional comments.

**Additional Comments (optional):**

**CLC Commitments and Recommendations:**

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**Floodplains**

**Project Effects**

**Coordinator Summary Degree of Effect:** 2 *Minimal* assigned 04/14/2016 by FDOT District 4

**Comments:**

The western portion of the project area and the portion through South Prong Slough are located within Zone AE of the 100-year floodplain. FDOT acknowledges the need for an ERP permit for this project and will file the required application in due time. FDOT will perform a floodplain analysis in accordance with PD&E and Drainage Manuals. FDOT concurs with FHWA and SJRWMD to assign a degree of effect of MINIMAL for Floodplains.

**Degree of Effect:** 2 *Minimal* assigned 02/18/2016 by Luis D Lopez, Federal Highway Administration

**Coordination Document:** PD&E Support Document As Per PD&E Manual

**Direct Effects**

**Identified Resources and Level of Importance:**

No additional comments.

**Comments on Effects to Resources:**

No comments.

**Additional Comments (optional):**

**CLC Commitments and Recommendations:**

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**Degree of Effect:** 2 *Minimal* assigned 02/10/2016 by Nathan Ottoson, Saint Johns River Water Management District

**Coordination Document:** Permit Required

**Coordination Document Comments:**

Project requires an ERP/permit from SJRWMD for improvements--to be obtained prior to construction commencement

**Direct Effects**

**Identified Resources and Level of Importance:**

impacts to the 100 year floodplain would not be regulated by SJRWMD but may be reviewed and regulated by the local water Control districts

**Comments on Effects to Resources:**

minimal

**Additional Comments (optional):**

Project requires an ERP/permit from SJRWMD for improvements--to be obtained prior to construction commencement

**CLC Commitments and Recommendations:**

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**Wildlife and Habitat**

**Project Effects**

**Coordinator Summary Degree of Effect:** 4 *Substantial* assigned 04/14/2016 by FDOT District 4

**Comments:**

The proposed project is located within the U.S. Fish and Wildlife Service (USFWS) Consultation Areas for the Audubon's crested caracara, Florida scrub jay (multiple known families in Wabasso SCA); Florida grasshopper sparrow, red cockaded woodpecker, and Everglade snail kite. The corridor is also within the Core Foraging Area (CFA) of six wood stork nesting colonies. Based on a review of the Florida Fish and Wildlife Conservation Commission (FWC) eagle nest database, the closest documented eagle nest is located approximately two miles north of the project limits. During the PD&E Study, documentation and consultation regarding listed species and potential project effects will be documented within the ESBA. FDOT will prepare an Endangered Species Biological Assessment for the project as part of the PD&E Study. Based on the potential for the occurrence of listed species, FDOT acknowledges the assignment of MODERATE by FFWCC and SUBSTANTIAL by USFWS for Wildlife and Habitat. At this time FDOT

assigns a degree of effect of SUBSTANTIAL to Wildlife and Habitat.

**Degree of Effect:** 2 *Minimal* assigned 02/18/2016 by Luis D Lopez, Federal Highway Administration

**Coordination Document:** PD&E Support Document As Per PD&E Manual

**Direct Effects**

**Identified Resources and Level of Importance:**

Species have been identified and based on the information provided a survey would be needed during the PD&E for accurate information.

**Comments on Effects to Resources:**

Species have been identified and based on the information provided a survey would be needed during the PD&E for accurate information.

**Additional Comments (optional):**

**CLC Commitments and Recommendations:**

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**Degree of Effect:** 0 *None* assigned 03/01/2016 by Steve Bohl, FL Department of Agriculture and Consumer Services

**Coordination Document:** No Involvement

**Direct Effects**

**Identified Resources and Level of Importance:**

**Comments on Effects to Resources:**

**Additional Comments (optional):**

**CLC Commitments and Recommendations:**

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**Degree of Effect:** 4 *Substantial* assigned 02/18/2016 by John Wrublik, US Fish and Wildlife Service

**Coordination Document:** To Be Determined: Further Coordination Required

**Direct Effects**

**Identified Resources and Level of Importance:**

Federally listed species and fish and wildlife resources

**Comments on Effects to Resources:**

Federally-listed species -

The Service has reviewed our Geographic Information Systems (GIS) database for recorded locations of Federally listed threatened and endangered species on or adjacent to the project study area. The GIS database is a compilation of data received from several sources. Based on review of our GIS database, the Service notes that the following Federally listed species may occur in or near the project area.

