DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
10117 PRINCESS PALM AVENUE, SUITE 120
TAMPA, FLORIDA 33610

July 23, 2012

REPLY TO ATTENTION OF

Tampa Permits Section
SAJ-2011-00551 (IP-TEH)

Ms. Michele Baker
Pasco County Board of County Commissioners
7530 Little Road, Suite 320
New Port Richey, Florida 34654

Mr. John Post, Jr.
Florida Department of Transportation
Florida's Turnpike Enterprise
Post Office Box 613069
Ocoee, Florida 34761

Dear Ms. Baker and Mr. Post:

This is in reference to your permit application requesting Department of the Army authorization to impact waters of the United States in association with a project known as "Ridge Road Extension" (SAJ-2011-00551 (IP-TEH)). The U.S. Army Corps of Engineers (Corps) published a public notice on November 28, 2011. The Corps requires the following information and/or clarification to determine if the project complies with our 404(b)(1) Guidelines and other regulations pertinent to our review:

Alternatives Analysis – Definition of Alternatives

1. The Corps was advised during our July 18, 2012 teleconference that the alternatives analysis was based on the Cost Affordable Plan as reflected on Map 7-2b (Attachment 1) of the 2035 Long Range Transportation Plan (LRTP) rather than the Needs Plan. The alternatives analysis provided in the application is based instead on the Needs Plan. Please clarify and revise the alternatives analysis accordingly.

2. Attachment 2, compiled by the Corps using Map 7-2b, provides a summary of lanes provided by the Cost Affordable 2035 LRTP as well as the project alternatives. The Cost Affordable 2035 LRTP provides for 6 additional lanes west of the Suncoast Parkway and 14 additional lanes east of the Suncoast Parkway. Alternative 4 features 12 additional lanes east of the Suncoast Parkway, which falls short of the identified need. Please clarify whether Alternative 4 is a viable alternative.

3. The provided alternatives analysis has been revised with regard to the alternatives involving the widening of SR-52 and SR-54. Previous analyses included the evaluation of widening SR-52 between Moon Lake Road and US-41 and widening SR-54 between Little Road and US-41. The revised analysis considers widening of SR-52 and SR-54 beginning at US-19. This change results in adding an additional 9.25 miles of road widening to alternatives that include SR-52 and 4.75 miles of additional road widening to alternatives that include SR-54. The Corps finds that extending alternatives that include SR-52 and SR-54 to US-19 is inappropriate given the extent and connectivity provided by the proposed Ridge Road

Extension. The preferred alternative provides increased roadway capacity east of the Moon Lake Road – Starkey Boulevard north-south corridor. An appropriate analysis will examine similar gains in capacity along SR-52 and SR-54 east of the Moon Lake Road – Starkey Boulevard north-south corridor. The inclusion of widening efforts westward to US-19 has inflated the costs and impacts associated with alternatives involving SR-52 and/or SR-54. To provide a meaningful comparison of project alternatives, the Corps requests that you revise the alternatives analysis to include widening of SR-52 between Moon Lake Road and US-41 and widening of SR-54 between Starkey Boulevard and US-41 (see Attachment 3).

4. Information provided by FDOT indicates that there is a 1,800-foot portion of the Suncoast Parkway where a diamond interchange could be constructed without adversely impacting the Parkway. This window begins at the Angeline Corporation property line to the south and ends 1,800 feet to the north. Please clarify why two alternatives (6A and 6C) lie outside of this window.

5. Please provide an evaluation of the alternatives of a) constructing an elevated roadway within the Serenova Tract (approximately 11,190 feet or 2.1 miles between Stations 118 and 237) and b) constructing elevated areas within the Serenova Tract in addition to the four elevated areas currently proposed.

6. Please evaluate the following alternatives to provide the needed lanes as defined in the LRTP:
a) adding additional lanes to Tower Road instead of constructing the preferred alternative, b) adding additional lanes to both Tower Road and SR-52 instead of constructing the preferred alternative,
c) constructing a 2-lane Ridge Road Extension in combination with additional lanes on Tower Road,
d) constructing a 2-lane Ridge Road Extension in combination with additional lanes on SR-52, and
e) constructing a 2-lane Ridge Road Extension in combination with additional lanes on SR-54.

Alternatives Analysis - Evaluation

7. One of the project purposes is to improve east-west roadway capacity between US-19 and US-41 and enhance overall mobility in both west and central Pasco County in accordance with the County's current Comprehensive Plan and the Metropolitan Planning Organization's LRTP. Section 5.1.3 of the alternatives analysis provides two criteria directly relevant to this purpose: 1) the length of proposed alternative and 2) whether or not it connects to the Suncoast Parkway.

The Corps finds that these criteria do not provide sufficient information by which to evaluate the various alternatives with respect to roadway capacity (see Question 3 above with respect to the length of alternatives). The previous transportation analysis, conducted by Tindale-Oliver & Associates in December 2003, also fails to provide data to compare project alternatives. The analysis is now outdated, as it relies on the 2025 Long Range Transportation Plan and does not account for road improvements that have occurred since 2003. This report is limited to a with- and without- Ridge Road Extension evaluation (i.e. the preferred alternative and the "no-action" alternative). The Corps requests that you provide a transportation analysis that allows for a comparison of the level of service for the major area roadways given the various alternatives. "Area roadways" include those bounded by SR-52 to the north, SR-54 to the south, US-41 to the east, and Moon Lake Road / DeCubellis Road / Starkey Boulevard to the west.

8. The second project purpose is to provide additional roadway capacity and improved routing away from coastal hazard areas and improve hurricane evacuation clearance times in the event of a hurricane or other major weather-related occurrence. Section 5.1.4 of the alternatives analysis states that a new lane added to an existing roadway does not have the same vehicle capacity as a new roadway. Alternatives that involve creation of a new road (Alternatives 6A-6F) were assigned the highest score of a "5", while all other alternatives were assigned the lowest score of a "0". The Corps finds this analysis arbitrary, as any road improvements would be expected to provide some improvement in hurricane evacuation.

The Corps requests that you further clarify your project purpose related to hurricane evacuation so that an objective evaluation of project alternatives may be performed. The refinement of this portion of the project purpose should be based on quantifiable criteria related to efficacy of hurricane evacuation such as modeled evacuation time-savings per industry standards.

Following the refinement of this portion of the project purpose, as described above, please reevaluate the factor as it relates to all project alternatives.

9. Section 4.2.2 of the application indicates that the alternatives analysis accounts for the fact that SR-52 will be widened to 6 lanes under the 2035 LRTP regardless of whether the proposed Ridge Road Extension is built. The application states that the reported impacts for Alternatives 2, 3, and 5, no longer include those required to widen SR-52 to 6 lanes and are limited to impacts due to widening in excess of 6 lanes. This is a significant revision to the analysis performed under your previous application (reference your October 13, 2010 submittal). The Corps finds this revision more accurately represents the impacts of the alternatives and contributes to a meaningful comparison among alternatives. However, the Corps notes the following areas of concern with regard to this revision:

a. This same adjustment was not made for Alternative 4. Under the LRTP, Tower Road (Alternative 4) will be constructed with 2 lanes west of the Suncoast Parkway and 4 lanes east of the Suncoast Parkway regardless of whether the proposed Ridge Road Extension is built. Therefore, reported impacts for Alternative 4 should be limited to impacts due to construction of the 4 additional lanes west of the Suncoast Parkway and 2 additional lanes east of the Suncost Parkway, not the total of 6 lanes. Please revise the analysis accordingly.