Wood Stork

The project corridor is located in the Core Foraging Areas (CFA)(within 18.6 miles ) of two active nesting colonies of the endangered wood stork (*Mycteria americana*). 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. Moreover, wetlands provided as mitigation should adequately replace the wetland functions lost as a result of the action. The Service does not consider the preservation of wetlands, by itself, as adequate compensation for impacts to wood stork foraging habitat, because the habitat lost is not replaced. Accordingly, any wetland mitigation plan proposed should include a restoration, enhancement, or creation component. In some cases, the Service accepts wetlands compensation located outside the CFA of the affected wood stork nesting colony. Specifically, wetland credits purchased from a "Service Approved" mitigation bank located outside of the CFA would be acceptable to the Service, provided that the impacted wetlands occur within the permitted service area of the bank.

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 Methodology can found in the Service's May 18, 2010, wood stork determination key (Service Federal Activity Code Number 41420-2007-FA-1494) provided to the Corps.

Florida Scrub-Jay



The project occurs within the geographic range of the threatened Florida Scrub-Jay (*Aphelocoma coerulescens*). According to the Service's records, the project footprint lies immediately adjacent to occupied scrub-jay habitat at Indian River County's Wabasso Scrub Conservation Area ([WSCA] north of the existing CR 510 and west of 58th Avenue). At least three families of scrub-jays are known to occur within the WCSA. Consequently, road construction in the WCSA would likely result in the incidental take of the scrub jay within an area acquired to protect scrub-jay habitat as compensation for a different development project. We recommend that the project be designed to conduct all widening activities to lands south of road in the section of the project adjacent to the WCSA.

#### Audubon's crested caracara

The project occurs within the geographic range of the threatened Audubon's crested caracara (*Polyborus cheriway* = *Polyborus plancus audubonii*). If suitable habitat occurs in or near the project footprint, we recommend that nest surveys based on Service protocol be conducted to determine the status of caracara nesting in the project area. The Service's caracara nest survey guidance can be found at: <http://www.fws.gov/verobeach/ListedSpeciesBirds.html>

The Service believes that the following federally listed species have the potential to occur in or near the project site: wood stork, Florida scrub-jay, Audubon's crested caracara, Eastern indigo snake (*Drymarchon corais couperi*), and Federally listed plants in Indian River County at <http://ecos.fws.gov/ipac/>. Accordingly, the Service recommends that the Florida Department of Transportation (FDOT) prepare a Biological Assessment for the project (as required by 50 CFR 402.12) during the FDOT's Project Development and Environment process.

#### Fish and Wildlife Resources -

Wetlands provide important habitat for fish and wildlife, and are known to occur within the project area. We recommend that these valuable resources be avoided to the greatest extent practicable. If impacts to these wetlands are unavoidable, we recommend the FDOT provide mitigation that fully compensates for the loss of important resources.

#### Additional Comments (optional):

#### CLC Commitments and Recommendations:

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**Degree of Effect:** 3 *Moderate* assigned 02/10/2016 by Jennifer Goff, FL Fish and Wildlife Conservation Commission

**Coordination Document:** To Be Determined: Further Coordination Required

#### Direct Effects

##### Identified Resources and Level of Importance:

Florida Fish and Wildlife Conservation Commission (FWC) staff has reviewed ETDM #14233, Indian River County, and provides the following comments related to potential effects to fish and wildlife resources of this Programming Phase project.

The Project Description Summary states that this project involves the widening of CR 714 between CR 512 and 58th Avenue from a two-lane to a four-lane road, with multi-modal facilities to accommodate transit users, bicyclists, and pedestrians. The project length is approximately 4.25 miles, and acquisition of additional right-of-way is anticipated. The Project Description did not address the possible need for new drainage retention areas (DRAs) to handle the stormwater runoff from the expanded roadway.

An assessment of the project area was performed on lands within 500 feet of the proposed alignment to determine potential impacts to habitat which supports listed species and other fish and wildlife resources. Our inventory included a review of aerial and ground-level photography, various wildlife observation and landcover data bases, along with coordination with FWC biologists and other State and Federal agencies. A GIS analysis was performed using the Florida Department of Transportation's (FDOT) Environmental Screening Tool to determine the potential quality and extent of upland and wetland habitat, and other wildlife and fisheries resource information. We have reviewed the Preliminary Environmental Discussion Comments Report provided by the FDOT, and offer the following comments and recommendations.

Our assessment reveals that land use in the project area is a mix of Agriculture (mostly citrus or former citrus with some pasture - 55.27%), Urban (23.45%), and other landcover types including Rural Lands (4.34%, 28.5 acres), Hardwood Forested Uplands (3.59%, 23.6 acres), Mixed Hardwood-Coniferous (3.30%, 21.7 acres), Mesic Flatwoods (2.75%, 18.1 acres), Other Hardwood Wetlands (1.61%, 10.6 acres), Open Water (1.43%, 9.4 acres), Shrub and Brushland (1.42%, 9.3 acres), Scrub (1.28%, 8.4 acres), Extractive (1.00 %, 6.6 acres), Wet Prairie (0.31%, 2.1 acres), and Exotic Plants (0.27%, 1.8 acres).

The most valuable wildlife habitats in the project area are within the three adjacent public conservation land parcels owned and managed by Indian River County. The Wabasso Scrub Conservation Area is a 111-acre parcel on the north side of this project's east end, and it contains xeric oak scrub, sand pine scrub, and scrubby flatwoods. It supports three families of Florida scrub jays, along with gopher tortoises and other xeric habitat animals and

plants. The 37.48-acre South Prong Slough Conservation Area is on both sides of CR 510 where it crosses the upper end of the South Prong St. Sebastian River. The narrow slough is a hardwood and cypress swamp. Across CR 512 from the project's north terminus is the Ansin Tract, a 28.12-acre parcel that connects to the St. Sebastian River Preserve State Park. It contains pine flatwoods and wetlands within the floodplain of the river.

Based on range and preferred habitat type, the following species listed by the Federal Endangered Species Act and the State of Florida as Federally Endangered (FE), Federally Threatened (FT), State-Threatened (ST), or State Species of Special Concern (SSC) have the potential to occur in the project area: American alligator (FT based on similarity of appearance to American crocodile), Eastern indigo snake (FT), crested caracara (FT), Florida scrub jay (FT), wood stork (FT), gopher frog (SSC), Florida pine snake (SSC), gopher tortoise (ST), burrowing owl (SSC), southeastern American kestrel (ST), Florida sandhill crane (ST), limpkin (SSC), snowy egret (SSC), little blue heron (SSC), tricolored heron (SSC), roseate spoonbill (SSC), white ibis (SSC), Florida mouse (SSC), and Sherman's fox squirrel (SSC). All of these species either likely or potentially utilize appropriate habitats in the project vicinity.

The GIS analysis revealed several specific characteristics associated with lands along the project alignment that provide an indication of potential habitat quality or sensitivity that will require field studies to verify the presence or absence of listed wildlife species and the quality of wildlife habitat resources. In the FWC's Integrated Wildlife Habitat Ranking System, 17.15% of the assessment area is ranked Moderately High or Medium. In the Florida Natural Areas Inventory Critical Lands and Waters Identification Project (CLIP), 4.72% is ranked Priority 1 or 2 (high) for Biodiversity Resources. The project is within U.S. Fish and Wildlife Service Consultation Areas for Caracara, Red-cockaded Woodpecker, Snail Kite, Piping Plover, Grasshopper Sparrow, Scrub Jay, and Manatee. It is also within the Core Foraging Area of eight wood stork colonies. Three Rare and Imperiled Fish species are found in this project's drainage basin: the mountain mullet, river goby, and opossum pipefish.

#### Comments on Effects to Resources:

Primary wildlife issues associated with this project include: potential loss of scrub and forested wetlands habitat adjacent to or within public conservation lands; potential adverse effects to a moderate number of species listed by the Federal Endangered Species Act as Endangered or Threatened, or by the State of Florida as Threatened or Species of Special Concern; and potential for water quality impacts during construction.

Based on the project information provided, we believe that direct and indirect effects of this project could be moderate, provided that road construction is confined to the existing cleared right-of-way as much as possible, any loss of public conservation land is replaced in kind, any required DRAs are constructed on disturbed sites, and Best Management Practices are followed for treatment of stormwater runoff.