b. Table 3 has been revised under "Minimized Alternative" to reflect lower direct (primary) wetland impacts associated with the reduced project footprints for Alternatives 2, 3, and 5. Other aspects of the alternatives analysis will be similarly affected by the reduced footprint of Alternatives 2, 3, and 5, as most parameters of comparison are based on the total acreage of impact and/or the acreage of wetland impacts. However, beyond an adjustment in Table 3 to reflect accurate direct wetland impacts and in Table 9 to reflect accurate costs, no other aspects of the alternatives analysis were reevaluated for Alternatives 2, 3, and 5. Accordingly, the Corps notes the following items require reanalysis[1]:

i. Supporting maps in Enclosure 1, Volume 2, Appendix 15, Section 10 should be altered to reflect the revised footprints of the alternatives
ii. Table 2 (Community Impacts)
iii. Table 4 (Wildlife Scores)

[1] This list is not exhaustive. Please ensure all aspects of the alternatives analysis are revised as necessary.

iv. Table 5 (Floodplain Impacts)
v. Table 6 (Air Quality)
vi. Table 10 (Safety)
vii. Table 11 (Alternatives Evaluation Matrix)
viii. Appendix G (Cost Funding Methodology and Calculations)

c. Clarify why Table 3 has been revised under "Minimized Alternative" to account for this change with respect to Alternative 2, but the impacts under the "Original Alternative" have not been changed since the previous application.

d. Clarify why Table 3 was not adjusted to reflect revised secondary impacts for alternatives with alteration to the primary impact footprint.

e. Table 9 (Estimated Costs) provides summary data from Appendix G (Cost Funding Methodology and Calculations). However, Appendix G is inconsistent with Table 9 with respect to the costs for Alternatives 3 and 5. Please clarify and revise these portions of the application, as appropriate.

f. Table 10 has not been revised to reflect the revised costs in Table 9 (Estimated Costs). Please revise Table 10 to reflect the costs in Table 9.

10. Table 3 indicates that the proposed wetland impacts associated with Alternative 6C have decreased since your October 13, 2010 submittal. Please clarify how this has been accomplished.

11. The provided alternatives analysis addresses impacts on forested, herbaceous, and scrub-shrub wetland systems. It does not, however, address the impacts of various alternatives on streams. Please provide this analysis.

12. The provided alternatives analysis of wetland impacts is based on 1999 Florida Land Use, Cover and Forms Classification System (FLUCCS) data from Southwest Florida Water Management District (SWFWMD). Other evaluation criteria appear to have been evaluated using more current data. Please revise the analysis to include an evaluation of all factors based on the most current (2009) FLUCCS data from SWFWMD.

13. Please provide documentation addressing the relationship and strength of the relationship between the number of roadway lanes and the safety of motorized vehicles, pedestrians, and bicycles. Please also provide the source of the documentation.

14. Please clarify what, if any, efforts have been taken by Pasco County to pursue funding and/or increase the prioritization of improvements on SR-52, SR-54, and Tower Road.

15. Within the area bounded by SR-52 to the north, SR-54 to the south, US-41 to the east, and Moon Lake Road / DeCubellis Road / Starkey Boulevard to the west, provide a) a list of road improvements that are to be funded (wholly or partially) and/or completed by others (e.g., Florida Department of Transportation or developer commitments as part of Developments of Regional Impact, etc.), and b) the anticipated start and end dates for roadway improvements to be undertaken by Pasco County.

16. Section 5.1.5 of the application states that the right-of-way costs for alternatives were computed by multiplying the reduced construction costs by a factor of 1.20. In an email transmitted by Ms. Baker on April 3, 2012, it was further clarified that this factor was selected as being representative of the historic cost trends for right-of-way acquisition versus construction costs. Please provide documentation supporting this statement.

17. In Appendix G, clarify how and why factor "%Add'l Road R/W (Excl Ponds)" was applied to Alternatives 2-5.

Cultural Resources

18. The Corps has determined that the proposed permit area may contain unknown historical properties which warrant further research and may be eligible for inclusion in the National Register of Historic Places (NRHP). In accordance with the National Historic Preservation Act, you are required to conduct a Phase I cultural resources survey for the presence of potentially eligible historic properties within all areas that have not been previously surveyed and submit the resulting report. Your October 10, 2011 submittal identified the areas that have not been surveyed. Additional survey work is also required at previously identified site 8PA70 (River Ridge Site) so that a determination may be made as to whether this site is eligible for the NRHP. These surveys must be conducted in accordance with the "Secretary of Interior Standards & Guidelines for Archeology & Historic Preservation" and the "Florida Cultural Resources Management Standards & Operations Manual".

The Bexley Site (8PA668) has been determined to be potentially eligible for listing in the NRHP. The proposed roadway right-of-way will impact the southern portion of this site. Proposed floodplain compensation pond A-5 will also impact this known site. Please provide a scaled map of this site, including the location of the proposed roadway and pond. Additionally, please evaluate measures to avoid and minimize impacts to this known site. If you cannot revise the project to eliminate impacts to this site, the Corps will initiate further consultation with the State Historic Preservation Officer and formal consultation with the Seminole Tribe of Florida, in accordance with the comments from these parties (Attachments 4 and 5, respectively). If site 8PA668 cannot be avoided and the project will have an adverse effect, a Memorandum of Agreement will be necessary, per 36 CFR 800.6.

Endangered Species

19. Please provide a completed 2008 Wood Stork Key for Central and North Peninsular Florida (Attachment 6) including a foraging habitat assessment procedure.

20. Please provide an analysis of the potential impacts the project may have with regard to fragmentation of habitat for the Eastern indigo snake.

Cumulative and Secondary Impacts

21. Please provide an assessment of secondary effects. Secondary effects are those caused by an action and are later in time or farther removed in distance but are still reasonably foreseeable.

22. Please provide an assessment of cumulative effects. Cumulative effects are the impacts on the environment that result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other action. Please find attached (Attachment 6) Table 1-5 from the Council on Environmental Quality's Considering Cumulative Effect Under the National Environmental Policy Act (1997) that outlines the steps of this analysis.

The Corps requests that you provide the information outlined above within 30 days of the date of this letter. If no response is received, we will assume you have no further interest in obtaining a Department of the Army permit and the application will be withdrawn.

Should you have any questions or comments regarding this letter, please contact Tracy Hurst of my staff at the letterhead address, by phone at 813-769-7063, or by electronic mail at Tracy.E.Hurst@usace.army.mil.

Sincerely,

Kevin D. O'Kane

Kevin D. O'Kane
Chief, Tampa Permits Section

Attachments:

1. Map 7-2b from 2035 LRTP
2. Corps Comparison of 2035 LRTP to Alternatives
3. Map of Alternatives with Areas of SR-52 and SR-54 to be Omitted
4. State Historic Preservation Officer letter dated 5/8/12
5. Seminole Tribe of Florida letter dated 5/7/12
6. 2008 Wood Stork Key for Central and North Peninsular Florida
7. Table 1-5 from CEQ's Considering Cumulative Effect Under the National Environmental Policy Act (1997)

cc(w/atts):

Dr. Paul Backhouse
Seminole Tribe of Florida
Tribal Historic Preservation Office
30290 Josie Billie Hwy., PMB 1004
Clewiston, FL 33440
(Ref. THPO #009124)

Mr. Terry Gilbert
Florida Fish and Wildlife Conservation Commission
27 West Point Drive
Crawfordville, FL 32327

Ms. Laura Kammerer
Florida Department of State
Division of Historical Resources
500 S. Bronough St.
Tallahassee, FL 32399-0250
(Ref. DHR No. 2012-1341B)

Mr. Ron Miedema
Wetlands and Marine Regulatory Section
U.S. Environmental Protection Agency
400 North Congress Avenue, Suite 120
West Palm Beach, Florida 33401

Dr. Heath Rauschenberger
U.S. Fish and Wildlife Service
7915 Baymeadows Way, Suite 200
Jacksonville, Florida 32256-7517

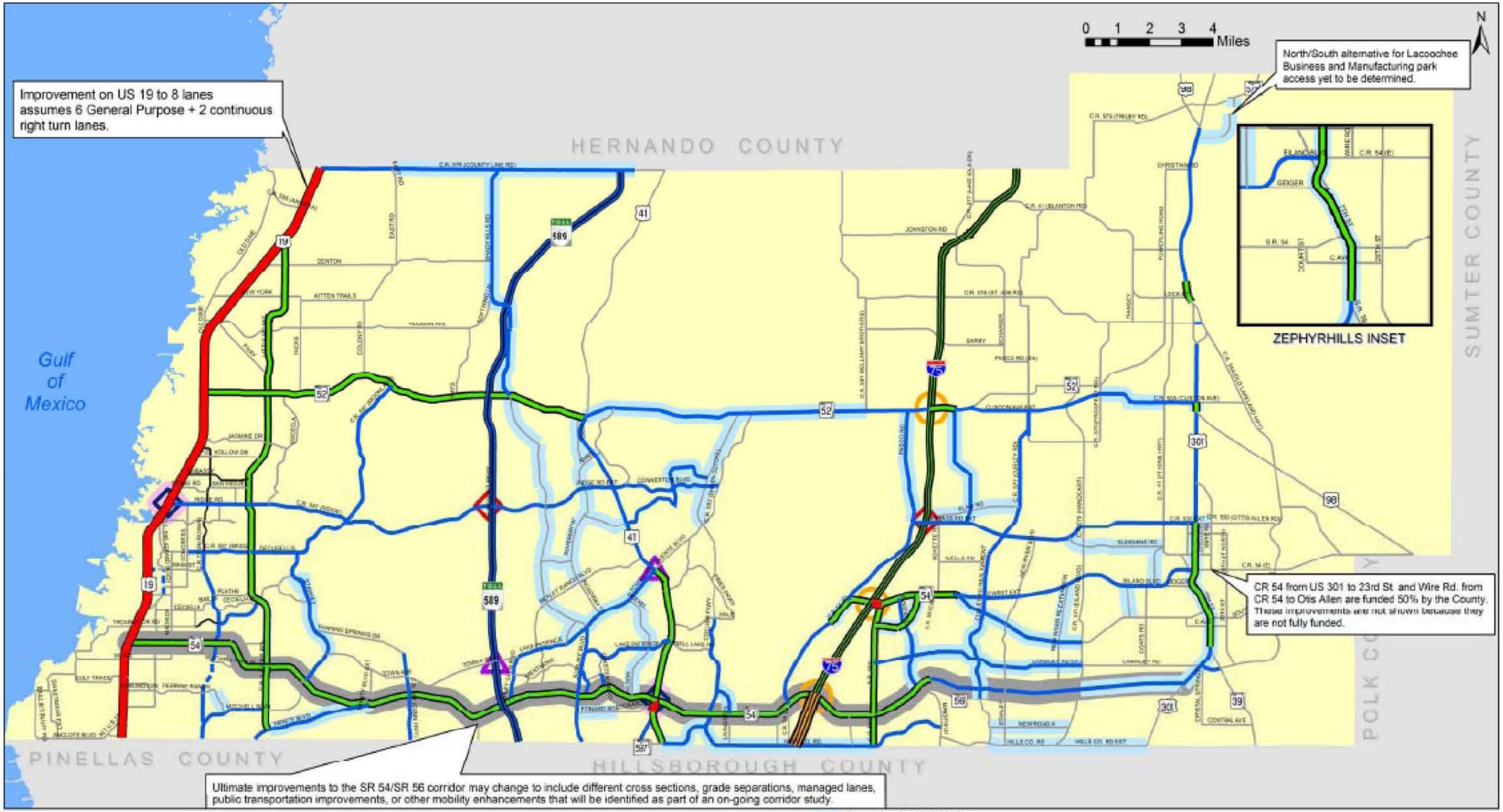
Mr. David Sauskojus
Southwest Florida Water Management District
7601 US Hwy. 301
Tampa, FL 33637-6759
(Ref. ERP No. 43018792.005)

Improvement on US 19 to 8 lanes assumes 6 General Purpose + 2 continuous right turn lanes.

North/South alternative for Lacoochee Business and Manufacturing park access yet to be determined.

CR 54 from US 301 to 23rd St. and Wire Rd. from CR 54 to Otis Allen are funded 50% by the County. These improvements are not shown because they are not fully funded.

Ultimate improvements to the SR 54/SR 56 corridor may change to include different cross sections, grade separations, managed lanes, public transportation improvements, or other mobility enhancements that will be identified as part of an on-going corridor study.



Map 7-2b: Pasco County 2035 LRTP - 2035 Cost Affordable 2026-2035 Roadway Improvements

This map includes the improvements that are cost affordable during 2025 to 2035 and the number of lanes by 2035. The blue highlights indicate roadways that will be improved by 2035.

Improvements (2026-2035)
Interchange/Overpass Improvements (2026-2035)
Interchange
Overpass
Grade Seperated Intersection
Interchange Reconstruction
Managed Lanes (Improvements to be determined by FDOT Study)

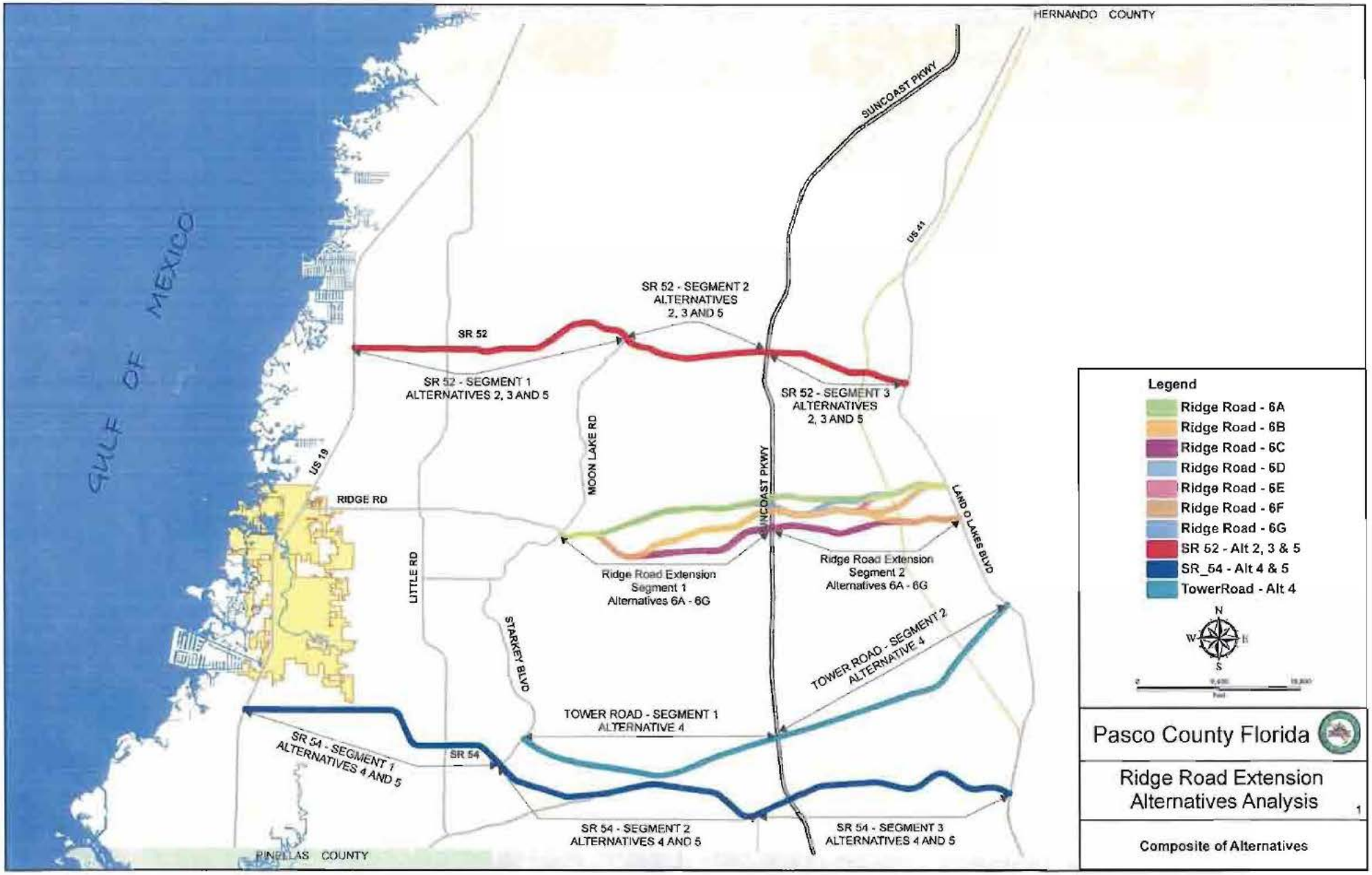
ROAD TYPE	NUMBER OF LANES (General Purpose) 2	3	4	6	8	10	12	14
One-Way								
Undivided								
Divided								
Freeway								

2035 LRTP & ALTS 6A-6G		WEST OF PARKWAY			EAST OF PARKWAY		
		EXISTING	2035	NET GAIN	EXISTING	2035	NET GAIN
	SR 52	6	6	0	2	6	4
	RRE	0	4	4	0	4	4
	TOWER RD	0	4	4	0	4	4
	SR 54	6	8	2	4	10	6
	Total	**12**	**22**	**10**	**6**	**24**	**18**

ALT 2 & 3		WEST OF PARKWAY			EAST OF PARKWAY		
		EXISTING	2035	NET GAIN	EXISTING	2035	NET GAIN
	SR 52	6	10~~6~~	4~~0~~	2	10~~6~~	8~~4~~
	RRE	0	0~~4~~	0~~4~~	0	0~~4~~	0~~4~~
	TOWER RD	0	4	4	0	4	4
	SR 54	6	8	2	4	10	6
	Total	**12**	**22**	**10**	**6**	**24**	**18**

ALT 4		WEST OF PARKWAY			EAST OF PARKWAY		
		EXISTING	2035	NET GAIN	EXISTING	2035	NET GAIN
	SR 52	6	6	0	2	6	4
	RRE	0	0~~4~~	0~~4~~	0	0~~4~~	0~~4~~
	TOWER RD	0	6~~4~~	6~~4~~	0	6~~4~~	6~~4~~
	SR 54	6	8	2	4	8~~10~~	4~~6~~
	Total	**12**	**20~~2~~**	**8~~10~~**	**6**	**20~~24~~**	**14~~18~~**

ALT 5		WEST OF PARKWAY			EAST OF PARKWAY		
		EXISTING	2035	NET GAIN	EXISTING	2035	NET GAIN
	SR 52	6	8~~6~~	2~~0~~	2	8~~6~~	6~~4~~
	RRE	0	0~~4~~	0~~4~~	0	0~~4~~	0~~4~~
	TOWER RD	0	4	4	0	4	4
	SR 54	6	8	2	4	8~~10~~	4~~6~~
	Total	**12**	**20~~22~~**	**8~~10~~**	**6**	**20~~24~~**	**14~~18~~**


HERNANDO COUNTY
SUNCOAST PKWY
US 41
GULF OF MEXICO
SR 52 - SEGMENT 2
ALTERNATIVES
2, 3 AND 5
SR 52
SR 52 - SEGMENT 1
ALTERNATIVES 2, 3 AND 5
SR 52 - SEGMENT 3
ALTERNATIVES
2, 3 AND 5
MOON LAKE RD
US 19
RIDGE RD
LITTLE RD
STARKEY BLVD
LAND O LAKES BLVD
Ridge Road Extension
Segment 1
Alternatives 6A - 6G
Ridge Road Extension
Segment 2
Alternatives 6A - 6G
TOWER ROAD - SEGMENT 2
ALTERNATIVE 4
TOWER ROAD - SEGMENT 1
ALTERNATIVE 4
SR 54 - SEGMENT 1
ALTERNATIVES 4 AND 5
SR 54
SR 54 - SEGMENT 2
ALTERNATIVES 4 AND 5
SR 54 - SEGMENT 3
ALTERNATIVES 4 AND 5
PINELLAS COUNTY
Legend
Ridge Road - 6A
Ridge Road - 6B
Ridge Road - 6C
Ridge Road - 6D
Ridge Road - 6E
Ridge Road - 6F
Ridge Road - 6G
SR 52 - Alt 2, 3 & 5
SR_54 - Alt 4 & 5
TowerRoad - Alt 4
N
W
E
S
Pasco County Florida
Ridge Road Extension
Alternatives Analysis
1
Composite of Alternatives

FLORIDA DEPARTMENT of STATE

RICK SCOTT
Governor

KEN DETZNER
Secretary of State

Tracy Hurst
U.S. Army Corps of Engineers
Tampa Regulatory Office
10117 Princess Palm Ave., Suite 120
Tampa FL, 33610

May 8, 2012

RECEIVED
MAY 11 2012
Tampa Regulatory Office

DHR No.: 2012-1341**B** / Received by DHR: March 29, 2012
Permit Application No.: SAJ-2011-00551 (IP-THE)
Applicant: FDOT, Turnpike Enterprise
Project: *Ridge Road Extension in Pasco County*

Dear Ms. Hurst:

Our office received and reviewed the referenced project in accordance with Section 106 of the National Historic Preservation Act of 1966, *as amended*, and implementing regulations 36 C.F.R. Part 800, for possible impact to historic properties listed, or eligible for listing, in the National Register of Historic Places (NRHP). The State Historic Preservation Officer is to advise and assist state and federal agencies when identifying historic properties, assessing effects upon them, and considering alternatives to avoid or minimize adverse effects.

This office participated in a conference call with the Army Corps and the Seminole Tribe of Florida to review additional information regarding the Ridge Road Extension project. Additional survey work is required for previously un-surveyed portions of the project in order for this office to review impact to cultural resources and specifically, to make a determination of NRHP eligibility for 8PA70. All project activities should avoid the NRHP eligible site, 8PA668; further consultation with this office is required if impacts to 8PA668 are unavoidable.

If there are any questions concerning our comments or recommendations, please contact Daniel McClarnon, Archaeologist, by phone at 850.245.6333, or by electronic mail at daniel.mcclarnon@dos.myflorida.com.

Sincerely,

Laura A. Kammerer

Laura A. Kammerer
Deputy State Historic Preservation Officer
For Review and Compliance

PC: Roy Jackson, FDOT CEMO
John Post, FDOT Turnpike Enterprise

SEMINOLE TRIBE OF FLORIDA
TRIBAL HISTORIC PRESERVATION OFFICE

TRIBAL HISTORIC
PRESERVATION OFFICE

SEMINOLE TRIBE OF FLORIDA
AH-TAH-THI-KI MUSEUM

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CLEWISTON, FL 33440

PHONE: (863) 983-6549
FAX: (863) 902-1117

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MICHAEL D. TIGER

Tracy Hurst
Jacksonville District Corps of Engineers
Tampa Regulatory Office
10117 Princess Palm Avenue, Suite 120
Tampa, Florida 33610

THPO#: 009124
Project #: SAJ-2011-00551

May 7, 2012

Subject: Assessment of Effects for the Proposed Ridge Road Extension Project, Pasco County, Florida

Dear Ms. Hurst,

The Seminole Tribe of Florida's Tribal Historic Preservation Office (STOF-THPO) has received and reviewed the archaeological surveys, SHPO letters, and other information provided by the Jacksonville District Corps of Engineers regarding the aforementioned project. After reviewing the additional information, and what was discussed on the conference call occurring on 7 May 2012, the STOF-THPO requests that additional survey work be conducted in the area around site 8Pa70 in order to ascertain its eligibility status for the National Register of Historic Places (NRHP), as well as in any areas of the APE which have not yet been systematically tested for cultural resources. Additionally, the STOF-THPO would like to receive and review the report which led to the eligibility determination for site 8Pa70. Furthermore, the STOF-THPO would also like to request that archaeological site 8Pa668 be avoided by all construction activities due to its classification as eligible for the NRHP. If this request is not possible, further consultation with the STOF-THPO will be required to develop minimization or mitigation techniques. The Seminole Tribe of Florida appreciates the opportunity to comment on this project and looks forward to working with you in the future.

Please reference *THPO-009124* in any future correspondence about this project.

Sincerely,

Direct routine inquiries to:

Paul N. Backhouse, Ph.D.
Acting Tribal Historic Preservation Officer
Seminole Tribe of Florida

Anne Mullins
Compliance Review Supervisor
annemullins@semtribe.com

THE CORPS OF ENGINEERS, JACKSONVILLE DISTRICT, U. S. FISH AND WILDLIFE SERVICE, JACKSONVILLE ECOLOGICAL SERVICES FIELD OFFICE AND STATE OF FLORIDA EFFECT DETERMINATION KEY FOR THE WOOD STORK IN CENTRAL AND NORTH PENINSULAR FLORIDA

September 2008

Purpose and Background

The purpose of this document is to provide a tool to improve the timing and consistency of review of Federal and State permit applications and Federal civil works projects, for potential effects of these projects on the endangered wood stork (*Mycteria americana*) within the Jacksonville Ecological Services Field Office (JAFL) geographic area of responsibility (GAR see below). The key is designed primarily for Corps Project Managers in the Regulatory and Planning Divisions and the Florida Department of Environmental Protection or its authorized designee, or Water Management Districts. The tool consists of the following dichotomous key and reference material. The key is intended to be used to evaluate permit applications and Corps' civil works projects for impacts potentially affecting wood storks or their wetland habitats. At certain steps in the key, the user is referred to graphics depicting known wood stork nesting colonies and their core foraging areas (CFA), footnotes, and other support documents. The graphics and supporting documents may be downloaded from the Corps' web page at http://www.saj.usace.army.mil/permit or at the JAFL web site at http://www.fws.gov/northflorida/WoodStorks. We intend to utilize the most recent information for both the graphics and supporting information; so should this information be updated, we will modify it accordingly. **Note: This information is provided as an aid to project review and analysis, and is not intended to substitute for a comprehensive biological assessment of potential project impacts. Such assessments are site-specific and usually generated by the project applicant or, in the case of civil works projects, by the Corps or project co-sponsor.**

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

Scope of the key

This key should only be used in the review of permit applications for effects determinations on wood storks within the JAFL GAR, and not for other listed species. Counties within the JAFL GAR include Alachua, Baker, Bradford, Brevard, Citrus, Clay, Columbia, Dixie, Duval, Flagler, Gilchrist, Hamilton, Hernando, Hillsborough, Lafayette, Lake, Levy, Madison, Manatee, Marion, Nassau, Orange, Pasco, Pinellas, Putnam, St. Johns, Seminole, Sumter, Suwannee, Taylor, Union, and Volusia.

The final effect determination will be based on project location and description, the potential effects to wood storks, and any measures (for example project components, special permit conditions) that avoid or minimize direct, indirect, and/or cumulative

impacts to wood storks and/or suitable wood stork foraging habitat. Projects that key to a "no effect" determination do not require additional consultation or coordination with the JAFL. Projects that key to "NLAA" also do not need further consultation; however, the JAFL staff will assist the Corps if requested, to answer questions regarding the appropriateness of mitigation options. Projects that key to a "may affect" determination equate to "likely to adversely affect" situations, and those projects should not be processed under the SPGP or any other programmatic general permit. For all "may affect" determinations, Corps Project Managers should request the JAFL to initiate formal consultation on the Wood stork.

Summary of General Wood Stork Nesting and Foraging Habitat Information

The wood stork is primarily associated with freshwater and estuarine habitats that are used for nesting, roosting, and foraging. Wood storks typically nest colonially 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; Rodgers et al. 1996). Successful breeding sites are those that have limited human disturbance and low exposure to land based predators. Nesting sites 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.

In addition to limited human disturbance and land-based predation, successful nesting depends on the availability of suitable foraging habitat. Such habitat generally results from a combination 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 that tends to 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 opportunities, a variety of wetland habitats exhibiting short and long hydroperiods should be present. In terms of wood stork foraging, the Service (1999) describes a short hydroperiod as one where a wetland fluctuates between wet and dry in 1 to 5-month cycles, and a long hydroperiod where the wet period is greater than five consecutive months. Wood storks during the wet season generally feed in the shallow water of 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).

Because of their specialized feeding behavior, wood storks forage most effectively in shallow-water areas with highly concentrated prey. Typical foraging sites for the wood stork include freshwater marshes, depressions in cypress heads, swamp sloughs, managed impoundments, stock ponds, shallow-seasonally flooded roadside or agricultural ditches, and narrow tidal creeks or shallow tidal pools. Good foraging conditions are characterized by water that is relatively calm, open, and having water depths between 5 and 15 inches (5 and 38 cm). Preferred foraging habitat includes wetlands exhibiting a mosaic of submerged and/or emergent aquatic vegetation, and shallow, open-water areas subject to hydrologic regimes ranging from dry to wet. The vegetative 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 daily or seasonal low water periods.

WOOD STORK KEY

Although designed primarily for use by Corps Project Managers in the Regulatory and Planning Divisions, and State Regulatory agencies or their designees, project permit applicants and co-sponsors of civil works projects may find this key and its supporting documents useful in identifying potential project impacts to wood storks, and planning how best to avoid, minimize, or compensate for any identified adverse effects.

A. Project within 2,500 feet of an active colony site[1]……*May affect*

Project more than 2,500 feet from a colony site……go to B

B. Project does not affect suitable foraging habitat[2] (SFH)…….*no effect*

Project impacts SFH[2]……go to C

C. Project impacts to SFH are less than or equal to 0.5 acre[3]…….....*NLAA*[4]

Project impacts to SFH are greater than or equal to 0.5 acre..……..go to D

D. Project impacts to SFH not within a Core Foraging Area[5] (see attached map) of a colony site, and no wood storks have been documented foraging on site…….....NLAA[4]

Project impacts to SFH are within the CFA of a colony site, or wood storks have been documented foraging on a project site outside the CFA ……..….go to E

E. Project provides SFH compensation within the Service Area of a Service-approved wetland mitigation bank or wood stork conservation bank preferably within the CFA, or consists of SFH compensation within the CFA consisting of enhancement, restoration or creation in a project phased approach that provides an amount of habitat and foraging function equivalent to that of impacted SFH (see *Wood Stork Foraging Habitat Assessment Procedure*[6] for guidance), is not contrary to the Service's *Habitat Management Guidelines For The Wood Stork In The Southeast Region* and in accordance with the CWA section 404(b)(1) guidelines……*NLAA*[4]

Project does not satisfy these elements.…….....……...*May affect*

[1] An active nesting site is defined as a site currently supporting breeding pairs of wood storks, or has supported breeding wood storks at least once during the preceding 10-year period.

[2] Suitable foraging habitat (SFH) is described as any area containing patches of relatively open (< 25% aquatic vegetation), calm water, and having a permanent or seasonal water depth between 2 and 15 inches (5 to 38 cm). 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 and stock ponds, shallow, seasonally flooded roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. See above *Summary of General Wood Stork Nesting and Foraging Habitat Information*.

[3] On an individual basis, projects that impact less than 0.5 acre of SFH generally will not have a measurable effect on wood storks, although we request the Corps to require mitigation for these losses when appropriate. Wood Storks are a wide ranging species, and individually, habitat change from impacts to less than 0.5 acre of SFH is 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.

[4] Upon Corps receipt of a general concurrence issued by the JAFL through the Programmatic Concurrence on this key, "NLAA" determinations for projects made pursuant to this key require no further consultation with the JAFL.

[5] The U.S. Fish and Wildlife Service (Service) has identified core foraging area (CFA) around all known wood stork nesting colonies that is important for reproductive success. In Central Florida, CFAs include suitable foraging habitat (SFH) within a 15-mile radius of the nest colony; CFAs in North Florida include SFH within a 13-mile radius of a colony. The referenced map provides locations of known colonies and their CFAs throughout Florida documented as active within the last 10 years. The Service believes loss of suitable foraging wetlands within these CFAs may reduce foraging opportunities for the wood stork.

[6]This draft document, *Wood Stork Foraging Habitat Assessment Procedure*, by Passarella and Associates, Incorporated, may serve as further guidance in ascertaining wetland foraging value to wood storks and compensating for impacts to wood stork foraging habitat.

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 that were determined "may affect, not likely to adversely affect." It is requested that information on date, Corps identification number, project acreage, project wetland acreage, and latitude and longitude in decimal degrees be sent to the Service quarterly.

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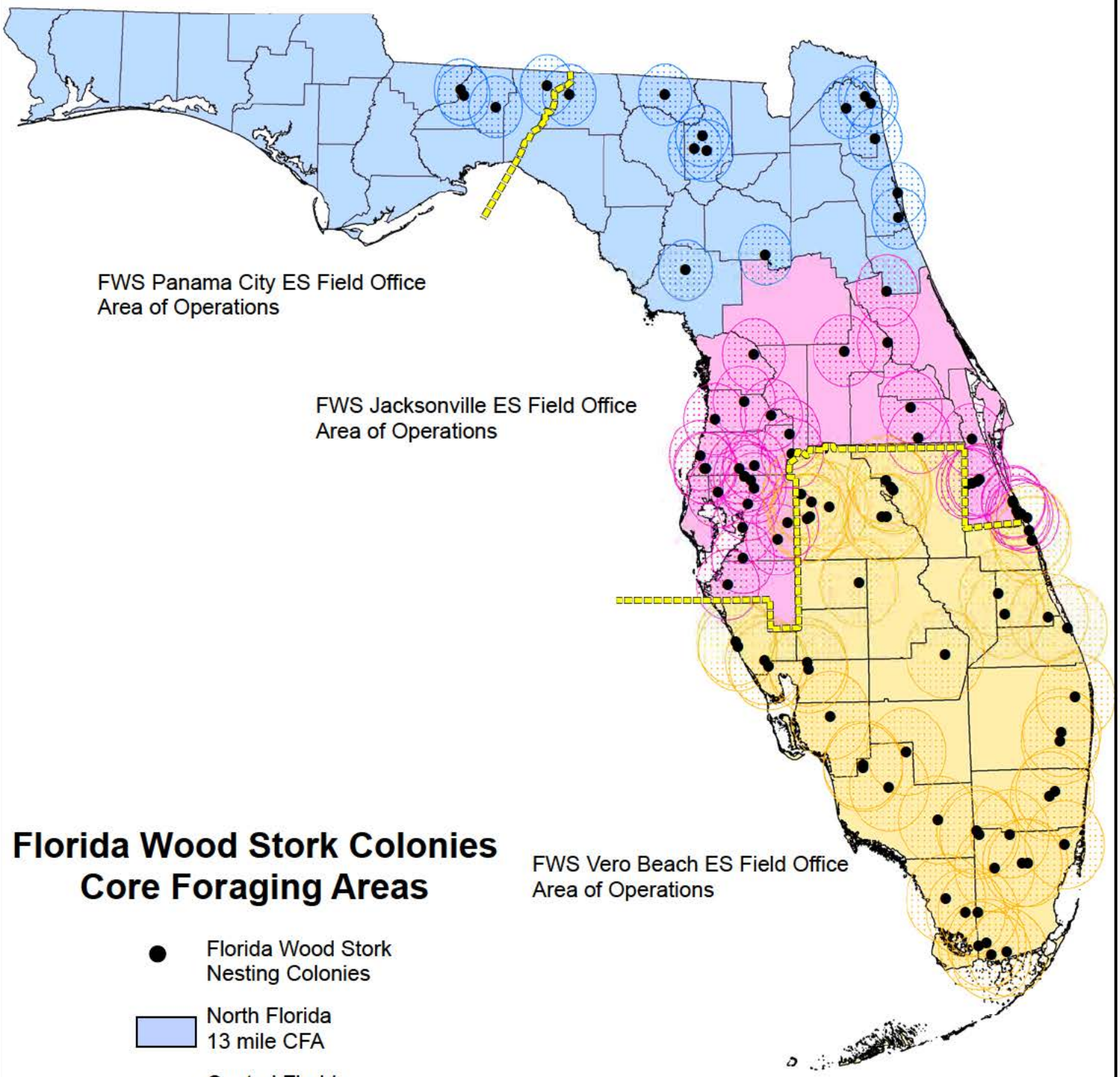

Florida Wood Stork Colonies Core Foraging Areas

- Florida Wood Stork Nesting Colonies
- North Florida 13 mile CFA
- Central Florida 15 mile CFA
- South Florida 18.6 mile CFA

N

0 25 50 100 Miles

The U.S. Fish and Wildlife Service gives no warranty, either expressed or implied, as to the accuracy, reliability, or completeness of this map.

November 1, 2007

WOOD STORK FORAGING HABITAT ASSESSMENT PROCEDURE

DRAFT

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INTRODUCTION

This procedure provides a tool to assist the user in making a comparative assessment of the potential value of foraging habitat for the wood stork (*Mycteria americana*) on a land development site and on the proposed habitat compensation site, which are subject to a federal action (i.e., federal permit). This procedure should only be used after the appropriate regulatory agencies and permit applicant have agreed that foraging habitat compensation is an acceptable voluntary conservation measure for the wood stork.

The wood stork is listed as endangered and is protected under the Endangered Species Act of 1973. There is no critical habitat designated for the wood stork.

METHODOLOGY

This wood stork foraging habitat functional assessment procedure is based on information obtained from the U.S. Fish and Wildlife Service's (USFWS) Draft Habitat Management Guidelines for the Wood Stork (1990 and 2002), Florida's Fragile Wildlife (Wood 2001), Rare and Endangered Biota of Florida (Rodgers *et al.* 1996), and local field knowledge.

The functional assessment is a rating index organized similar to the format utilized in the Wetland Rapid Assessment Procedure (WRAP) developed by the South Florida Water Management District (1997). However, this assessment has been established using three variables that are indicative of the necessities and functions of foraging habitat required by the wood stork. This specific functional assessment analyzes each wetland on-site. All three variables have a maximum score of 3.0 for optimal foraging habitat (Appendix A). After each variable has been rated, the final sum is divided by nine for a mean average of all three variables. The resulting score is then multiplied by the acreage of the wetland polygon for either the development site or habitat compensation site to determine the functional units of foraging habitat provided by that wetland. The variable scores and foraging habitat functional score are summarized using a data sheet (Appendix B).

Prey Availability

The first variable is the availability of prey within the wetland assessment area. Optimal foraging depths occur in littoral areas that range from two inches to 15 inches in depth (Ogden 1990) with the water fluidity calm and without dense coverage of emergent aquatic vegetation (Rodgers *et al.* 1996). Also included in this rating index is an assessment of the wetland for small depressional pockets that will concentrate forage during a drying hydrologic regime (Ogden 1990). An optimal rating of preferred foraging habitat would score a 3.0 (Appendix A).

Hydrologic Regime

The second variable is the hydrologic regime required for wood stork foraging. Appropriate hydrological regimes for wood stork foraging for larger wetland systems or water bodies should provide indicators indicative of a longer hydroperiod for interior wetlands during the dry cycle of

the drying season along with still providing some standing water in the dry season (USFWS 2002). Also, smaller water bodies or wetlands that demonstrate shallower hydrological regimes are necessary in the initial stages of the wet season to maintain required foraging depths compared to larger and deeper hydrological areas (Ogden 1990). Furthermore, these wetlands and water bodies should have strong hydrological connections such as ditches, swales, sheetflow, etc. to provide a stable amount of hydrology for supporting the appropriate densities of fish as prey (Rodgers *et al.* 1996). These three hydrological ratings are necessary to determine appropriate staging levels for adequate supplies of foraging prey and foraging depths. A combination of all above mentioned ratings would be considered as optimal hydrological regimes to supporting foraging habitat (Appendix A).

Water Quality

The third variable assesses if the appropriate water quality is prevalent in the assessment wetland. It has been determined that the presence of chemicals such as fertilizers, pesticides, and herbicides can adversely impact prey species for the wood stork (Wood 2001). Also, elevated levels of organochlorine pesticides, PCBs, and mercury have been identified in small samples from wood storks (Rodgers *et al.* 1996). Therefore, an appropriate rating of the localized water quality is necessary to determine possible impacts to the wood stork. The rating index utilized is the same water quality, pre-treatment index utilized in WRAP (South Florida Water Management District 1997). This method evaluates the contributing areas to the wetland. This rating index is determined by the summation of the land use category with the pre-treatment category divided by two. The maximum score of each category is 3.0 (Appendix A).

SUMMARY AND DISCUSSION

This procedure provides a tool in making a comparative assessment between impacts to wood stork foraging habitat resulting from a land development project and the proposed foraging habitat compensation. The habitat variables of prey availability, hydrologic regime, and water quality all play a role in determining the ecological function that a wetland provides for wood stork foraging.

This functional assessment provides a rating index for foraging habitat and does not assess roosting or nesting habitat. Rogers (*et al.* 1996) establishes that nesting habitat for colonies is optimal on isolated islands or in woody vegetated areas surrounded by vast areas of open water. Wood (2001) explains three to five feet in water depths is adequate to deter predators such as raccoons and skunks. These water depths also provide areas for alligators, which also may deter land based predators (Wood 2001). Night time roosting within the project site will be dependent on the locality of the nearest nest colonies. Ogden (1990) explains nesting storks traveling long distances (more than 40 miles) may feed at a site and roost nearby and travel back to the colony the following day. If nesting or roosting occurs on the project site, then additional variables would need to be considered if this assessment procedure is to be used to assess nesting and roosting habitat. This procedure also does not assess human induced disturbances. Wood (2001) found that nesting wood storks have a somewhat higher tolerance to human disturbances than other wading birds. General observations of wood storks feeding on roadside swales and water management lakes also indicate their comfort zone for human disturbances while foraging.

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Wood, D.A. 2001. Florida's Fragile Wildlife Conservation and Management. University of Florida. Gainesville, Florida. Pgs. 178-193.

U.S. Fish and Wildlife Service. 2002. Draft Habitat Management Guidelines for the Wood Storks in the South Florida Ecological Services Consultation Area. Vero Beach, Florida.

APPENDIX A

RATING INDICES FORAGING HABITAT VARIABLES

1. Prey Availability

Descriptions	Score
➢ Wetland or water body provides two to 15 inches of littoral depth for foraging purposes for the majority of the forging area ➢ Wetland or water body provides relative calm fluidity and without dense coverage of aquatic vegetation ➢ Wetland contains many small depressional pockets for forage to become concentrated	3.0
➢ Wetland or water body provides two to 15 inches of littoral depth for at least half of the foraging area ➢ Wetland or water body provides a calm fluidity motion with a few patches of dense aquatic vegetation ➢ Wetland contains scattered depressional pockets for forage to become concentrated	2.0
➢ Wetland or water body provides two to 15 inches of littoral depths for at least some of the foraging area ➢ Wetland or water body provides a calm fluidity motion with scattered patches of dense aquatic vegetation ➢ Wetland contains few depressional pockets for forage to become concentrated	1.0
➢ Wetland or water body does not provide littoral foraging areas with two to 15 inches in depth ➢ Wetland or water body does not provide a calm fluidity motion or has extreme coverage of dense aquatic vegetation	0.0

2. Hydrologic Regime

Descriptions	Score
➢ Wetland or water body provides indicators indicative of longer hydroperiods for interior wetlands during the drying cycle of the dry season ➢ Wetland or water body provides indicators indicative of a short hydroperiod during the wet season to provide littoral foraging of appropriate depths when larger wetlands and water bodies are too inundated ➢ Wetland or water body has a strong hydrological connection such as ditches, swales, sheetflow, etc. that provides more permanent hydrology to make available necessary fish densities for foraging	3.0

2. Hydrologic Regime (Continued)

Descriptions	Score
➢ Wetland or water body provides evidence of very few hydrological alterations for interior wetlands during the drying cycle of the dry season ➢ Wetland or water body provides evidence of very few hydrological alterations during the wet season that will provide littoral foraging of appropriate depths when larger wetlands and water bodies are inundated ➢ Wetland or water body has an adequate hydrological connection such as ditches, swales, sheetflow, etc. that provides more permanent hydrology to make available necessary fish densities	2.0
➢ Wetland or water body provides evidence of a moderately altered hydroperiod for interior wetlands during the drying cycle of the dry season. ➢ Wetland or water body provides evidence of a moderately altered hydroperiod during the wet season that will provide some littoral foraging at appropriate depths when larger wetlands and water bodies are inundated ➢ Wetland or water body has moderate hydrological connections such as ditches, swales, sheetflow, etc. that provides adequate hydrology to make available necessary fish densities	1.0
➢ Wetland or water body provides evidence of a severely altered hydroperiod for interior wetlands during the drying cycle that provide no available foraging habitat ➢ Wetland or water body provides evidence of a severely altered hydroperiod during the wet season that provide no littoral areas when other areas have extreme inundation ➢ Wetland or water body has no hydrological connection such as ditches, swales, sheetflow, etc. that could provide adequate hydrology for necessary fish densities	0.0

3. Water Quality

Land Use Category	Score
Open Space/Natural, Undeveloped Areas	3.0
Unimproved Pasture/Rangeland	2.5
Citrus Grove	2.0
Sugar Cane	2.0
Low Density Residential	2.0
Low Density Commercial	2.0
Low Density Highway	2.0
Institutional	2.0
Single-family Residential	1.5

3. **Water Quality (Continued)**

Land Use Category	Score
Recreational	1.5
Golf Course	1.5
Moderately Intense Commercial	1.5
High Volume Highway	1.0
Industrial	1.0
Mining	1.0
Multi-family Residential	1.0
Improved Pasture	1.0
Row Crop	1.0
High Intensity Commercial	0.5
Dairy or Feed Lot	0.0
Pretreatment Category	
Natural, Undeveloped Areas	3.0
Wet Detention with Swales	2.5
Wet Detention with Dry Detention	2.5
Combination Grass Swales with Dry Detention	2.0
Grass Swales Only	1.0
Dry Detention Only	1.0
No Treatment	0.0

APPENDIX B

WOOD STORK FORAGING HABITAT ASSESSMENT PROCEDURE DATA SHEET

Wood Stork Foraging Habitat Assessment Procedure

☑ Check One
☐ Existing Conditions ☐ Proposed Conditions

USACOE Appl. No.	USFWS Log No.	Project Name	Date	Evaluator	Project/Mitigation Site

FLUCFCS Code	Description	Wetland Acreage	Wetland Number

Prey Availability

Hydrologic Regime

Water Quality

Land Use Category (LU)

Land Use Category	(Score) X	(% of area)	=Sub Total
		(LU) Total	

Pretreatment Category (PC)

Pretreatment Category	(Score) X	(% of area)	=Sub Total
		(PC) Total	

Score

Notes

Prey Availability

Hydrologic Regime

Water Quality

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

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HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Introduction

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

General

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

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

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

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

I. Feeding habitat.

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

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

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

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

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

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

II. Nesting habitat.

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

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

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

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

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

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

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

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

III. Roosting habitat.

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

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

IV. Management zones and guidelines for feeding sites.

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

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

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

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

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

V. Management zones and guidelines for nesting colonies.

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

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

2. Recommended Restrictions:

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

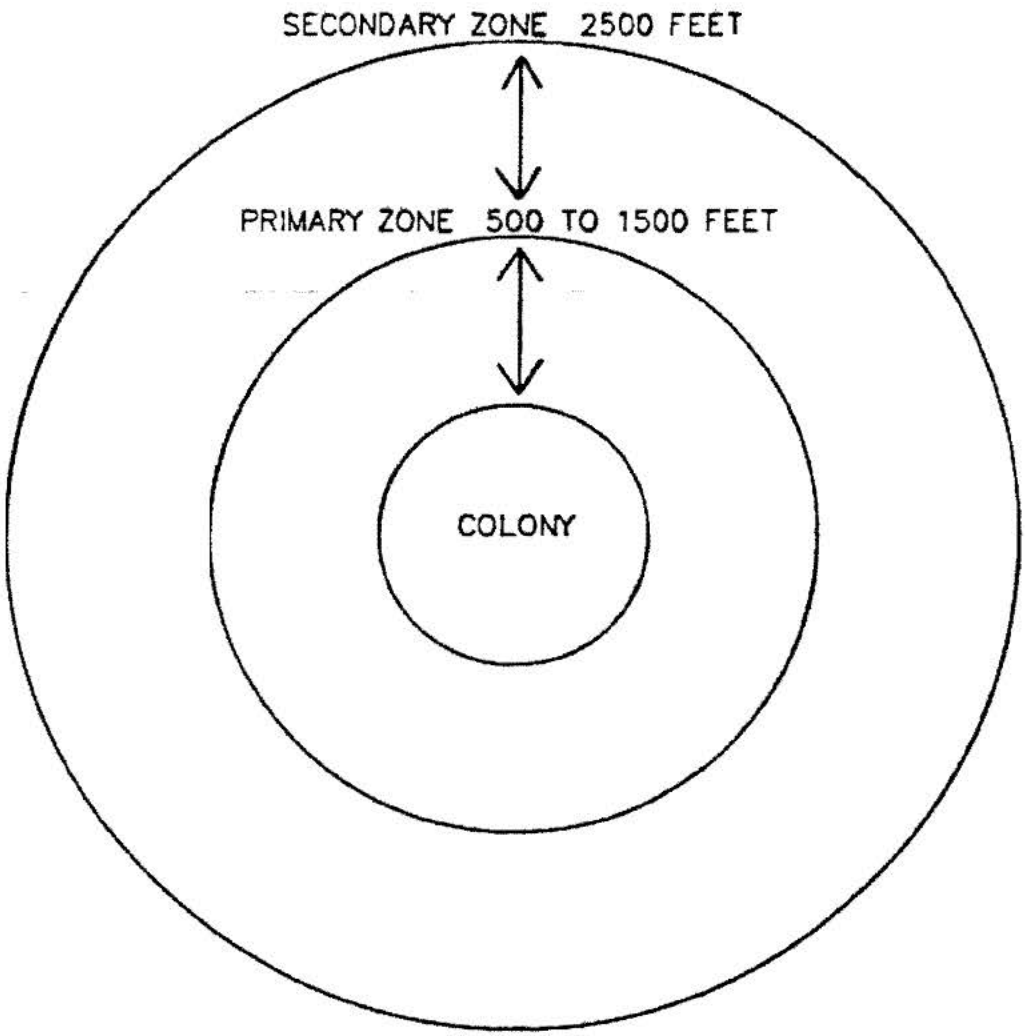
(1) Any lumbering or other removal of vegetation, and

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

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

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

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


SECONDARY ZONE 2500 FEET
PRIMARY ZONE 500 TO 1500 FEET
COLONY

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

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

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

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

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

2. Recommended Restrictions:

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

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

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

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

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

VI. Roosting site guidelines.

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

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

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

VII. Legal Considerations.

A. Federal Statutes

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

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

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

B. State Statutes

1. State of Alabama

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

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

2. State of Florida

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

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

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

3. State of Georgia

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

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

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

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

4. State of South Carolina

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

ROADMAP TO THE HANDBOOK

The chapters that follow discuss the incorporation of cumulative effects analysis into the components of environmental impact assessment: scoping (Chapter 2), describing the affected environment (Chapter 3), and determining the environmental consequences (Chapter 4). Although cumulative effects analysis is an iterative process, basic steps that to be accomplished can be identified in each component of the NEPA process; each chapter focuses on its constituent steps (Table 1-4). The last chapter of this report discusses developing a cumulative effects analysis methodology that draws upon existing methods, techniques, and tools to analyze cumulative effects. Appendix A provides brief descriptions of 11 cumulative effects analysis methods.

Table 1-5. Steps in cumulative effects analysis (CEA) to be addressed in each component of environmental impact assessment (EIA)

EIA Components	CEA Steps
Scoping	1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals. 2. Establish the geographic scope for the analysis. 3. Establish the time frame for the analysis. 4. Identify other actions affecting the resources, ecosystems, and human communities of concern.
Describing the Affected Environment	5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stresses. 6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds. 7. Define a baseline condition for the resources, ecosystems, and human communities.
Determining the Environmental Consequences	8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities. 9. Determine the magnitude and significance of cumulative effects. 10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects. 11. Monitor the cumulative effects of the selected alternative and adapt management.