#### Additional Comments (optional):

#### CLC Commitments and Recommendations:

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## Coastal and Marine

### Project Effects

**Coordinator Summary Degree of Effect:** 2 Minimal assigned 04/22/2016 by FDOT District 4

#### Comments:

Within the project corridor where CR-510 intersects the South Prong Slough Conservation Area the potential for Essential Fish Habitat (EFH) exists since no salinity control structure has been observed north of the slough. The project is not located near any Coastal Barrier Resource Area (CBRA). FDOT acknowledges the recommendations of the National Marine Fisheries Service and will proceed in accordance with the PD&E Manual. FDOT concurs with degree of effect assignment of MINIMAL for Coastal and Marine.

**Degree of Effect:** N/A N/A / No Involvement assigned 02/10/2016 by Nathan Ottoson, Saint Johns River Water Management District

**Coordination Document:** Permit Required

#### Coordination Document Comments:

ERP permit required for roadway improvements

### Direct Effects

#### Identified Resources and Level of Importance:

n/a

#### Comments on Effects to Resources:

#### Additional Comments (optional):

ERP permit required for roadway improvements

#### CLC Commitments and Recommendations:

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**Degree of Effect:** 2 *Minimal* assigned 02/10/2016 by Brandon Howard, National Marine Fisheries Service

**Coordination Document:** Tech Memo Required

**Coordination Document Comments:**

EFH Assessment will be required if the onsite wetlands are determined to be EFH.

#### Direct Effects

##### Identified Resources and Level of Importance:

Magnuson-Stevens Act and Fish and Wildlife Coordination Act: The portion of the project that crosses the South Prong of the St. Sebastian River is essential fish habitat (EFH) for white shrimp (*Litopenaeus setiferus*). A future interagency site visit will be conducted to verify this determination. The South Atlantic Fishery Management Council (SAFMC) designates forested palustrine wetlands as EFH for juvenile white shrimp. The project would impact moderate to low quality freshwater marsh.

##### Comments on Effects to Resources:

Impacts to these wetlands should be sequentially avoided, minimized, and compensated with mitigation. FDOT should explore expanding only within the right-of-way. This would demonstrate that adequate avoidance measures have been taken. If the project continues to PD&E without this sequential mitigation, NMFS would likely find it necessary to issue EFH conservation recommendations, assuming the site inspection confirms EFH is present.

With expansion of the road, impervious surface area will be replaced or expanded. Surface and stormwater runoff into the surrounding waters may result. The discharge of hydrocarbons and other contaminants may degrade water quality. Subsequently, NOAA trust resources located in the receiving waters could be adversely affected. To the extent practicable, runoff from the new roads should be treated before being discharged into the canal.

##### Additional Comments (optional):

EFH Assessment will be required if the onsite wetlands are determined to be EFH.

#### CLC Commitments and Recommendations:

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**Degree of Effect:** 0 *None* assigned 02/18/2016 by Luis D Lopez, Federal Highway Administration

**Coordination Document:** PD&E Support Document As Per PD&E Manual

#### Direct Effects

##### Identified Resources and Level of Importance:

##### Comments on Effects to Resources:

##### Additional Comments (optional):

#### CLC Commitments and Recommendations:

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## ETAT Reviews and Coordinator Summary: Physical

### Noise

#### Project Effects

**Coordinator Summary Degree of Effect:** 2 *Minimal* assigned 04/14/2016 by FDOT District 4

##### Comments:

Several residential homes are located along the proposed project corridor. GIS Analysis from ETDM identified no high-density residential areas of six or more dwelling units per acre within the 500-foot buffer. However, 33.9 acres of medium density residential area of 2-5 dwelling units per acre are within 500-ft of the project corridor. A Noise Study Report (NSR) will be prepared in accordance with 23 Code of Federal Regulations Part 772, Chapter 335.17 Florida Statutes, and the FDOT PD&E Manual to identify unavoidable noise impacts, and an evaluation of abatement. Based on a review of the EST GIS layers and a field review, FDOT assigns a degree of effect of MINIMAL to Noise.

**Degree of Effect:** 2 *Minimal* assigned 02/18/2016 by Luis D Lopez, Federal Highway Administration

**Coordination Document:** PD&E Support Document As Per PD&E Manual

#### Direct Effects

##### Identified Resources and Level of Importance: