

APPENDIX D – FISH AND WILDLIFE COORDINATION

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Draft 9/16/04

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OPTIONAL FORM 99 (7-00)

| FAX TRANSMITTAL | | # of pages ▶ 8 |
|---------------------------|------------------------------|----------------|
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NON 7540-01-317-7000 5088-101 GENERAL SERVICES ADMINISTRATION

Dear Mr. Duck:

The Fish and Wildlife Service (Service) has prepared this response to the Army Corps of Engineers (Corps) Public Notice (dated August 18, 2004) seeking information to define issues and concerns to be addressed in a supplemental Environmental Assessment (EA) being prepared for the Canal 51 (C-51) West End Flood Control Project. The purpose of the supplemental EA is to evaluate alternative means to diminish the potential impacts of pump station 362 (S-362) discharge to the Levee 40 borrow canal (L-40 BC) on Arthur R. Marshall Loxahatchee National Wildlife Refuge (A.R.M. LNWR). This letter is provided in accordance with the Fish and Wildlife Coordination Act of 1958, as amended (FWCA) (48 stat. 401; 16 U.S.C. 661 *et seq.*), and the Endangered Species Act of 1973, as amended (ESA) (87 stat. 884; 16 U.S.C. 1531 *et seq.*).

This response does not constitute the report of the Secretary of Interior as required by section 2(b) of the FWCA, nor does it constitute a biological opinion under section 7 of the ESA. This PAL provides guidance and recommendations regarding resource conservation issues related to the C-51 West End Flood Control Project, authorized in Section 315 of the Water Resources Development Act (WRDA) of 1996.

I. Introduction

The U.S. Army Corps of Engineers (Corps) and the Fish and Wildlife Service (Service) coordinate to conserve, protect, and enhance fish, wildlife, and plants and their habitats throughout the Central and South Florida (C & SF) project area. Natural resource protection legislation relevant to the C & SF projects include the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*), the Fish and Wildlife Coordination Act (FWCA) of 1958, as amended (16 U.S.C. 661 *et seq.*), the National Environmental Policy Act (NEPA), as amended (42 U.S.C. 4321 *et seq.*), the Migratory Bird Treaty Act (16 U.S.C. 703-712), the Estuary Protection Act (16 U.S.C. 1221-1226), and the Coastal Zone Management Act (16 U.S.C. 1451-1464). In addition, several Executive Orders have also established guidance to Federal agencies, including the Service, relative to fish and wildlife protection and conservation. For C & SF projects authorized under the Water Resources Development Act, the ESA, FWCA, and NEPA represent the primary authorities under which the Service cooperates and coordinates with the Corps and their project sponsors.

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II. Project Description

The C-51 West End Flood Control Project includes construction of the following: Stormwater Treatment Area 1 East (STA 1E), pump stations S-319 and S-362, C-51 enlargements, and gated structure 155 A. The project is designed to enhance the level of flood protection existing in the C-51 Basin, provide additional clean water to A.R.M. LNWR, also known as Water Conservation Area 1 (WCA 1), and reduce discharges of stormwater to Lake Worth Lagoon. Construction of the project, by the Corps, is currently nearing completion. The supplemental EA will evaluate alternative means to diminish potential impacts to the A.R.M. LNWR interior marsh associated with the operation of S-362 and discharges to the L-40 BC.

The Service supports the Corps initiative to address concerns regarding potential impacts associated with discharges from S-362. In response to these concerns, the Corps proposes to construct a 1,000 foot berm at the junction of the S-362 discharge canal and the L-40 BC, widen the L-40 BC from the S-362 discharge point to approximately 3,000 feet downstream, and dredge approximately 8,200 feet of the L-40 BC. Alternatives under consideration include no action and various scales of dredging and berm construction along L-40 BC.

II. Existing Conditions

The A.R.M. LNWR is part of the Everglades Protection Area and includes the only remaining cypress swamp in the eastern Everglades. The A.R.M. LNWR consists of 143,238 acres owned by the State of Florida and managed by the Service and 2,550 acres owned and managed by the Service adjacent to the refuge interior. Hydrologic alterations have led to significant changes in the landscape, opening large tracts of land in south Florida to agricultural and urban development. The construction of extensive drainage networks, including a large array of levees and canals, has disrupted natural hydrologic and water quality patterns in the region. Stormwater runoff and wastewater discharges are now part of the hydrological regime in the A.R.M. LNWR (Service 2003).

The interior marsh is a unique oligotrophic soft-water (low alkalinity) rainfall driven ecosystem. The composition of algal species which define the endemic periphyton community are highly susceptible to influences associated with altered water quality (Richardson 1990). Phosphorus concentrations above 10 ppb are known to reduce the diversity and alter the species composition of this unique periphyton community. Periphyton serves as the base of the food chain. Therefore, alterations affecting periphyton may have impacts to wildlife at higher trophic levels supported by this food base (Swift and Nicholas 1987), including invertebrates such as apple snails, snail kites (*Rostrhamus sociabilis plumbeus*) foraging on apple snails, and wading birds such as wood storks (*Mycteria americana*) which feed on small fish.

III. Fish and Wildlife Resource Issues to be Considered During Project Planning

A. Water Quality and Habitat Issues

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The Service is concerned that water discharged from the project to the A.R.M LNWR be of adequate quality to meet Outstanding Florida Water body (OFW) antidegradation standards. The A.R.M. LNWR was established to protect natural Everglades' ecosystems and fish and wildlife resources. Proposed project-related discharges into the refuge could negatively affect natural resources that the refuge protects. The Service is concerned that additional agricultural and urban development that the project may support can further degrade natural hydrologic flows, including the amount, timing, and distribution to the A.R.M. LNWR. In addition, outflows from STA 1W are anticipated to mobilize low bulk density organic sediments, containing readily available phosphorus in the L-40 BC (Daroub et al. 2003). The phosphorus flux from the readily available phosphorus fraction in the sediments can be transported downstream leading to the elevation of phosphorus concentrations in the range of 10 to 15 ppb above the 10 ppb discharges from S-362 (Daroub et al. 2003). These processes could lead to impacts associated with elevated phosphorus levels and excursions being recorded at water quality monitoring stations located throughout the A.R.M. LNWR.

STA 1E?

Soil composition and emergent marsh vegetation may also be impacted by nutrient laden sediments mobilized by discharged water. Mobilized sediments from the L-40 BC may be transported to the marsh contributing to elevated phosphorus concentrations in the water column and over time lead to increased phosphorus levels in the marsh soils. Elevated phosphorus levels have been associated with changes in the vegetative communities allowing the expansion of cattails in the southwestern portions of the A.R.M. LNWR which were once dominated by sawgrass (*Cladium jamaicense*) (Richardson et al. 1990, Stober et al. 2001).

Sulfates potentially present in discharged water may increase concentrations above background to levels which are toxic to macrophytes, increase mercury methylation, and increase mercury levels in fish and wildlife. Sulfates may be present, or directed into the A.R.M. LNWR by discharges from the S-362 pump station (EPA 2001, Stober et al. 2002). Sulfate loading into aquatic systems has been implicated as a primary driving force in methylation of mercury by sulfate-reducing bacteria (SFWMD 2002). Interior marsh locations have background sulfate concentrations of around 2.0 ppm (Bates et al. 2002, Scheidt et al. 2000). Sulfate loading into a system may be even more important to methyl mercury production than mercury loading (U.S. Environmental Protection Agency 2001, Stober et al. 2002).

Project-related discharges could also alter conductivity levels currently present in the rainfall driven interior LNWR. Conductivity levels at interior marsh locations within A.R.M. LNWR are often less than 100 umhos/cm and are consistent with a rainfall driven system with little influence from waters conveyed by the surrounding canals (Scheidt et al. 2000). Discharges from the S-362 may exhibit conductivity levels above 1000 umhos/cm. Discharges from the S-362 may lead to increased conductivity levels an order of magnitude above interior marsh background levels. Potential increased conductivity levels may lead to a reduction in diversity and alteration in species composition of the unique periphyton community found at A.R.M. LNWR (Browder et al. 1991).

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B. Threatened and Endangered Species Issues

Six federally listed animal species or habitats used by these species exist in the general project area. These species include the endangered wood stork (*Mycteria americana*), endangered Everglades snail kite (*Rostrhamus sociabilis plumbeus*), endangered Florida panther [*Felis (=Puma) concolor coryi*], threatened southern bald eagle (*Haliaeetus leucocephalus*), and threatened eastern indigo snake (*Drymarchon corais couperi*). Additionally, critical habitat for the snail kite (see 50 CFR 17.95) is present in the project area of the A.R.M. LNWR.

The project area is within the boundary of the Panther Core Area, as described in the Service's *Comprehensive Everglades Restoration Plan (CERP) Initial CERP Update (ICU) Planning Aid Report*, dated February 27, 2004, and depicted in Figure 1 of the CERP Landscape Level Project Planning/Siting Map for Panther Conservation (Service 2004). The footprint of the C-51 West End Flood Control Project falls within the areas labeled "Conservation Lands and Other Zone" of this map (Fig. 1).

The information furnished above is intended to assist the Corps in preparing an Environmental Assessment (EA) for the C-51 West End Flood Control Project, in formulating project alternatives, and in identifying a preferred project plan. In order to complete the EA and planning process, the Service recommends that the Corps or its designees complete the following actions:

1. Consider multiple scenarios associated with the berm construction and dredging of the L-40BC. Include a scenario to combine dredge and berm options which protect the water quality compliance station, LOX4, (dredge to south end of L-40 constriction, and dredge entire L-40).
2. Include a water quality monitoring plan.
3. Survey the proposed project area for the presence of listed species and critical habitat and include the results of past surveys for listed species in the project area. Service biologists are available to assist the Corps.
4. Review and analyze potential direct, indirect, and cumulative effects of the proposed project plan on listed species and critical habitat during construction and operations.
5. Interview authorities on listed species and critical habitats including experts within the Service, National Marine Fisheries Service (NMFS), Florida Fish and Wildlife Conservation Commission (FWC), universities, and others who may have data not yet published in the scientific literature.
6. Review literature and scientific data to determine the distribution, habitat needs, and other biological requirements of listed species.

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7. Describe measures to be taken in the proposed project plan that will avoid, reduce, or eliminate adverse effects to listed species or critical habitat.
8. Analyze actions that may provide conservation measures and describe measures to be taken to enhance beneficial effects to listed species.

VI. Closing Comments

The Service appreciates this opportunity to provide planning guidance and recommendations to the Corps in support of the C-51 West End Flood Control Project planning effort. We look forward to continuing to work with you and to provide technical support to the Corps during all phases of the project. If you have questions or comments, please contact Susan Teel, Fish and Wildlife Biologist, at (772) 532-8965.

Sincerely yours,

James J. Slack
Field Supervisor
South Florida Ecological Services Office

cc:

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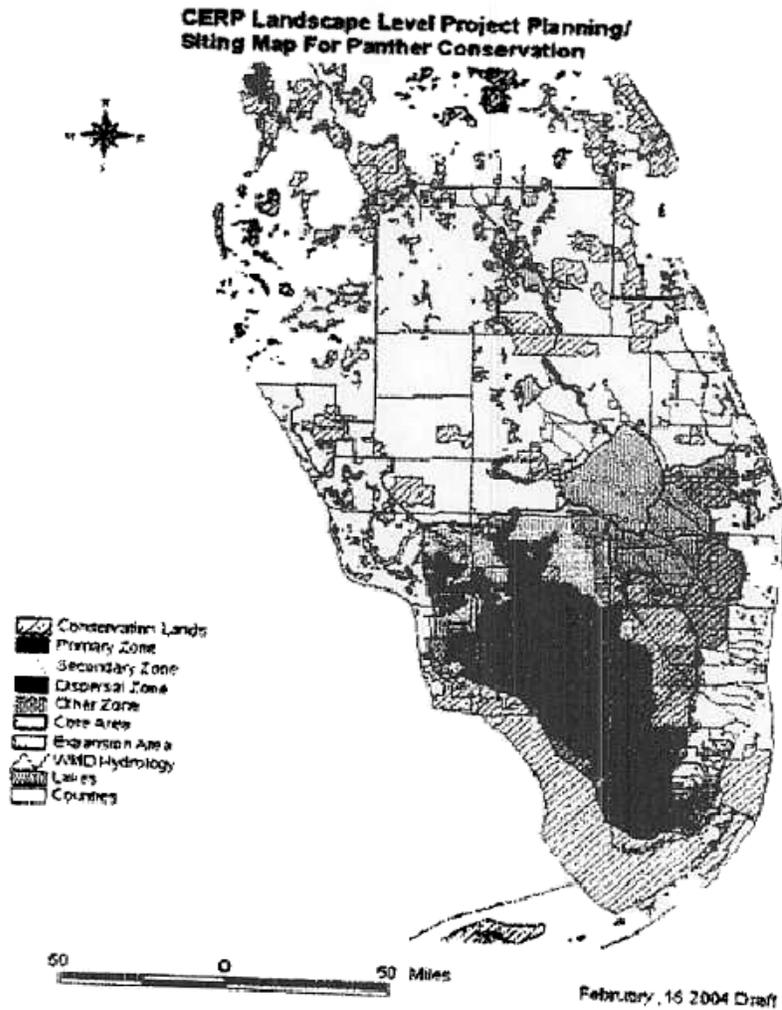


Figure 1. Comprehensive Everglades Restoration Plan Landscape Level Project Planning/Siting Map for Panther Conservation. Adapted from the Multi-species



United States Department of the Interior



FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
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Vero Beach, Florida 32960

September 1, 2005

Colonel Robert M. Carpenter
District Engineer
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207-8175

Dear Colonel Carpenter:

The enclosed document is a draft Fish and Wildlife Coordination Act (FWCA) report on the L-40 Borrow Canal Modifications Project for your review. This report is provided in accordance with the FWCA of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et seq.*) and the Endangered Species Act of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

If you or your staff has any questions regarding the findings and recommendations contained in this draft FWCA report, please feel free to contact Susan Teel at 772-532-8965. The cooperation of your staff is greatly appreciated.

Sincerely yours,

James J. Slack ^{Fov}
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Enclosure

cc: w/enclosure
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TAKE PRIDE
IN AMERICA

L-40 Borrow Canal Modifications Project

Draft Fish and Wildlife Coordination Act Report



Submitted to:
Jacksonville District
U.S. Army Corps of Engineers
Jacksonville, Florida

Prepared by: Susan Teel
Reviewed by: Sharon Fauver and Barry Rosen
Approved by: James J. Slack, Field Supervisor

Fish and Wildlife Service
South Florida Ecological Services Office
Vero Beach, Florida

September 2005

EXECUTIVE SUMMARY

The L-40 Borrow Canal Modifications Project (L-40 Project) is a component of the C-51 West End Flood Control Project (C-51 Project) included in the Central and Southern Florida Project (U.S. Army Corps of Engineers [Corps] 1999). The L-40 Project, located on the northeast boundary of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (LNWR) in southern Palm Beach County, Florida (Figure 1), was proposed to assess potential impacts of STA-1E discharges via the L-40 Borrow Canal into the Fish and Wildlife Service's (Service's) LNWR. LNWR staff expressed concerns that that S-362 pump station (S-362) discharges could dislodge organic sediments (muck) from the L-40 Borrow Canal bottom and that flows exceeding the canal banks could transport muck to the LNWR. The migration of muck could potentially impact LNWR water quality and wildlife habitat in the vicinity of S-362. The Corps' analysis, performed in response to Service concerns, concluded that the L-40 Borrow Canal is unable to convey S-362 flow capacity within its banks under certain flow conditions and prevent overflow into the LNWR, and therefore, modifications to the L-40 Borrow Canal were warranted.

The Corps proposes the following L-40 Borrow Canal modifications to alleviate potential impacts to the LNWR:

1. Construct a 1,000-foot berm at the junction of the S-362 discharge canal and the L-40 Borrow Canal;
2. Widen the L-40 Borrow Canal to a width of 200 feet from the S-362 discharge point to approximately 3,000 feet downstream; and
3. Dredge along approximately 13,500 feet of the L-40 Borrow Canal, 3,500 feet upstream of the S-362 and 10,000 feet downstream. Other alternatives under consideration may include various ranges (*i.e.*, depth, length, etc.) of dredging and berm construction along the L-40 Borrow Canal.

Federally listed species assessed during planning and evaluation include the endangered wood stork (*Mycteria americana*), the endangered Everglade snail kite (*Rostrhamus sociabilis plumbeus*), the endangered Florida panther [*Felis (Puma concolor coryi)*], the threatened bald eagle (*Haliaeetus leucocephalus*), and the threatened eastern indigo snake (*Drymarchon corais couperi*). In addition, LNWR is Everglade snail kite designated critical habitat.

The Service provided recommendations to protect and conserve fish and wildlife resources in the project area consistent with the basic project purpose. Service recommendations include:

1. Implement standard protection measures, construction precautions, standard local operating procedures, and habitat management guidelines for federally listed species during the construction, operation, and maintenance phases of the project to avoid adverse effects on listed species.

2. Meet wildlife-protective water quality criteria, including water temperature for discharged water, to minimize direct and indirect effects of potentially-degraded water quality on aquatic resources.
3. Consult with the Florida Fish and Wildlife Conservation commission for additional State-listed species conservation recommendations and habitat needs.

The C-51 Project was authorized under the Water Resources Development Act of 1996 and includes the following components: S-319, S-362, C-51 Enlargement, G-155A, and L-40 Borrow Canal Modifications, all planned for construction by the Corps (Corps 1998). The objectives for this project include (1) reduce the potential sediment load in the L-40 Borrow Canal downstream of the S-362 pump station; (2) increase the L-40 Borrow Canal conveyance capacity in the vicinity of the S-362 pump station; and (3) reduce the potential impacts to LNWR interior marshes by improving water quality from STA-1E discharges.

Alternatives considered for the L-40 Project in the Corps' Draft Environment Assessment are Alternative Number 1, the Tentatively Selected Plan (TSP); this alternative includes constructing a 1,000-foot berm, widening the canal 3,000 feet downstream of S-362, dredging 13,500 feet of the L-40 Borrow Canal, and disposing of the dredge material. Alternative Number 2 (Scales of Dredging) includes constructing a 1,000-foot berm, widening the canal 3,000 feet downstream of S-362, dredging 5,280 feet of the L-40 Borrow Canal, and disposing of the dredge material. Alternative Number 3 (Dredging Techniques) includes dredging 8,200 feet of the L-40 Borrow Canal and disposing of the dredge material. The No-Action Alternative represents the future-without implementing the L-40 Project.

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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|--------------|---|
| C&SF | Central and Southern Florida Project |
| CERP | Comprehensive Everglades Restoration Plan |
| cfs | cubic feet per second |
| Corps | U.S. Army Corps of Engineers |
| C-51 Project | C-51 West End Flood Control Project |
| District | South Florida Water Management District |
| DEP | Florida Department of Environmental Protection |
| 1-East | 1E |
| ECP | Everglades Construction Project |
| EPA | U.S. Environmental Protection Agency |
| ESA | Endangered Species Act |
| fps | feet per second |
| FWC | Florida Fish and Wildlife Conservation Commission |
| FWCA | Fish and Wildlife Coordination Act |
| GIS | Geographic Information System |
| L-40 Project | L-40 Borrow Canal Modifications Project |
| LNWR | Arthur R. Marshall Loxahatchee National Wildlife Refuge |
| MSRP | South Florida Multi-Species Recovery Plan |
| muck | organic sediments |
| NPDES | National Pollutant Discharge Elimination System |
| PAL | Planning Aid Letter |
| ppb | parts per billion |
| Service | Fish and Wildlife Service |
| SSC | Florida Species of Special Concern |
| STA | Stormwater Treatment Area |
| TSP | Tentatively Selected Plan |
| WCA | Water Conservation Area |
| 1-West | 1W |
| WRDA | Water Resources Development Act |

I. THE PROPOSED L-40 BORROW CANAL MODIFICATION PROJECT

A. Introduction

The proposed L-40 Borrow Canal Modification Project (L-40 Project) is a component of the existing C-51 West End Flood Control Project (C-51 Project) included in the Central and Southern Florida (C&SF) Project (U.S. Army Corps of Engineers [Corps 1999]). The L-40 Project was first proposed to assess potential impacts identified during the National Pollutant Discharge Elimination System (NPDES) permit process associated with Stormwater Treatment Area (STA) 1-East (1E). The concerns that were raised center on the possibility that S-362 discharges would cause organic sediments (muck) to be dislodged from the L-40 Borrow Canal bottom and then be transported to the Arthur R. Marshall Loxahatchee National Wildlife Refuge (LNWR) by flows that exceed the canal banks. The Fish and Wildlife Service (Service) is concerned that the migration of unwanted muck could potentially impact LNWR water quality and important wildlife habitat in the vicinity of S-362. Based on these concerns, the Corps performed an analysis of the L-40 Borrow Canal's capacity to prevent overflow into the LNWR. The Corps' analysis concluded that the canal is indeed unable to convey the entire capacity of S-362 within its banks under certain flow conditions, and therefore, modifications to the L-40 Borrow Canal were warranted. The L-40 Project is located on the northeast boundary of the LNWR in southern Palm Beach County, Florida (Figure 1).

B. Authority

The C-51 Project was authorized under the Water Resources Development Act (WRDA) of 1996 and includes the following components: S-319, S-362, C-51 Enlargement, G-155A, and L-40 Borrow Canal Modifications, all planned for construction by the Corps (Corps 1998). In addition to the C-51 Project, the Everglades Construction Project (ECP) was also authorized under the WRDA of 1996, and included the following construction features: STA-1E, 1-West (1W), STA-2, STA-3/4, STA-5, and STA-6. Specific information for both C-51 Project and STA-1E can be found in the Final Programmatic Environmental Impact Study (Corps 1996).

Once finalized, the Fish and Wildlife Coordination Act (FWCA) Report will constitute the report of the Secretary of the Interior as required by section 2(b) of the FWCA of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et seq.*), which establishes fish and wildlife conservation as a coequal purpose or objective of federally funded or permitted water resource development projects. The FWCA allows for recommendations from the Service and the State wildlife agencies, in this case, the Florida Fish and Wildlife Conservation Commission (FWC), to be integrated into the Corps' reports seeking authorization for Federal actions. The FWCA also grants authority to the Corps to include fish and wildlife conservation measures within these projects. Other authorities relevant to Service participation in the planning process for this project include the Endangered Species Act of 1973, as amended (ESA) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*), the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 *et seq.*), the Bald and Golden Eagle Protection Act (16 U.S.C. §668 *et seq.*), and the Migratory Bird Treaty Act (16 U.S.C. 703-712).

C. Purpose and Scope

The broad objective of the L-40 Project is to maintain L-40 Borrow Canal flows within the confines of the canal bank to keep STA-1E discharges and sediments from entering into the LNWR marshes. Specific objectives for the L-40 Project include:

1. Reducing the potential sediment load in the L-40 Borrow Canal in the vicinity of the S-362;
2. Increasing the L-40 Borrow Canal conveyance capacity in the vicinity of the S-362; and
3. Reducing the extent of acres within LNWR interior marsh impacted by STA-1E discharges above 0.075 feet per second (fps).

II. SERVICE INVOLVEMENT IN THE PROPOSED AND ASSOCIATED PROJECTS

Throughout the planning process, beginning in November 2002, the Service has been an active member attending L-40 Project meetings and workshops, in addition to providing numerous comments and technical guidance via emails and Planning Aid Letters (PAL). We are committed to working with the Corps and South Florida Water Management District (District) to ensure that we provide the best scientific information possible to maximize project benefits and yet at the same time conserve and protect our trust resources.

A. L-40 Project Coordination Chronology

On November 18, 2002, the LNWR staff outlined concerns regarding potential impacts to LNWR associated with L-40 discharges from STA-1E and sent those concerns to both the Corps and District with a copy later sent to the Florida Department of Environmental Protection (DEP) in March 2003.

On January 15, 2004, an email discussion was held with the Everglades Program Team regarding the L-40 Borrow Canal excavation status. An electronic file of photos was attached to the email and sent to the Corps and DEP.

On June 1, 2004, LNWR hosted a meeting to discuss the L-40 downstream monitoring. A Service Hydrologist gave a short presentation to representatives from the Corps and District. An electronic copy of the presentation was later submitted to DEP.

On October 1, 2004, Service staff submitted a letter to the Corps regarding a supplemental Environmental Assessment for the L-40 Project with a copy to DEP.

On October 26, 2004, the Service submitted a PAL to the Corps.

On January 7, 2005, the Service submitted draft performance measures to the DEP, Corps, and District to help characterize the effectiveness of the L-40 Project.

B. C-51 West End Flood Control Project and Everglades Construction Project Coordination

The C-51 Project is currently being constructed by the Corps and includes the following features: STA-1E, S-319 and S-362, C-51 Enlargement, G-155A, and L-40 Borrow Canal Modifications. The project is designed to enhance the level of flood protection existing in the C-51 Basin, while providing additional treated water deliveries to the LNWR, also known as Water Conservation Area 1 (WCA-1), and reducing stormwater discharge to the Lake Worth Lagoon. The Corps' supplemental Environmental Assessment, currently being drafted, will evaluate alternative means to diminish potential impacts to the LNWR interior marsh associated with the operation of S-362 and discharges to the L-40 Borrow Canal.

On September 4, 1987, the Service concurred with the Corps' determination of "no effect" to the endangered Everglade snail kite (*Rostrhamus sociabilis plumbeus*), endangered wood stork (*Mycteria americana*), threatened bald eagle (*Haliaeetus leucocephalus*), endangered red cockaded woodpecker (*Picoides borealis*), and threatened eastern indigo snake (*Drymarchon corais couperi*), for the initial C-51 Project. The Service also concurred that the project would not adversely modify the Everglade snail kite's critical habitat.

On a September 28, 1995, Biological Opinion the Service concluded that the ECP was likely to adversely affect, but was not likely to jeopardize the continued existence of the wood stork due to the potential mobilization and methylation of mercury from STA discharges.

In February 1996, the Service submitted a FWCA to the Corps' Jacksonville District identifying the ECP as an important and achievable first step in protecting water quality in the Everglades.

C. ACME Basin B

ACME Basin B is another key project related to the L-40 Project. Acme Basin B is one of two primary drainage basins within the Acme Improvement District. The Acme Improvement District, a dependent district to the Village of Wellington, is located in central Palm Beach County in Townships 43 and 44 South, Range 41 East. Acme Basin B boundaries generally follow Pierson Road to the north, Flying Cow Road to the west, the LNWR to the southwest and south, and the Lake Worth Drainage District to the east. Acme Basin B encompasses approximately 8,680 acres of low-density development including rural residential areas, plant nurseries, and equestrian facilities. The primary goal of the Acme Basin B Discharge Project is to provide surface water to the LNWR that would otherwise be routed through the C-51 Borrow Canal and then eventually lost to tide.

III. AREA SETTING AND RESOURCE CONCERNS

The Use of Best Scientific and Commercial Information by the Service

The Service uses the most current and up-to-date scientific and commercial information available. The nature of the scientific process dictates that information is constantly changing and improving as new studies are completed. The scientific method is an iterative process that builds on previous information. As the Service becomes aware of new information, we will ensure it is fully considered in our decisions, evaluations, reviews, and analyses as it relates to the base of scientific knowledge and any publications cited in our documents.

Specifically, there is one such document cited in this draft FWCA Report the Service acknowledges has been affected in its cited form by new scientific information. The Service has taken these new sources of information into account when using this document to help guide our analysis and decisions. This document is the South Florida Multi-Species Recovery Plan (MSRP) of 1999 (Service 1999).

South Florida Multi-Species Recovery Plan

The MSRP was designed to be a living document and it was designed to be flexible to accommodate the change identified through ongoing and planned research and would be compatible with adaptive management strategies. These principals are set forth in both the transmittal letter from the Secretary of the Interior and in the document itself. As predicted, this is what indeed occurred in the intervening years since the MSRP was published. The Service uses the MSRP in the context it still presents useful information when taken in conjunction with all the new scientific information developed subsequent to its publication.

A. Threatened and Endangered Species

Six federally listed threatened and endangered animal species, as well as federally designated critical habitat for the Everglade snail kite (see 50 CFR 17.95) were considered during planning and evaluation including the endangered wood stork, the endangered Everglade snail kite, the endangered Florida panther [*Felis (Puma concolor coryi)*], the threatened bald eagle, and the threatened eastern indigo snake.

The final design and operation of the L-40 Project modifications will influence whether listed species would continue to use the area. Once the final design and operation plans are provided, the Service can conclude its full evaluation of the potential effects of the L-40 Project modifications on listed species.

Bald Eagle

Although the bald eagle has been proposed for delisting under the ESA (64 FR 36453), it is still protected under the ESA, the Bald and Golden Eagle Protection Act, and Migratory Bird Treaty Act. Current threats to the bald eagle include habitat fragmentation and loss, collisions with cars and power lines, and shooting. Bald eagle distribution is influenced by the availability of suitable nest and perch sites near large, open water bodies, typically with high amounts of water-to-land edge.

Bald eagles breed throughout Florida and are typically found near freshwater or estuarine water bodies. In south Florida, bald eagle nests are usually built in pines, cypress, or snags, often in areas between pine forest and wetland marsh, rivers, lakes, or estuaries where they feed primarily on fish and water-dependent birds. Bald eagle nesting in Florida has increased from a few hundred nesting territories in 1973 to 831 in 1995. Similar increases in nesting activity have been documented throughout the remainder of the bald eagle's range. In response to the bald eagle population increase, efforts are currently underway to reevaluate the management of bald eagles in the southeastern United States and to refine conservation recommendations to reduce eagle-human conflict (Service 1999).

The Service's Geographic Information System (GIS) database indicates that there are three documented bald eagle nests in the L-40 Project vicinity (Figure 2). Bald Eagle nests PB010 and PB013 were active during the 2003 nesting season and nest PB005 has been inactive since 1992. Service biologists observed adult and juvenile bald eagles in STA-1E and STA-1W as recently as May 2005.

Disturbance, during construction and operation of the L-40 Borrow Canal modifications may affect nesting and foraging bald eagles. Noise and nighttime lighting associated with construction activities could alter foraging patterns of resident eagles using water bodies in the vicinity of the L-40 Project.

Everglade Snail Kite

The endangered Everglade snail kite is nomadic throughout south Florida, seeking suitable wetland habitat for nesting and foraging. Critical habitat was designated for the Everglade snail kite in 1977 (Figure 3). Everglade snail kites are food specialists, preying on apple snails which live in long hydroperiod, freshwater wetlands with emergent vegetation. The Everglade snail kite has experienced population fluctuations associated with both man-induced and natural hydrologic influences. Water management actions that affect hydrology and water quality are important human-controlled factors in the recovery of the Everglade snail kite (Service 1999). The Everglade snail kite occurs in the Everglades, Lake Okeechobee, Kissimmee River, Caloosahatchee River, and the upper St. Johns River watersheds which have all experienced habitat degradation due to urban development and agricultural activities (Service 1999).

Everglade snail kites have nested in the northeastern region of the LNWR, though not in recent years (Figure 3). The L-40 Borrow Canal modifications are located within the northeastern boundaries of the LNWR which is designated critical habitat for the Everglade snail kite. Construction activities associated with the L-40 Project could affect Everglade snail kite nesting and forage habitat. We expect the loss of 15 acres of marginal foraging habitat and designated Everglade snail kite critical habitat as result of the dredge and fill-related construction.

Wood Stork

The wood stork is primarily associated with freshwater and estuarine habitats which it uses for nesting, roosting, and foraging. Wood storks prefer to construct nests in tall trees surrounded by open water or within marshes and/or swamps. The wood stork is a long-legged wading bird that typically forages in freshwater marshes, ponds, ditches, tidal creeks and pools, impoundments, pine/cypress depressions, and swamp sloughs (Service 1999). Wood storks use a specialized feeding behavior called tactolocation, or grope feeding. A foraging wood stork wades through the water with its beak immersed and partially open (17.78 inches to 20.32 inches). When it touches a prey item, the mandibles snap shut; the wood stork raises its head, and swallows (Kahl 1964). This unique feeding method gives it specialized habitat requirements; the habitats on which wood storks depend have been disrupted by changes in the distribution, timing, and quantity of water flows in south Florida. The extensive loss and degradation of wetlands in central and south Florida are principal threats to the wood stork.

The Service's GIS database records identified two wood stork nest colonies within the LNWR during 2003 and 2004 in two locations on the eastern edge of the LNWR. The L-40 Borrow Canal and STA-1E are within the Core Foraging Area of these wood stork nesting colonies (Figure 4). Construction and operation of the L-40 Project could affect forage and nesting of wood storks in the vicinity. We expect the loss of 15 acres of marginal foraging habitat as result of the dredge and fill-related construction. As a result of historical pesticide application, pesticide residues are likely to exist in the sediments to be dewatered near the STA-1E discharge canal and may potentially enter LNWR, posing a potential risk to the wood stork.

Florida Panther

The Florida panther occurs in most of the counties in central and south Florida. Florida panthers are rarely located east of Lake Okeechobee in Palm Beach County and the closest telemetry points are located to the west of WCA-2A. The Florida panther was historically observed near the LNWR and was assumed to forage in the vicinity. There have been no confirmed sightings in recent years although panthers could potentially range along levees near the LNWR. The L-40 Project is separated from the panther consultation area (Figure 5) (Service 2000a) by the WCAs. The L-40 Project is within the Comprehensive Everglades Restoration Plan (CERP)

Landscape Level Project Planning Siting Map for Panther Conservation (Figure 6) (Service 2004). The benefits to LNWR should reduce impacts to habitat for Florida panther prey species through a reduction in the rate of expansion of cattails (*Typhadomingensis*). No foraging or breeding activities are expected in the area. The proposed project is not expected to negatively impact the panther population.

Eastern Indigo Snake

The eastern indigo snake was listed as a threatened species as a result of population declines caused by over-collecting for the pet trade as well as mortalities caused by rattlesnake collectors who gassed gopher tortoise (*Gopherus poluphemus*) burrows to collect snakes. Since its listing, habitat loss and fragmentation by residential and commercial expansion have become much more significant threats to the eastern indigo snake (Service 1999).

The eastern indigo snake is present but uncommon throughout Florida. Over most of its range, the eastern indigo snake uses pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, freshwater marsh edges, agricultural fields, coastal dunes, and human-altered habitats. In central and coastal Florida, eastern indigo snakes are mainly found within high, sandy ridges. In extreme south Florida, eastern indigo snakes are typically found in pine flatwoods, pine rocklands, tropical hardwood hammocks, and in most other undeveloped areas (Kuntz 1977). Eastern indigo snakes also use some agricultural lands and various types of wetlands (Layne and Steiner 1996). In the milder climates of central and southern Florida, eastern indigo snakes exist in a more stable thermal environment, where availability of thermal refugia may not be as critical to the snake's survival.

The eastern indigo snake may be present within and adjacent to the proposed L-40 Project site. Eastern indigo snakes are known to use levees which impound water in south Florida. Expansion of the L-40 Borrow Canal and reduction of the L-40 levee area would result in a loss of habitat for the eastern indigo snake. However, construction of the 1,000-foot berm may provide additional habitat for the foraging indigo snakes, although, the additional access roads and associated vehicular use could increase risk to this species.

B. State-listed Species

State-listed species that are also not federally listed, potentially occurring within the project footprint are listed in Table 1. The FWC has indicated that the gopher tortoise is not likely to occur at the site. The FWC provided a PAL on September 20, 2005, regarding the L-40 Project.

Table 1. State-listed species, that are also not federally listed, potentially present in the L-40 Project vicinity. T=Threatened; E=Endangered; SSC=Species of Special Concern.

| Scientific Name | Common Name | Status |
|---|---------------------------------|--------|
| <i>Gobiomorus dormitor</i> | Bigmouth sleeper | T |
| <i>Alligator mississippiensis</i> | American alligator | SSC |
| <i>Pituophis melanoleucus mugitus</i> | Florida pine snake | SSC |
| <i>Ajaia ajaja</i> | Roseate spoonbill | SSC |
| <i>Aramus guarauna</i> | Limpkin | SSC |
| <i>Egretta caerulea</i> | Little blue heron | SSC |
| <i>Egretta rufescens</i> | Reddish egret | SSC |
| <i>Egretta thula</i> | Snowy egret | SSC |
| <i>Egretta tricolor</i> | Tricolored (=Louisiana) heron | SSC |
| <i>Eudocimus albus</i> | White ibis | SSC |
| <i>Falco sparverius paulus</i> | Southeastern American kestrel | T |
| <i>Grus canadensis pratensis</i> | Florida sandhill crane | T |
| <i>Pelecanus occidentalis</i> | Brown pelican | SSC |
| <i>Speotyto cunicularia</i> | Burrowing owl | SSC |
| <i>Blarina carolinensis (=brevicauda sherman)</i> | Sherman's short-tailed shrew | SSC |
| <i>Eumops glaucinus floridanus</i> | Florida (=Wagner's) mastiff bat | E |
| <i>Podomys floridanus</i> | Florida mouse | SSC |

C. Fish and Wildlife Resources

Typical non-listed native and exotic species that are likely found in the L-40 Project area are listed in Appendix.

Vertebrates

The L-40 Project area provides habitat for migratory waterfowl, migratory passerines, wood storks, and wading birds. There are many rookeries present that include great blue heron, anhinga, white ibis, little blue heron, tricolored heron, black-crowned night-heron, great egrets, cattle egret, and snowy egrets. A complete list of the plants and wildlife observed at the LNWR can be viewed at the following web address (<http://loxahatchee.fws.gov/CCP/index.asp>). Waterfowl, wading birds, and other bird species that depend upon wetlands for critical resources dominate avian communities here (Service 1999, 2000b).

The south Florida ecosystem is located along one of the primary migratory routes for bird species that breed in temperate North America and winter in the tropics of the Caribbean and South America. Forty-three species of migratory non-game birds of management concern, identified in a coordinated effort by Federal, State, and private agencies, are supported by the south Florida ecosystem. Large numbers of species use south Florida as a primary or major

migratory pathway. More than 129 bird species migrate to the south Florida ecosystem to overwinter. Another 132 bird species breed in the south Florida ecosystem (Service 1999). Because the south Florida ecosystem is located near Cuba and the West Indies, it draws Caribbean species that rarely appear elsewhere in North America. Fifteen species of herons, storks, and ibises nest in the south Florida ecosystem and are considered ecological indicators because of their wide foraging ranges, relatively narrow food requirements, and relatively specific habitat requirements.

In addition, forested uplands and wetlands serve as important resting areas for migrating passerine birds. Coastal Florida is often the last stop before these species cross the Gulf Stream or continue their migration south to Cuba. Development has eliminated many of the traditional forested stopover areas making remaining forested areas in south Florida more important to these species.

Fish communities occur in the LNWR marsh and adjacent canals, including the L-40 Borrow Canal. Small fish assemblages, such as those listed in Appendix, can be found. In addition to small species, deeper open-water alligator holes may temporarily support communities composed of large fish. Regardless of size, fish assemblages respond positively to periods without severe annual drydowns (Loftus and Eklund 1994). Although populations of small fishes can rebound after normal annual drydowns, during a severe drought it could take 1 to 3 years for some populations to reach pre-drought conditions and perhaps longer to rebound after consecutive droughts. Fish are an important part of the food web and support populations of wading birds and other vertebrate species. Because the LNWR is an impounded area with higher water levels during the wet season, larger fish species can be temporarily supported in portions of the interior. Additionally, the L-40 Project area provides habitat for mammals, reptiles, and amphibians such as those listed in the Appendix (Service 2000b).

Invertebrates

Common invertebrates found in the marsh are listed in the Appendix. Macroinvertebrates act as processors of detritus and algae, play significant roles in the cycling of energy and nutrients, and are important prey species (Corps 1999). The apple snail (*Pomacea paludosa*) is the almost exclusive food of the endangered Everglade snail kite and a major prey of some other predators, such as the limpkin. The crayfish is important prey to the white and glossy ibis. Everglades' slough crayfish (*Procambarus fallax*) are short hydroperiod dwellers burrowing deep during dry conditions perhaps beyond the reach of white ibis, while slough crayfish populations requiring longer hydroperiods can be greatly impacted by dry conditions. The L-40 Project could potentially affect apple snail populations in the LNWR and change crayfish availability and composition.

Exotic Species

Vegetative communities in the L-40 Project area consist of both native Everglades and exotic species. Unnatural hydrology, fire regimes, and long-term soil disturbance, have caused a variety of changes in vegetative composition and dominance in these communities. These changes have resulted in exotic invasion by Brazilian pepper (*Schinus terebinthifolius*) on upland communities, and melaleuca (*Melaleuca quinquenervia*), Australian pine (*Casuarina equisetifolia*), and more recently Old World climbing fern on both upland and aquatic communities.

In addition, significant increases in nutrient concentrations (particularly phosphorus) have resulted in increased soil phosphorus content, changes in periphyton communities, increased organic matter in water, and loss of dissolved oxygen causing eutrophic conditions (Stober et al. 2001). Pesticides have also adversely impacted the Everglades ecosystem (Service 1999). Other anthropogenic disturbances such as borrow pits, surface mines, and well-field drawdowns tend to lower water tables, compounding problems to maintaining these habitats (Service 1999). These disturbances, in combination with an encroaching regional human population, have supported the persistence of undesirable plant and animal species.

D. Ecological Communities

Elevation, hydroperiod, water level, and water quality play an important role in the composition and geographical location of vegetative communities at the LNWR. There are four main types of communities: slough/wet prairie, cypress swamp, freshwater marsh, and tree islands. Freshwater marsh is the dominant community.

The interior marsh is a unique oligotrophic, rainfall-driven ecosystem. The composition of algal species which define the endemic periphyton community is highly susceptible to influences associated with altered water quality (Richardson et al. 1990). Periphyton serves as the base of the food chain. Therefore, alterations affecting periphyton may have impacts to invertebrates such as apple snails and to wildlife at higher trophic levels supported by this food base (Swift and Nicholas 1987), including Everglade snail kites foraging on apple snails.

Sloughs/Wet Prairies

Located in areas of lower elevation, deepest water, and longest hydroperiod are sloughs and wet prairies. These areas support aquatic floating, emergent, and submerged vegetation. Historically drier areas exposed to artificially long hydroperiods can also become dominated by these more aquatic species common to sloughs and wet prairies.

Cypress Swamp Forests

Cypress forests at L-40 Project area are dominated by pond cypress (*Taxodium ascendens*) and/or bald cypress (*T. distichum*). The cypress forests provide valuable resources for a diversity of aquatic and terrestrial wildlife, including, Florida softshell turtle (*Apalone ferox*), white-tailed deer (*Odocoileus virginianus*), and wood storks.

Freshwater Marshes

Freshwater marshes, flooded 6 to 9 months per year and typically dominated by sawgrass (*Cladium jamaicense*), are found throughout the Everglades, including the L-40 Project area. Other vegetative species present include spikerush, water hyssop (*Bacopa caroliniana*), marsh mermaid weed (*Proserpinaca palustris*), and Glades morning glory (*Ipomoea sagittata*). These moderate to long-hydroperiod wetlands are indicative of "peat-forming" Everglades' habitat.

Freshwater habitats are dynamic in nature and under natural conditions undergo periodic droughts, floods, and fires. In a managed state, this dynamic pattern of change must be simulated or these systems will follow successional trends toward filling in of their basins and eventual transition to forested community types, with a dramatic loss of habitats necessary for species diversity. Much of the current problem in the Everglades is a function of holding two-thirds of the system in rigidly managed states for agriculture or water control with limited ability to vary conditions in order to sustain natural biological functions (Service 1999).

Freshwater marshes often support sensitive species such as the endangered Everglade snail kite and wood stork. Although these species differ in their respective habitat requirements, both depend upon seasonal fluctuation of water depth in concert with long-term inundation, for foraging and nesting. Prolonged or shortened hydroperiods can result in unnatural changes in the vegetative communities of these areas.

Tree Islands

Forested wetlands within the L-40 Project area occur as elevated tree islands which can range in size from less than 1 acre to greater than 300 acres. The two main types of tree islands found in the L-40 Project area are bayheads and willow heads. Many vertebrate species depend on tree islands, especially during periods of high water, because the vegetative communities and higher elevation relative to the surrounding marsh support them. At lower elevations, tree islands usually support aquatic plants in the understory whereas at higher elevations, hardwoods and bayheads will exist in the understory (Gunderson and Loftus 1993).

E. Contaminants and Water Quality

Excavation, transport, and subsequent usage of potentially contaminated sediments during the construction of the berm canal dredging and dewatering operations could increase the bioavailability of contaminants to elevated concentrations. Certain contaminants, such as copper (an element in citrus fungicides) and methylmercury, can be toxic to fish and other aquatic life. Similarly, organochlorine pesticides can be toxic and become problematic to wildlife if they biomagnify within the food web. Effects can range from behavioral changes or slight decreases in reproductive success to mortality.

The L-40 Project is located within the boundaries of LNWR, therefore, any contaminants that may become mobilized during construction, dredging, or dewatering operations could impact the LNWR. Preliminary contaminant sampling and assessment results are reported in the L-40 Borrow Canal LNWR Sediment Quality Investigation Report. Twenty-two samples were collected within the proposed dredge area. Results of the L-40 sediment sampling (Table 3) showed there are several sediment samples with contaminant concentrations exceeding the Sediment Quality Assessment Guidelines (MacDonald et al. 2003). There are a few sediment samples that exceed the probable effects concentrations for copper, and 4-4'-DDE.

Table 2. Sediment analysis in the L-40 Project footprint and surrounding area.

| | Samples SS0001-SS0022 | | | Samples SS0023-SS0034 | | | Samples SS0001-SS0034 | | |
|-------------------------------------|-----------------------|--------|-------|-----------------------|--------|-------|-----------------------|--------|-------|
| | Average | Max | Min | Average | Max | Min | Average | Max | Min |
| Metals | | | | | | | | | |
| Arsenic milligram/kilograms (mg/kg) | 4.93 | 8.70 | 0.76 | 0.93 | 7.50 | 0.00 | 3.52 | 8.70 | 0.00 |
| Copper (mg/kg) | 30.91 | 66.00 | 0.35 | 7.88 | 42.00 | 0.20 | 22.78 | 66.00 | 0.20 |
| Mercury (mg/kg) | 0.09 | 0.80 | 0.00 | 0.01 | 0.09 | 0.00 | 0.06 | 0.80 | 0.00 |
| Organics | | | | | | | | | |
| 4, 4'-DDD (ug/kg) | 3.14 | 20.00 | 0.00 | 0.28 | 2.90 | 0.00 | 2.13 | 20.00 | 0.00 |
| 4, 4'-DDE (ug/kg) | 14.43 | 70.00 | 0.00 | 1.47 | 16.00 | 0.00 | 9.85 | 70.00 | 0.00 |
| 4, 4'-DDT (ug/kg) | 1.69 | 31.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.09 | 31.00 | 0.00 |
| Chemistry | | | | | | | | | |
| Total Phosphorus (kg/mg) | 376.92 | 880.00 | 8.20 | 68.69 | 550.00 | 5.30 | 268.13 | 880.00 | 5.30 |
| Percent solids | 37.50 | 80.00 | 14.00 | 71.00 | 82.00 | 20.00 | 49.32 | 82.00 | 14.00 |
| pH | 7.55 | 8.00 | 7.00 | 7.90 | 8.10 | 7.20 | 7.68 | 8.10 | 7.00 |
| Organic Content | 24.18 | 47.20 | 2.20 | 3.49 | 29.90 | 0.50 | 16.88 | 47.20 | 0.50 |
| Particle Size | | | | | | | | | |
| Percent Sand | 48.53 | 91.70 | 11.10 | 87.82 | 95.30 | 69.20 | 62.39 | 95.30 | 11.10 |
| Percent Silt | 26.47 | 58.10 | 2.30 | 2.11 | 9.70 | 0.60 | 17.87 | 58.10 | 0.60 |
| Percent Clay | 21.75 | 49.40 | 4.10 | 2.01 | 5.00 | 0.50 | 14.78 | 49.40 | 0.50 |

Outflows from STA-1E are anticipated to mobilize muck, containing readily available phosphorus, in the L-40 Borrow Canal. The phosphorus flux can be transported downstream into the LNWR leading to the elevation of phosphorus levels (Daroub et al. 2003). Emergent marsh vegetation may also be impacted by nutrient laden sediments mobilized by discharged water. Elevated phosphorus levels have been associated with changes in vegetative communities, allowing the expansion of cattails in the southwestern portions of the LNWR which once was dominated by sawgrass (Richardson et al. 1990, Stober et al. 2001).

Water discharged from STA-1E to the LNWR is required to meet the State's Outstanding Florida Waterbody antidegradation standards. The LNWR was established to protect natural Everglades' ecosystems and fish and wildlife resources. Proposed project-related discharges entering the LNWR should not present a potential negative impact to natural resources in the LNWR. The Service is concerned that additional agricultural and urban development can potentially degrade hydrologic flows, including the amount, timing, and distribution to the LNWR.

Sulfates may be present, or directed into the LNWR by discharges from the S-362 (U.S. Environmental Protection Agency [EPA] 2001, Stober et al. 2001). Sulfate loading into aquatic systems has been implicated as a primary driving force in the methylation of mercury by sulfate-reducing bacteria (District 2002). Interior marsh locations have background sulfate concentrations of around 2.0 parts per million (Bates et al. 2002, Scheidt et al. 2000). Sulfate loading into a system may be more important to methylmercury production than mercury loading (EPA 2001, Stober et al. 2001). Because methylmercury readily bioaccumulates in fish and wildlife, the Service is concerned if levels of both mercury and sulfates entering the marshes are found to increase.

STA-1E discharges may also alter conductivity levels currently present in the rainfall-driven interior of LNWR. Conductivity levels in the LNWR interior marsh locations are usually, less than 100 micromhos per centimeter and are consistent with a rainfall-driven system with little influence from waters conveyed in the surrounding canals (Scheidt et al. 2000). Potential increased conductivity levels may lead to a reduction in diversity and alteration in species composition of the unique periphyton community found at LNWR (Browder et al. 1991).

IV. DESCRIPTION AND COMPARISON OF THE ALTERNATIVES AND THE TENTATIVELY SELECTED PLAN

A. Project Location and Site Description

The L-40 Project is located wholly within the boundaries of the LNWR. The L-40 Borrow Canal serves as a rim canal to LNWR (Figure 1). The project footprint will include the L-40 levee, L-40 Borrow Canal, and marsh areas within LNWR. The STA-1E is located in Palm Beach County adjacent to the northeast section of the LNWR, also known as WCA-1. The LNWR consists of 143,238 acres owned by the State of Florida and 2,550 acres adjacent to the WCA-1

owned by the U. S. Department of Interior. STA-1E discharges via S-362 to the L-40 Borrow Canal. The L-40 Borrow Canal is also part of a 57-mile levee/borrow canal system that defines the perimeter of LNWR. The L-40 Borrow Canal depth is approximately 12 feet, the top width varies from 70 to 90 feet, and the bottom width is approximately 40 feet in the vicinity of the S-362. Pump Station S-362 has a total pumping capacity of 4,200 cubic feet per second (cfs).

Soil depths in WCA-1 range from 3.6 to 14.0 feet (Silveira 1996). The three main types of peat located within the LNWR include Loxahatchee Peat (derived primarily from white water lily / slough communities), Everglades peat (derived from sawgrass), and Gandy peat (derived from forest vegetation on tree islands) (Gleason and Stone 1994).

B. Evaluation Method

The Service provided guidance to the C-51 Action Team to assist in the protection and conservation of trust resources. The Corps was primarily responsible for the development of the hydrologic model and model results.

All four alternatives were evaluated to determine the extent to which STA-1E discharge velocities exceeded 0.075 feet per second (fps). This rate is predicted to be sufficient to mobilize organic sediment in the canal and potentially transport it into the marsh. Deposition of this material could contribute to an increase of total phosphorus in the marsh soils, thereby facilitating expansion of cattail encroachment into the relatively pristine marsh areas of the LNWR.

C. Comparison of the Project Alternatives

Four potential alternatives were developed by the Corps and were evaluated for the volume of sediment removed from the L-40 Borrow Canal, increased conveyance of the L-40 Borrow Canal, and the spatial extent within LNWR where surface water velocities were greater than 0.075 fps, as simulated during maximum discharge of the S-362 pump station.

1. Alternative Number 1 - Tentatively Selected Plan (TSP): This alternative includes a 1,000-foot berm, canal widening 3,000 feet downstream of S-362, dredging 13,500 feet of the L-40 Borrow Canal, and disposal of dredge material.
2. Alternative Number 2 - Scales of Dredging: This alternative includes a 1,000-foot berm, canal widening 3,000 feet downstream of S-362, dredging 5,280 feet of the L-40 Borrow Canal, and disposal of dredge material.
3. Alternative Number 3 - Dredging Techniques: This alternative includes dredging 8,200 feet of the L-40 Borrow Canal, and disposal of dredge material.
4. No-Action - future-without project.

A comparison of the alternatives considered during the planning process is provided in Table 3. Alternative 1, the TSP, appears to be the best plan in reducing the potential sediment load in the L-40 Borrow Canal, in the vicinity of the S-362. Both the TSP and Alternative 2 include widening the canal to 200 feet, thus meeting the project goal of improving L-40 Borrow Canal conveyance capacity in the vicinity of the S-362. However, the analysis of the modeling could not detect any discernable improvement in the L-40 conveyance capacity for Alternative 3. The TSP appears to be the best plan in reducing the spatial extent of potential impacts to marsh areas in the LNWR. Overall, the TSP alternative meets all the project goals by maximizing benefits from the construction of the berm, canal widening, and dredging. Detailed information and modeling results for this project can be found in the Design Documentation Report, or Appendix E of the C-51 Final Environmental Impact Statement (Corps 2005).

Table 3. Comparison of L-40 Project Alternatives. The last column, "LNWR effects," represents the number of acres of the LNRW where the simulated velocities reach 0.075 fps during maximum discharge rate of 3,980 cfs.

| | Sediment removed (cubic yard) | L-40 conveyance capacity | LNWR effects (acres) |
|-------------------------|----------------------------------|-----------------------------|-------------------------|
| Alternative 1 - the TSP | 100,000 | increase | 134 |
| Alternative 2 | 40,000 | increase | no information |
| Alternative 3 | 60,000 | negligible increase | 249 |
| No Action Alternative | n/a | n/a | 249 |

The combined benefits of the dredging, widening, and berm construction are expected to reduce the number of times that the interior marsh areas are impacted by nutrient loads and unnaturally high velocities related to STA-1E discharges.

V. FISH AND WILDLIFE RESOURCES WITHOUT THE PROJECT

If the current rate of development in south Florida continues or increases, then we can expect agricultural and/or natural areas to be converted to residential or urban areas. This growth will likely increase stormwater runoff and require the construction of more canals. The regional ecology will be further stressed, impacting economic and recreational interests that are based on fish and wildlife resources.

VI. POTENTIAL BENEFICIAL AND ADVERSE EFFECTS OF THE PROJECT

A. Benefits

The TSP will likely provide improved foraging habitat for wood storks, bald eagles, and Everglade snail kites by reducing the potential for phosphorus and contaminated sediments to enter the relatively pristine areas of the LNWR. The TSP also minimizes the spatial extent of the

LNWR marsh areas potentially impacted by degraded water quality. The L-40 Project is also expected to reduce the volume of water which contains high conductivity and sulfate levels entering the marsh. Thus, the unique periphyton community in the LNWR will benefit from reduced volumes of unnaturally high conductivity. Fish-eating wildlife may also benefit from the reduced sulfate loading into the marsh as this may reduce the potential cycling of methylmercury into the biotic community.

B. Effects of the Project on Vegetation

Constructing (filling) the berm and widening (dredging) the canal will impact approximately 15 acres of wetlands vegetation present in the L-40 Borrow Canal that is native to the Everglades. Ten acres are expected to be filled by constructing the 1,000-foot berm and 5 acres will be impacted by widening the L-40 Borrow Canal.

C. Effects of the Project on Threatened and Endangered Species

Short-term disturbances to fish and wildlife are expected from L-40 construction activities. However, potential disturbances should be minimized or avoided by limiting construction activities, when possible, during critical times, such as nesting season. Approximately 15 acres of habitat adjacent to the L-40 Borrow Canal is expected to be effected by the construction of the berm and widening of the canal.

The L-40 Project could directly or indirectly effect foraging habitat for wood storks, Everglade snail kite and Everglade snail kite designated critical habitat. Foraging habitat and Everglade snail kite critical habitat may benefit by the L-40 Project by reducing the frequency of velocities above 0.075 fps and removal of phosphorus-laden and potentially contaminated sediments from being potentially transported into the LNWR.

The L-40 Project will also likely reduce potentially negative effects to bald eagle foraging habitat by reducing velocities and transport of sediment into LNWR. Noise and nighttime lighting associated with construction activities could alter foraging patterns of resident bald eagles using water bodies in the vicinity. Bald eagles could become conditioned to ambient noise present during operations.

The L-40 Project should provide benefits to LNWR and habitat for Florida panther prey species by reducing the rate of expansion of cattails. The proposed project is not expected to negatively affect the Florida panther.

Temporary impacts, including displacement to individual indigo snakes, may occur during construction. With construction of additional access roads for maintenance or recreational access, additional effects to the eastern indigo snake could occur through road mortality. The proposed berm could provide upland habitat for terrestrial species including the eastern indigo snake

D. Potential Project Effects from Contaminants and Disposal of Sediments

Excavation, transport, and subsequent usage of potentially contaminated sediments during the construction of the berm, canal dredging, and dewatering operations could increase exposure of fish and wildlife to contaminants. Certain contaminants, such as copper (a common component of citrus fungicides) and methylmercury, can be toxic to fish and other aquatic life. Organochlorine pesticides can be toxic or become problematic to wildlife if they bioaccumulate to toxic levels within the food web. Effects to species can range from behavioral changes or slight decreases in reproductive success to mortality. The risk of increased transport of, and exposure to, contaminants and their subsequent biomagnification in fish and wildlife should be minimized in the project plan.

The Service's Environmental Contaminants staff reviewed the L-40 Borrow Canal Sediment Quality Investigation (Corps 2005) and expressed concern with the proposed dredged material placement located between the L-40 Borrow Canal and the STA-1E, which could lead to the discharge of contaminants into LNWR. Several "hot spots" with elevated levels of pesticides were reported. Additional sediment sampling was performed in accordance with DEP recommendations made to the C-51 Action Team.

E. Effects of the Project on Water Quality

The current Everglades Forever Act states numeric criterion for phosphorus within the Everglades Protection Area is 50 parts per billion (ppb) total phosphorus. This criterion is expected to be lowered to 10 ppb total phosphorus in December 2006. Treated water discharged into LNWR from STA-1E into the must meet the criteria established for an Outstanding Florida Waterbody and the Everglades Forever Act criterion. STA-1E will discharge into the LNWR at a point north of the existing Acme Basin B pump stations. These direct discharges are relatively high in levels of conductivity and can potentially impact the interior marshes of the LNWR.

F. Potential Exotic Species Effects

Exotic plant species such as Brazilian pepper and melaleuca are already present at the L-40 Borrow Canal site. The general disturbance of soil associated with construction activities creates the potential for introduction and propagation of exotic and nuisance plant species.

G. Cumulative Effects

The spatial extent of the L-40 Project is relatively small and encompasses 13,500 feet of the L-40 Borrow Canal, 15 acres of dredge and fill areas adjacent to the S-362 pump station, and several acres inside STA-1E which will be used for dewatering activities. Primary concerns for cumulative impacts to threatened and endangered species are related to contaminants, construction activities, and impacts to wetland habitat associated with dredging and filling. Approximately 180,000 cubic yards of material will be dredged and used to build the 1,000-foot

berm. It is expected that the TSP will remove 100,000 cubic yards of contaminated sediments from the L-40 Borrow Canal, thereby keeping this material from entering the interior marsh. Cumulative impacts such as effects on fisheries and listed species are of particular concern.

H. Assurances

The TSP and several alternatives were modeled by the Corps using RMA2, a depth-averaged hydrodynamic model of the Corps. The U.S. Geological Survey high accuracy elevation data was used to represent the interior area of LNWR, in addition to a Corps contracted survey of the L-40 Borrow Canal. LNWR staff has expressed concerns that the modeling performed may not be sensitive enough to evaluate differences between alternatives which include the 1,000-foot berm and those which do not include the berm.

The Corps is presently working to update the modeling report and incorporate these details into their final report. Additionally further sampling of the sediments in the L-40 Borrow Canal is scheduled to be completed and summarized in a report to the multi-agency C-51 Action Team.

I. Summary of Consultation Under the Endangered Species Act

On October 26, 2004, the Service submitted a PAL to the Corps regarding the proposed L-40 Project. The PAL outlined the Service's concerns related to threatened and endangered species. The Service as an active member of the C-51 Action Team for the L-40 Project will continue to provide technical and scientific guidance throughout informal consultation, and plan formulation and evaluation process.

On July 18, 2005, the Corps submitted to the Service a draft Biological Assessment which included effect determinations for the bald eagle, eastern indigo snake, Everglade snail kite and Everglade snail kite critical habitat, and wood stork. The Corps determined that the nature of the work and the precautionary measures taken for each species "may affect, but is not likely to adversely affect" threatened and endangered species. The Service will continue to provide necessary information on threatened and endangered species to the Corps throughout the informal consultation process.

VII. EVALUATION OF THE PROJECT

Over the long-term, the Service has some concern for exposure of federally listed species and other fish and wildlife resources to contaminants, due to the dredging and dewatering operations and which could impact the LNWR. The result of the additional sediment sampling will help to better define the potential ecological risk from contaminants to affect listed species and fish and wildlife resources.

VIII. RECOMMENDATIONS

Objectives identified by the Service in providing recommendations on this project are to protect and conserve fish and wildlife resources consistent with the overall L-40 Project purpose. This includes developing recommendations to make this project environmentally compatible and to further enhance the diversity and abundance of fish and wildlife resources in the study area.

A. Threatened and Endangered Species

1. Provide construction and operation-related details in the detailed design documentation and operations manual. Additional recommendations regarding the potential effects of the L-40 Project on listed species based on additional information made available in these documents may be necessary.
2. Plan and implement construction activities to avoid disturbance to actively foraging wood storks consistent with guidelines in *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (Ogden 1990). Avoid construction activities in areas with actively feeding wood storks. Maintain a 328-foot buffer distance from the foraging birds to minimize human disturbance (Rodgers and Smith 1997).
3. Plan any construction activities within the primary or secondary zones of bald eagle nest sites to occur between May 16 and September 30, outside of the bald eagle nesting season. Incorporate other relevant guidelines such as the *Habitat Management Guidelines for the Bald Eagle in the Southeast* (Service 1987) and *Bald Eagle Monitoring Guidelines* (Service 2002a) into the L-40 Project construction, operation and monitoring design and plans to reduce effects of human-related activities on nesting bald eagles.
4. Implement of the Service's *Draft Standard Protection Measures for the Eastern Indigo Snake* (Service 2002b) in all construction areas, including new access roads constructed for operations and maintenance as well as recreational access.
5. Coordinate with the FWC regarding habitat needs and additional conservation recommendations for species listed as threatened, endangered, or of special concern by the State of Florida.

B. Fish and Wildlife Resources

1. Coordinate with the Service and FWC in the event that colonial or solitary wading bird nests are observed within the construction footprint.

2. Plant or seed native and wetland vegetation on the constructed berm to provide ground cover and canopy vegetation for wildlife. Control or eradicate exotic and nuisance vegetation during construction, operation, and maintenance.
3. Adopt wildlife-protective water quality criteria to minimize potential direct and indirect effects from degraded water quality on aquatic resources.

C. Water Quality Monitoring Plan

Develop a Water Quality Monitoring Plan to enable the Action Team to determine whether construction or operational activities are causing effects that can potentially impact the LNWR. The number of samples suggested by the monitoring plan outlined in the draft NPDES permit should be increased (more than eight) unless it is believed there is minimal spatial variation in concentrations among samples.

D. Mitigation Plan

Conduct a post-project WRAP in the near future with a multi-agency team of Corps, Service, and FWC representatives to develop a Wetland Mitigation Plan. Include all Wetlands Rapid Assessment Procedure documentation for both the wetlands to be impacted and the wetlands to be offered as mitigation in the Mitigation Plan.

E. Contaminants

In order to determine the extent of risk to fish and wildlife resources, the Service recommends the following:

1. Augment the proposed Monitoring Plan outlined in the draft NPDES permit by including an analysis of dissolved (filtered water) and particulate bound (unfiltered water) mercury. Ensure that a sufficient number of samples are collected during the start-up sampling for proper statistical comparisons between inflow and midpoint samples. A power analysis should be performed on mercury monitoring data from other STAs to determine the minimum number of samples needed to detect what is considered to be a significant difference at a specified confidence level.
2. Finalize an STA-1E Operational Monitoring Plan to further assess the level of potential ecological risk posed from L-40 Project construction, dredging, and dewatering activities. A sampling and monitoring plan should be developed and implemented. The mercury and pesticide monitoring recommended in the September 28, 1995, Biological Opinion for the Everglades Construction Project should continue to be implemented.

3. In addition to sampling fish from multiple trophic levels, sample benthic and epi-benthic invertebrates quarterly for methylmercury. The variability would be beneficial for statistically determining seasonal variation in mercury body burdens compared to the composite results. Compositing the quarterly mosquito fish samples results in a loss of spatial variability data for the quarter.
4. Collect a sufficient number of samples during start-up sampling for proper statistical comparisons between inflow and midpoint samples. Perform a power analysis on mercury monitoring data from other STAs to determine the minimum number of samples needed to detect what is considered to be a significant difference at a specified confidence level.

F. Adaptive Management

Manage the L-40 Project in a manner consistent with adaptive management principles. Incorporate good science through careful monitoring and analysis to support operational or other changes to increase or improve overall project benefits including benefits to the natural system.

IX. SUMMARY OF POSITION

In response to concerns expressed by LNWR and other Service staff, the Corps proposes in the L-40 Project TSP to construct a 1,000-foot berm at the junction of the S-362 discharge canal and the L-40 Borrow Canal, widen the L-40 Borrow Canal to a width of 200 feet from the S-362 discharge point to approximately 3,000 feet downstream, and dredge approximately 13,500 feet of the L-40 Borrow Canal.

The primary objective of the L-40 Project is to reduce the potential for contaminated organic sediments to become dislodged from the L-40 Borrow Canal and migrate into the interior LNWR marsh. The conveyance capacity of the L-40 Borrow Canal in the water vicinity of the S-362 (cross-sectional area) will reduce the potential for velocities to exceed 0.075 fps which are predicted to be capable of transporting organic sediment from the canal into the marsh. The combined benefit of the dredging, berm construction, and canal widening is predicted to reduce interior marsh areas potentially impacted by nutrient and contaminant loads and unnaturally high velocities related to STA-1E discharges. The primary project objective is to reduce potential impacts to LNWR associated with STA-1E discharges. The Corps agrees to implement measures to reduce disturbance to threatened and endangered species, therefore the Service supports the L-40 Project.

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XI. FIGURES.

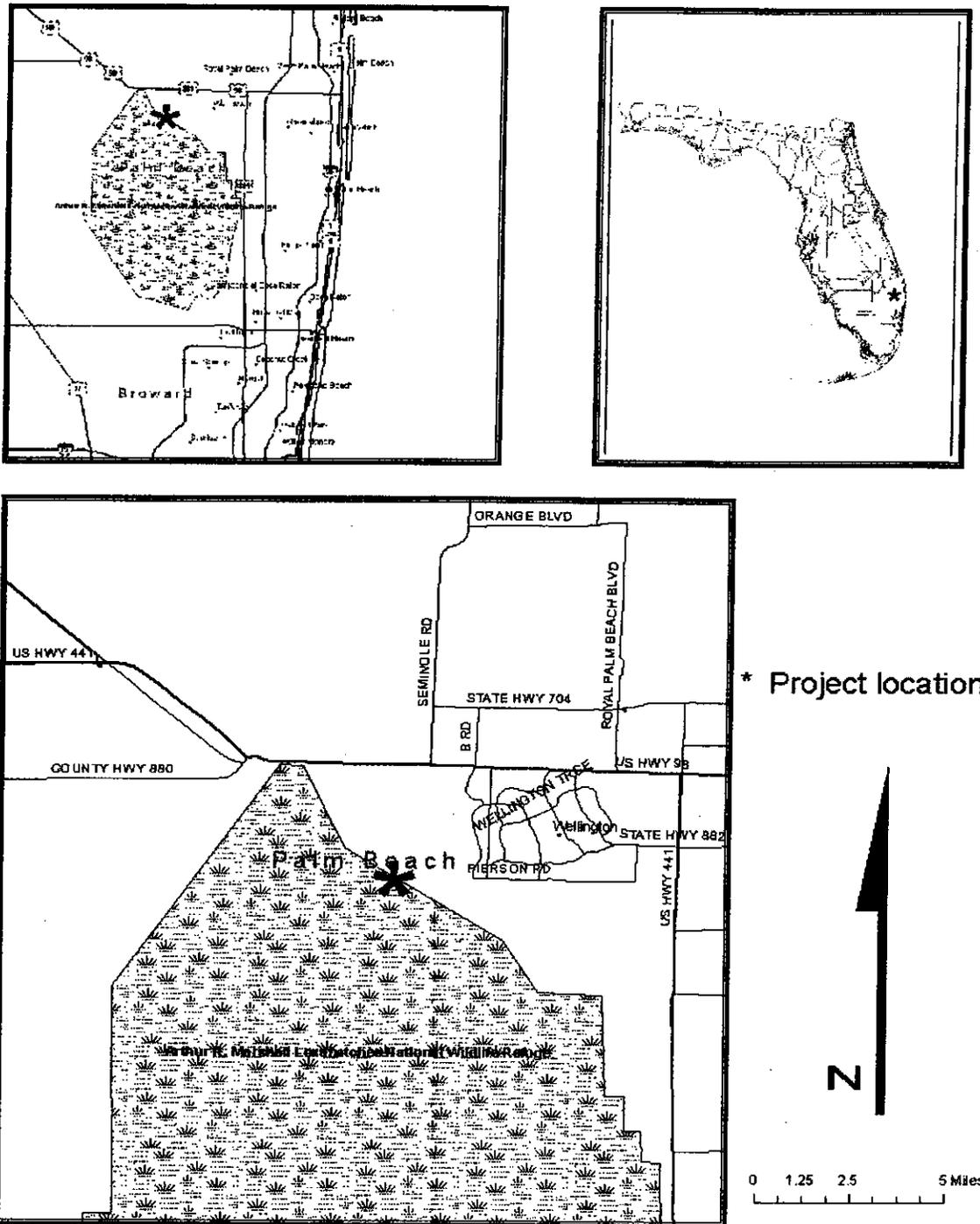


Figure 1. Location of L-40 Project.



Figure 2. L-40 Project site and bald eagle nest locations. Bald eagle nests PB010 and PB013 were active during the 2003 nesting season and nest PB005 has been inactive since 1992.

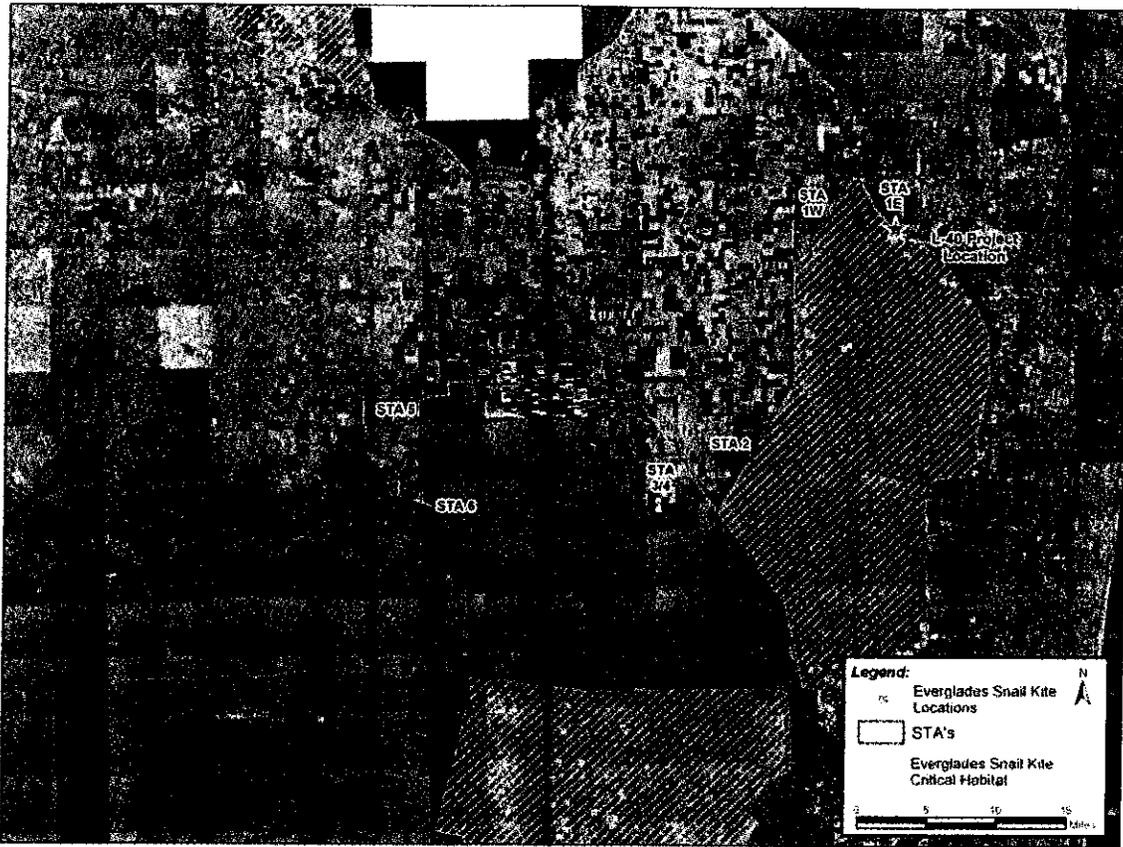


Figure 3. L-40 Project site and Everglade snail kite nest locations and designated critical habitat. Everglade snail kites have nested in the northeastern region of the LNWR, though not in recent years.

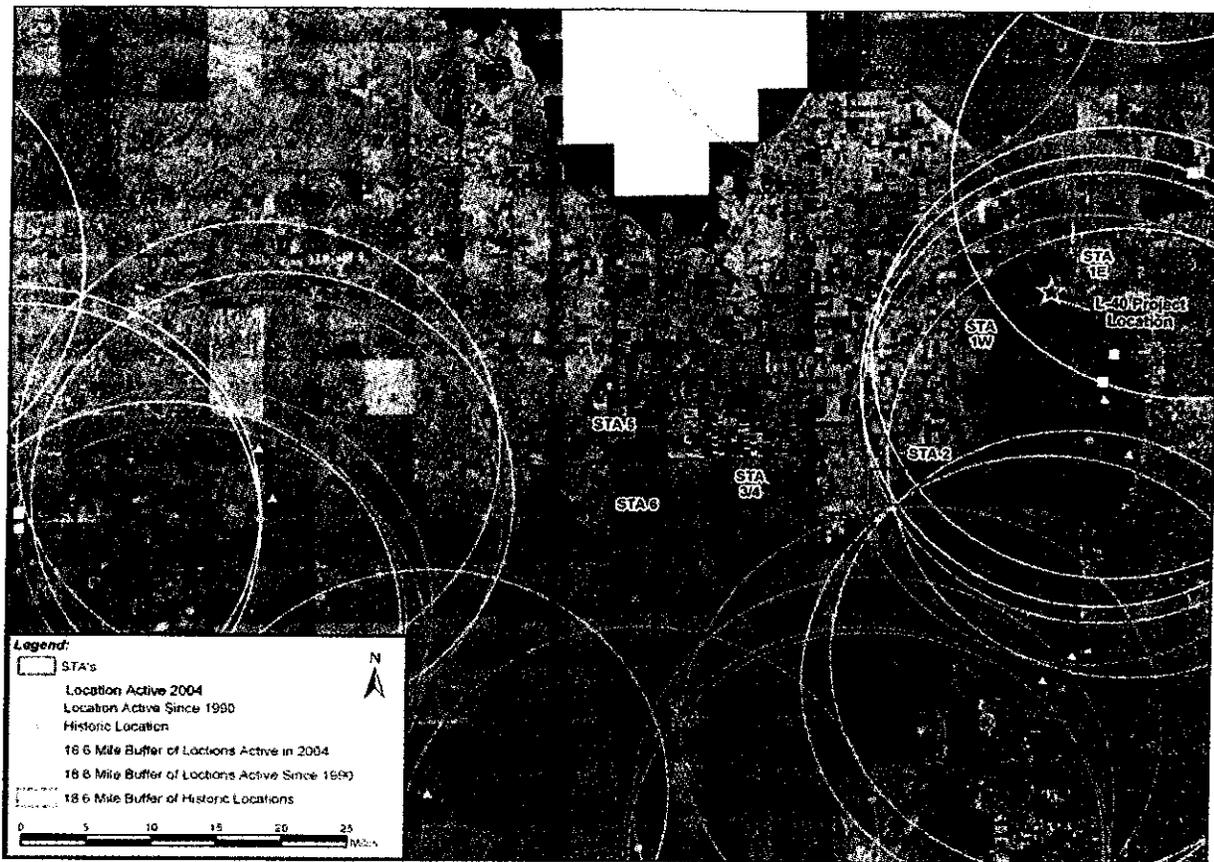


Figure 4. L-40 Project site and wood stork nest colonies. The L-40 Project is within the 18.6-mile Core Foraging Area of two wood stork nest colonies which were active in 2003 and 2004 in the LNWR.

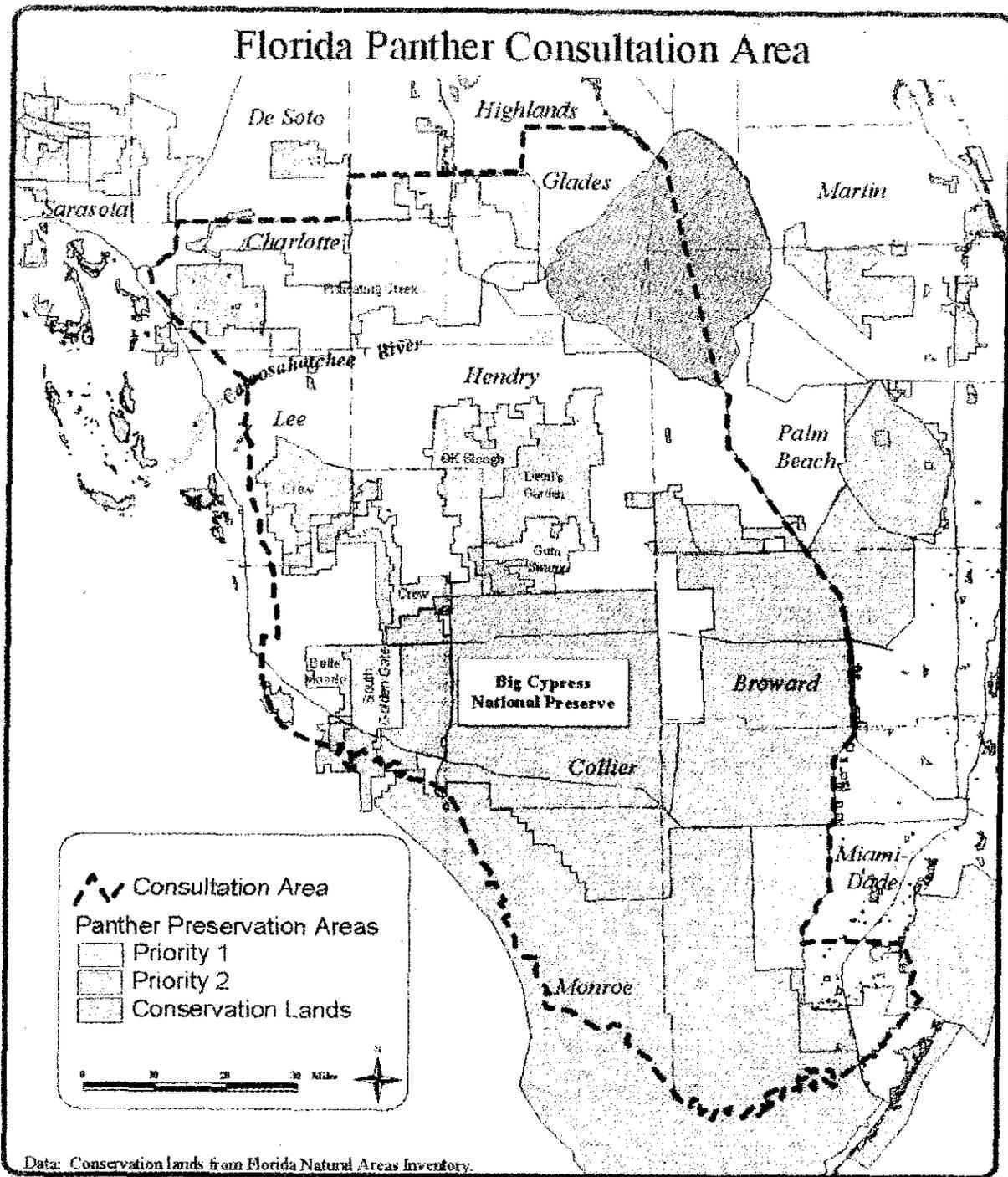


Figure 5. Florida panther consultation area. The L-40 Project site is located in Palm Beach County to the east of the Florida panther consultation area

**CERP Landscape Level Project Planning/
Siting Map For Panther Conservation**

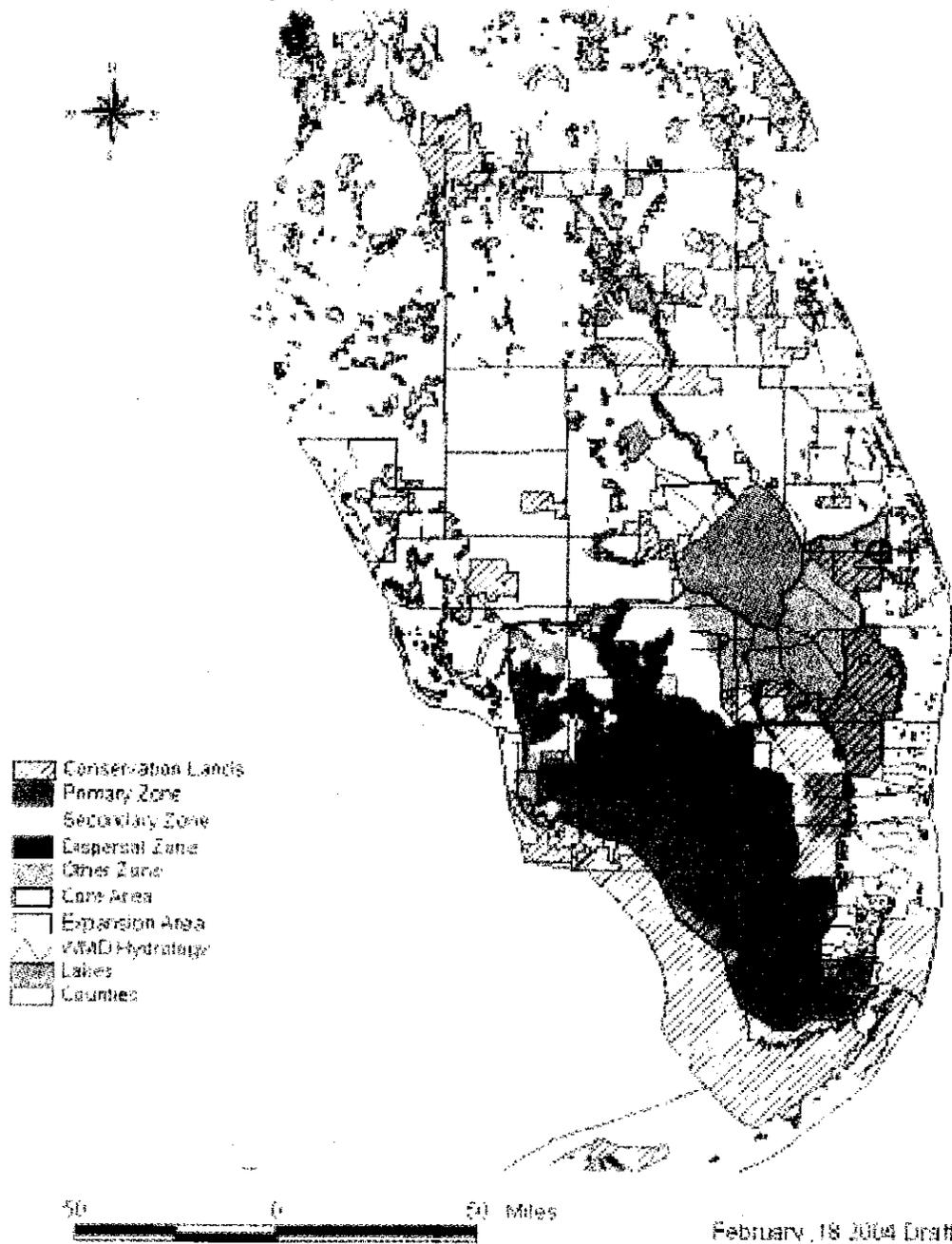


Figure 6. CERP Landscape Level and Project Planning/Siting Map for Panther Conservation. The L-40 Project is located inside of the CERP landscape level and project planning/siting map for panther conservation boundary.

APPENDIX

Vertebrate species likely found in the L-4 Borrow Canal Modification Project footprint and surrounding area. A few important invertebrate and exotic plant species are also included.

Mammals

river otter, *Lutra canadensis*
cotton mouse, *Peromyscus gossypinus*
raccoon, *Procyon lotor*
hispid cotton rat, *Sigmodon hispidus*
eastern cottontail, *Sylvilagus floridanus*
marsh rabbit, *Sylvilagus palustris*
opossum, *Didelphis marsupialis*
grey fox, *Urocyon cinereoargenteus*
nine-banded armadillo, *Dasypus novemcinctus*
eastern yellow bat, *Lasiurus intermedius*
bobcat, *Lynx rufus*
evening bat, *Nycticeius humeralis*
white-tailed deer,
rice rat, *Oryzomys palustris*
eastern mole, *Scalopus aquaticus*
river otter, *Lutra canadensis*
freetail bat, *Tadarida brasiliensis*
house mouse, *Mus musculus*
black rat, *Rattus rattus*
domestic dog, *Canis familiaris*
feral hog, *Sus scrofa*

Birds

spotted sandpiper, *Actitis macularia*
semipalmated sandpiper, *Calidris pusilla*
lesser yellowlegs, *Tringa flavipes*
greater yellowlegs, *Tringa melanoleuca*
double-crested cormorant, *Phalacrocorax auritus*
anhinga, *Anhinga anhinga*
great blue heron, *Ardea herodias*
cattle egret, *Bubulcus ibis*
green heron, *Butorides striatus*
black-crowned night heron, *Nycticorax nycticorax*
great egret, *Egretta alba*
glossy ibis, *Plegadis falcinellus*
mottled duck, *Anas fulvigula*
wood duck, *Aix sponsa*
ring-necked duck, *Aythya collaris*
fulvous whistling duck, *Dendrocygna bicolor*
ruddy duck, *Oxyura jamaicensis*

blue-winged teal, *Anas discors*
green-winged teal, *Anas crecca*
lesser scaup, *Aythya affinis*
northern pintail, *Anas acuta*
American widgeon, *Anas americana*
northern shoveler, *Anas clypeata*
hooded merganser, *Lophodytes cucullatus*
gadwall, *Anas strepera*
red-winged blackbird, *Agelaius phoeniceus*
eastern meadowlark, *Sturnella magna*
common grackle, *Quiscalus quiscula*
boat-tailed grackle, *Quiscalu major*
rusty blackbird, *Euphagus carolinus*
brown-headed cowbird, *Molothrus ater*
northern cardinal, *Cardinalis cardinalis*
cedar waxwing, *Bombycilla cedrorum*
black-throated warbler, *Dendroica coerulescens*
yellow-rumped warbler, *Dendroica coronata*
prairie warbler, *Dendroica discolor*
palm warbler, *Dendroica. palmarum*
northern mockingbird, *Mimus polyglottos*
house sparrow, *Passer domesticus*
rufous-sided towhee, *Pipilo erythrophthalmus*
American robin, *Turdus migratorius*
Carolina wren, *Thryothorus ludovicianus*
house wren, *Troglodytes aedon*
western kingbird, *Tyrannus verticalis*
great crested flycatcher, *Myiarcus crinitis*
white-eyed vireo, *Vireo griseus*
yellow-billed cuckoo, *Coccyzus americanus*
pileated woodpecker, *Drycopus pileatus*
red-bellied woodpecker, *Melanerpes carolinus*
red-shouldered hawk, *Buteo lineatus*
red-tailed hawk, *Buteo jamaicensis*
northern harrier, *Circus cyaneus*
black-shouldered kite, *Elanus caeruleus*
swallow-tailed kite, *Elanus forficatus*
barred owl, *Strix varia*
turkey vulture, *Cathartes aura*
black vulture, *Coragyps atratus*

Fish

killifishes, family Cyprinodontidae
live-bearers, Poeciliidae
mosquito fish, *Gambusia* spp.
sailfin molly, *Poecilia latipinna*
yellow bullhead, *Ameiurus natalis*
adult sunfishes, *Lepomis* spp.
largemouth bass, *Micropterus salmoides*
sunfish, family Centrarchidae
catfish, family Ictaluridae
bowfin, *Amia calva*
Florida gar, *Lepisosteus platyrhincus*

Reptiles and Amphibians

Florida softshell turtle, *Apalone ferox*
striped mud turtle, *Kinosternon bauri*
eastern mud turtle, *Kinosternon subrubrum*
green anole, *Anolis carolinensis*
eastern mud snake, *Farancia abacura*
rat snake, *Elaphe obsoleta*
cottonmouth, *Agkistrodon piscivorus*

oak toad, *Bufo quercicus*
southern cricket frog, *Acris gryllus dorsalis*
tree frogs, *Hyla* spp.
little grass frog, *Pseudacris ocularis*
narrowmouth toad, *Gastrophryne carolinensis*
pig frog, *Rana grylio*
southern leopard frog, *Rana sphenoccephala*
brown anole, *Anolis sagrei sagrei*

Invertebrates

amphipod, *Hyallela aztecus*
freshwater prawn, *Palaemonetes paludosus*
Everglades crayfish, *Procambarus alleni*
slough crayfish *Procambarus fallax*
apple snail, *Pomacea paludosa*

Exotic Plants

melaleuca, *Melaleuca quinquenervia*
Brazilian pepper, *Schinus terebinthifolius*
water hyacinth, *Eichhornia crassipes*
hydrilla, *Hydrilla verticillata*

Responses to the Recommendations from the U.S. Fish and Wildlife Service from the Draft FWCA Report

1. Provide construction and operation-related details in the detailed design documentation and operations manual. Additional recommendations regarding the potential effects of the L-40 Project on listed species based on additional information made available in these documents may be necessary.

Response: Concur.

2. Plan and implement construction activities to avoid disturbance to actively foraging wood storks consistent with guidelines in Habitat Management Guidelines for the Wood Stork in the Southeast Region (Ogden 1990). Avoid construction activities in areas with actively feeding wood storks. Maintain a 328-foot buffer distance from the foraging birds to minimize human disturbance (Rodgers and Smith 1997).

Response: Concur. Habitat management guidelines for the wood storks in the Southeast Region will be included in the construction plans and specifications.

3. Plan any construction activities within the primary or secondary zones of bald eagle nest sites to occur between May 16 and September 30, outside of the bald eagle nesting season. Incorporate other relevant guidelines such as the Habitat Management Guidelines for the Bald Eagle in the Southeast (Service 1987) and Bald Eagle Monitoring Guidelines (Service 2002a) into the L-40 Project construction, operation and monitoring design and plans to reduce effects of human-related activities on nesting bald eagles.

Response: Habitat management guidelines for the bald eagle in the Southeast will be included in the construction plans and specifications. In addition, surveys for bald eagles will be conducted prior to construction.

4. Implement of the Service's Draft Standard Protection Measures for the Eastern Indigo Snake (Service 2002b) in all construction areas, including new access roads constructed for operations and maintenance as well as recreational access.

Response: Concur. Habitat management guidelines for the indigo snake will be included in the construction plans and specifications.

5. Coordinate with the FWC regarding habitat needs and additional conservation recommendations for species listed as threatened, endangered, or of special concern by the State of Florida.

Response: Coordination with the FWC has not revealed any concerns related to species listed as threatened, endangered, or of special concern by the State of Florida.

6. Coordinate with the Service and FWC in the event that colonial or solitary wading bird nests are observed within the construction footprint.

Response: Concur. A bird observer is a requirement throughout construction, and findings will be coordinated with the appropriate agencies.

7. Plant or seed native and wetland vegetation on the constructed berm to provide ground cover and canopy vegetation for wildlife. Control or eradicate exotic and nuisance vegetation during construction, operation, and maintenance.

Response: The berm will be appropriately stabilized for erosion control. Wetland vegetation would not be appropriate for upland area. Exotic and nuisance vegetation will be controlled throughout construction and through operation and maintenance of the project.

8. Adopt wildlife-protective water quality criteria to minimize potential direct and indirect effects from degraded water quality on aquatic resources.

Response: The project purpose is to improve water quality. Direct and indirect effects of degraded water quality on aquatic resources is not anticipated.

9. Develop a Water Quality Monitoring Plan to enable the Action Team to determine whether construction or operational activities are causing effects that can potentially impact the LNWR. The number of samples suggested by the monitoring plan outlined in the draft NPDES permit should be increased (more than eight) unless it is believed there is minimal spatial variation in concentrations among samples.

Response: During construction, the contractor will be taking turbidity samples twice a day. The filtered water discharging into the East Distribution Cell will be sampled weekly, unless it is determined that no contaminants are present.

10. Conduct a post-project WRAP in the near future with a multi-agency team of Corps, Service, and FWC representatives to develop a Wetland Mitigation Plan. Include all Wetlands Rapid Assessment Procedure documentation for both the wetlands to be impacted and the wetlands to be offered as mitigation in the Mitigation Plan.

Response: The project is anticipated to benefit existing wetland systems by improving water quality in the systems in the northeast part of the Refuge. This benefit should offset impacts to the 15 acres that will be directly affected by project implementation. The Corps does not believe that the overall impacts of this project construction as aggregated with the beneficial effects will be adverse. We believe this project is self mitigating. The Corps agrees to complete a post project WRAP with a multi-agency team. If any adverse impacts are shown from this WRAP, the Corps will work with the Service on developing a mitigation plan.

11. Augment the proposed Monitoring Plan outlined in the draft NPDES permit by including an analysis of dissolved (filtered water) and particulate bound (unfiltered water) mercury. Ensure that a sufficient number of samples are collected during the start-

up sampling for proper statistical comparisons between inflow and midpoint samples. A power analysis should be performed on mercury monitoring data from other STAs to determine the minimum number of samples needed to detect what is considered to be a significant difference at a specified confidence level.

Response: During construction, the contractor will be taking turbidity samples twice a day. The filtered water discharging into the East Distribution Cell will be sampled weekly, unless it is determined that no contaminants are present.

12. Finalize an STA-1E Operational Monitoring Plan to further assess the level of potential ecological risk posed from L-40 Project construction, dredging, and dewatering activities. A sampling and monitoring plan should be developed and implemented. The mercury and pesticide monitoring recommended in the September 28, 1995 Biological Opinion for the Everglades Construction Project should continue to be implemented.

Response: The Corps will not change the mercury and pesticide content of the water column with the implementation of this project. An aggressive monitoring plan will be implemented until it's determined that no contaminants are found in the water column. The concentrations within the sediments are so low that it's anticipated that the water column concentrations will be at trace levels. Limited sampling will be conducted to demonstrate that.

13. In addition to sampling fish from multiple trophic levels, sample benthic and epi-benthic invertebrates quarterly for methyl mercury. The variability would be beneficial for statistically determining seasonal variation in mercury body burdens compared to the composite results. Compositing the quarterly mosquito fish samples results in a loss of spatial variability data for the quarter.

Response: Mercury is considered to be a CERCLA contaminant, and the Corps does not propose to sample benthic and epi-benthic invertebrates or fish populations related to construction of L-40 work activities.

14. Collect a sufficient number of samples during start-up sampling for proper statistical comparisons between inflow and midpoint samples. Perform a power analysis on mercury monitoring data from other ST As to determine the minimum number of samples needed to detect what is considered to be a significant difference at a specified confidence level.

Response: The construction activities associated with the L-40 do not warrant an extensive regional mercury monitoring program. However, the Corps is willing to discuss any mercury concerns with the Refuge.

15. Manage the L-40 Project in a manner consistent with adaptive management principles. Incorporate good science through careful monitoring and analysis to support operational or other changes to increase or improve overall project benefits including benefits to the natural system.

Response: Concur.



DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P.O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

27 OCT 2005

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

Mr. Jay Slack
Field Supervisor
South Florida Ecosystem Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960-3559

Dear Mr. Slack:

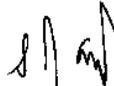
Enclosed is a Biological Assessment (BA) prepared by the U.S. Army Corps of Engineers (Corps), Jacksonville District, under Section 7 of the Endangered Species Act, as amended for the proposed L-40 Borrow Canal (L-40 BC) modifications to the C-51 West End Flood Control project. Modifications to L-40 BC include dredging to remove sediment, excavation for channel widener, construction of a berm, and removal of a submerged berm.

The U.S. Army Corps of Engineers has determined that the plan identified in the BA may have the following effects of federally listed species:

- May affect, but is not likely to adversely affect the endangered Everglade snail kite (*Rostrhamus socialbilis plumbeus*) and snail kite critical habitat;
- May affect, but is not likely to adversely affect the endangered wood stork (*Mycteria Americana*);
- May affect, but is not likely to adversely affect the threatened Eastern indigo snake (*Drymarchon corais couperi*);
- May affect, but is not likely to adversely affect the threatened bald eagle (*Haliaeetus leucocephalus*);
- May affect, but is not likely to adversely affect the endangered Florida panther (*Felis concolor coryi*).

We request your concurrence with our determination pursuant to ESA. If you have any questions concerning this project or our determination, please contact Ms. Carrie Bond at 904-232-1061.

Sincerely,

A handwritten signature in black ink, appearing to read 'SJA', is written over the typed name.

Stuart J. Appelbaum
Chief, Planning Division

Enclosure

**ENDANGERED SPECIES ACT
BIOLOGICAL ASSESSMENT
L-40 BORROW CANAL MODIFICATIONS TO C-51 WEST END FLOOD
CONTROL PROJECT
PALM BEACH COUNTY, FLORIDA**

1. PROJECT AUTHORITY: The C-51 West End Flood Control Project was authorized for Palm Beach County, Florida in Section 315 of the Water Resources Development Act (WRDA) of 1996. Authorized components of the C-51 West End Flood Control Plan included Stormwater Treatment Area 1 East (STA-1E) Works. Additional authorizations for C-51 improvements include the Flood Control Act of 1948 and 1962. Due to concerns about the potential impacts of STA-1E discharges to the L-40 Borrow Canal (L-40 BC) on the Loxahatchee Wildlife Refuge (LNWR or Refuge) and the possibility that pump station 362 (S-362) discharges will cause sediment to be dislodged from the bottom of L-40 BC and transported to the Refuge by any flow that exceeds the bank, modification of the L-40 BC is necessary to avoid potential impacts to the Refuge from STA-1E discharges. The L-40 BC modification project includes dredging to remove sediment, excavation for channel widener, construction of a berm, and removal of a submerged berm.

2. LOCATION: The L-40 BC runs between the northeastern part of the Refuge and the southwestern part of the STA-1E and is located on the east coast of Florida in Palm Beach County (see location map, *Figure 1*). Components of the project area are located within STA-1E, the L-40 BC, and the LNWR (*Figure 2*). The project footprint would include Levee 40 (L-40), L-40 BC, portions of the STA-1E, and marsh areas along the northeastern exterior of the LNWR (see *Figures 3 and 4*).

3. DESCRIPTION OF PROPOSED ACTION: The objective of the modification is to reduce the direct discharge from S-362 into the Refuge as well as remove sediment from a portion of the L-40 BC. The berm and widening modifications were designed to dramatically reduce flow penetrations into the Refuge from S-362. The dredging modification was designed to remove the sediment. (See proposed modifications drawing, *Figure 2*).

The L-40 BC will be dredged a total length of 13,500 feet (*Figure 3*). The bottom width of the canal will be 30 feet. The dredged elevation will vary between -4.0 feet and 1.5 feet. This dredging will consist of approximately 100,000 cubic yards of sediment. The dredged material will be dewatered in the designated area just east of the East Distribution Cell of STA-1E; material will also be disposed of in this location (*Figure 4*). The water resulting from the dewatering will then be pumped to the East Distribution Cell of STA-1E.

The canal widening will be approximately 2,700 feet in length (*Figure 3*). The bottom width of the widened portion of the canal will be 200 feet, for a distance of 900 feet. The canal will then taper to a width of 30 feet and excavated to elevation -2.5 feet. This excavation will consist of approximately 176,000 cubic yards of material. The excavated

material will be used to construct the berm. The excess excavated material will also be disposed of in the designated area between L-40 and the STA-1E Discharge Canal (*Figure 3*), which was previously used as a disposal site for STA-1E.

A berm will be constructed along the widened portion of the L-40 BC (*Figure 3*). It will be approximately 1,000 feet in length and 10 feet in height. The top width of the berm will be 30 feet, and the bottom width will be 90 feet. This construction will consist of approximately 25,000 cubic yards of material.

A submerged berm is located at the outfall of S-362. This will be excavated to the existing canal bottom elevation and disposed of in the designated disposal area for excavated material.

4. LISTED SPECIES WHICH MAY BE AFFECTED: Federally listed species which may occur in the vicinity of the proposed work and are under the jurisdiction of the U.S. Fish and Wildlife Service (FWS) are: the threatened bald eagle (*Haliaeetus leucocephalus*), threatened Eastern indigo snake (*Drymarchon corais couperi*), endangered Everglade snail kite (*Rostrhamus sociabilis plumbeus*) and snail kite critical habitat, endangered wood stork (*Mycteria americana*), and endangered Florida panther (*Felis concolor coryi*).

Bald Eagle

Bald eagles are considered common in South Florida and are known to breed throughout the state. Nest sites are usually located near large rivers, lakes, or estuaries where the eagle feeds primarily on fish and water-dependent birds. In Florida, overall bald eagle nesting has increased from a few hundred nesting territories in 1973 to 831 in 1995. Similar increases in nesting activity have been documented throughout the remainder of its range. Current threats to the bald eagle include: habitat fragmentation and loss, collisions with cars and power lines, and shooting. In recognition of increases in the eagle population, efforts are currently underway to reevaluate the management of bald eagles in the southeastern U.S. and to refine conservation recommendations to reduce eagle-human conflict (FWS 1999).

Bald eagles are considered a water-dependant species typically found near estuaries, large lakes, reservoirs, major rivers, and some seacoast habitats (FWS 2005). Their distribution is influenced by the availability of suitable nest and perch sites near large, open waterbodies, typically with high amounts of water-to-land edge. Throughout their range, bald eagles demonstrate a remarkable ability to tolerate perturbations to their habitat. Their adaptability to a variety of habitat conditions makes generalizations about habitat requirements and nesting behavior difficult. Though variable, eagles have basic habitat requirements that must be met in order to successfully reproduce and survive during the winter or non-nesting season.

U.S. Fish and Wildlife Service GIS database indicates that there are three documented bald eagle nests in the vicinity of STA 1 East and STA 1 West (*Table 1*). Bald Eagle nests PB010 and PB013 were active during the 2003 nesting season and nest PB005 has

been inactive since 1992 (FWS 2005). Eagle observations made by Service biologists in STA 1 East and STA 1 West are as follows.

- On March 11, 2005 in STA-1W, one juvenile eagle perched on top of telemetry/solar energy structure at the northwestern corner of cell 2.
- On March 31, 2005 in STA-1W, two adult eagles were observed foraging above cell 5B, STA-1W. Cell 5B water levels were very low and dry in some places. Both eagles landed on an elevated area inside the cell and were seen eating a fish.
- On May 10, 2005 in STA-1W, there was one juvenile eagle in cell 2 sitting on the ground.

Service biologists observed adult and juvenile eagle observations in STA-1E and STA-1W as recently as May 2005 (FWS 2005).

Table 1. Bald Eagle Sitings in Palm Beach County, Florida (FWS 2005).

| County | NestID | Longitude | Latitude | Township | Range | Section | Active Territory? | | | | | |
|------------|--------|-----------|----------|----------|-------|---------|-------------------|----|----|----|----|------|
| | | | | | | | 99 | 00 | 01 | 02 | 03 | Last |
| Palm Beach | PB005 | 80 12.00 | 26 34.50 | 45S | 42E | 06 | - | - | - | - | - | 1991 |
| Palm Beach | PB010 | 80 28.80 | 26 40.90 | 43S | 39E | 31 | N | Y | Y | Y | Y | 2003 |
| Palm Beach | PB013 | 80 15.70 | 26 36.90 | 44S | 41E | 28 | Y | Y | Y | Y | Y | 2003 |

Eastern Indigo Snake

The eastern indigo snake was listed as a threatened species as a result of dramatic population declines caused by over-collecting for the domestic and international pet trade as well as mortalities caused by rattlesnake collectors who gassed gopher tortoise burrows to collect snakes. Since its listing, habitat loss and fragmentation by residential and commercial expansion have become much more significant threats to the eastern indigo snake (FWS 1999).

Over most of its range, the eastern indigo snake frequents several habitat types, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats. Eastern indigo snakes need a mosaic of habitats to complete their annual cycle. Interspersion of tortoise-inhabited sandhills and wetlands improves habitat quality for this species (FWS 2005). In the milder climates of central and southern Florida, eastern indigo snakes exist in a more stable thermal environment, where availability of thermal refugia may not be as critical to the snake's survival. Throughout peninsular Florida, this species may be found in all terrestrial habitats which have not suffered high density urban development. They are especially common in the hydric hammocks throughout this region (FWS 2005). In central and coastal Florida, eastern indigos are mainly found within many of the State's high, sandy ridges. In extreme South Florida, these snakes are typically found in pine flatwoods, pine rocklands, tropical hardwood hammocks, and in most other undeveloped areas (FWS 2005). Eastern indigo snakes also use some agricultural lands (e.g., citrus) and various types of wetlands (FWS 2005).

Based on Service records, the endangered eastern indigo snake may be present within and adjacent to the proposed project boundaries. The eastern indigo snake was listed as a threatened species in January 1978. No critical habitat has been designated for this species (FWS 2005).

Everglade Snail Kite

The Florida population of snail kites is considered to be a single population with considerable distributional shifts. The combination of a range restricted to the watersheds of the Everglades, Lakes Okeechobee and Kissimmee, and the Upper St. Johns River, with a highly specific diet composed almost entirely of apple snails (*Pomacea paludosa*), makes the snail kite's survival directly dependent on the hydrology and water quality of these watersheds. Each of these watersheds has experienced, and continues to experience, pervasive degradation due to urban development and agricultural activities (FWS 1999).

Snail kite habitat consists of freshwater marshes and the shallow vegetated edges of lakes (natural and man-made) where apple snails can be found. These habitats occur in humid, tropical ecoregions of peninsular Florida and are characterized as palustrine-emergent, long-hydroperiod wetlands often on an organic peat substrate overlying oolitic limestone or sand or directly on limestone or marl (FWS 2005).

Everglade snail kites have nested in the northeastern region of the LNWR, but not in recent years. From 1998 to 2002, snail kite nests were located along the Refuge at points 98-10, 98-12, 98-15, 98-14, 98-1, 98-11, 98-8, 98-9, 98-3, 98-2, 98-4, 98-5, 98-6, 98-13, and 98-7 along the northeastern, eastern, and western parts (see nest map, **Figure 5**).

Everglade Snail Kite Critical Habitat

Critical habitat was designated for the snail kite in 1977 and, since then, has not been revised. Critical habitat includes the Arthur R. Marshall Loxahatchee NWR, WCA 2, portions of WCA 3, portions of Everglades NP, western portions of Lake Okeechobee, the Strazzulla and Cloud Lake reservoirs in St. Lucie County, and portions of the St. Johns Marsh in Indian River County. A complete description of the critical habitat is available in 50 CFR 17.95. Although snail kites have nested in several lakes (particularly East Lake Tohopekaliga, Lake Tohopekaliga, and Lake Kissimmee) in the headwaters of the Kissimmee River since the early 1980s, at the time of designation of critical habitat, potential habitat around these lakes was used only sporadically by snail kites, and was not included in the critical habitat (FWS 1999).

Wood Stork

In South Florida, breeding colonies of the wood stork occur in Broward, Charlotte, Collier, Miami-Dade, Hardee, Indian River, Lee, Monroe, Osceola, Palm Beach, Polk, St. Lucie, and Sarasota counties. Wood storks have also nested in Martin County, and at one time or another, in every county in South Florida. It is believed that storks nesting in north Florida, Georgia, and South Carolina move south during the winter months (December through February). The number of storks feeding in the three WCAs of the central and northern Everglades varied greatly among winters, ranging from a low of

1,233 birds in a high-water year to 7,874 birds in a low-water year (FWS 2005). In most of the study years, 1985 to 1989, the total number of storks in the WCAs increased substantially between December and January, and dropped off sharply after March. In some years, the inland marshes of the Everglades have supported the majority (55 percent) of the U.S. population of wood storks (FWS 1997).

The wood stork is primarily associated with freshwater and estuarine habitats 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 (FWS 2005). During the nonbreeding season, or while foraging, 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 or agricultural ditches, narrow tidal creeks or 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 (FWS 2005). In South Florida, low, dry-season water levels are often necessary to concentrate fish to densities suitable for effective foraging by wood storks (FWS 2005). As a result, wood storks will forage in many different shallow wetland depressions where fish become concentrated, either due to local reproduction by fishes, or as a consequence of seasonal drying.

The loss or degradation of wetlands in central and South Florida is one of the principal threats to the wood stork. Nearly half of the Everglades has been drained for agriculture and urban development (FWS 2005). The Everglades Agricultural Area (EAA) alone eliminated 802,900 hectares of the original Everglades, and the urban areas in Miami-Dade, Broward, and Palm Beach counties have contributed to the loss of spatial extent of wood stork habitat. Everglades NP has preserved only about one-fifth of the original extent of the Everglades, and areas of remaining marsh outside of the Everglades NP have been dissected into impoundments of varying depths.

From 1990 to 2001, wood stork nests were sited in the Refuge at points 01-16 and 90-8 along the eastern and southwestern parts (see nest map, **Figure 5**). The Service's GIS database records also identified two wood stork nest colonies within the LNWR during 2003 and 2004 in two locations on the eastern edge of the LNWR. The L-40 Borrow Canal and STA-1E are within the Core Foraging Area of these wood stork nesting colonies.

Florida Panther

The Florida panther (*Felis concolor coryi*), a subspecies of mountain lion (Puma [=Felis] concolor), is one of the most endangered large mammals in the world. They prefer native, upland forests, especially hardwood hammocks and pine flatwoods, over wetlands and disturbed habitats (FWS 1999). The most recent population estimate for the Florida panther is a total of 78 individuals, not including denning kittens (McBride 2001). This small population in south Florida represents the only known remaining wild population of an animal that once ranged throughout most of the southeastern United States from Arkansas and Louisiana eastward across Mississippi, Alabama, Georgia, Florida, and

parts of South Carolina and Tennessee. The panther presently occupies one of the least developed areas in the eastern United States; a contiguous system of large private ranches and public conservation lands in Broward, Collier, Glades, Hendry, Lee, Miami-Dade, Monroe, and Palm Beach counties totaling more than 809,400 ha. The project area is within the boundary of the Panther Core Area, as described in the Service's Comprehensive Everglades Restoration Plan (CERP) Initial CERP Update (ICU) Planning Aid Report, dated February 27, 2004, and depicted in Figure 1 of the CERP Landscape Level Project Planning/Siting Map for Panther Conservation (FWS 2004). The footprint of the C-51 West End Flood Control Project falls within the areas labeled "Conservation Lands and Other Zone" of this map.

Panthers are rarely located east of Lake Okeechobee in Palm Beach County and the closest telemetry points are located to the west of Water Conservation Area (WCA) 2A. The project location is separated from the panther consultation area by the WCAs. The L-40 Project is within the Comprehensive Everglades Restoration Plan (CERP) Landscape Level Project Planning Siting Map for Panther Conservation (FWS 2004).

The L-40 levee may also fragment habitat that could be used by the panther in Palm Beach County. The Florida panther was historically observed near the LNWR and was assumed to forage in the vicinity. In more recent years, there have been no confirmed sightings although panthers could potentially range along levees near the LNWR. No foraging or breeding activities are expected in the area.

5. DISCUSSION OF POTENTIAL IMPACTS TO LISTED SPECIES: The L-40 BC project would potentially affect approximately 37 acres of wetlands. The widening would convert 7 acres of nuisance mixed herbaceous marsh into open water. The widening therefore would lose 7 acres of wetland. The berm would convert 2 acres of nuisance mixed herbaceous marsh into upland. The construction easement would impact 5 acres of wetland. The berm plus the construction easement would lose 7 acres of wetland. The disposal of excavated material would convert 23 acres of disturbed wetland into an upland disposal pile. Therefore the excavated material disposal site would lose 23 acres of wetland. The combined effects of the berm, widening, and use of the excavated material disposal site comes to a total of 37 acres of wetlands impacted by the L-40 BC project, which could also impact listed species that may utilize the wetland habitat.

Bald Eagle

The threatened bald eagle is known to nest within and adjacent to the project boundaries. Bald Eagle nests PB010 and PB013 were active during the 2003 nesting season and nest PB 005 has been inactive since 1992. Bald eagle nesting season in the southeastern United States is from October 1 to May 15; construction activities planned between May 16 and September 30 outside the primary and secondary zones of nests should pose minimal risk to the bald eagle. The L-40 BC project could reduce impacts to bald eagle foraging habitat by decreasing the frequency of 0.075 fps or greater water velocities and removal of 100,000 cy of phosphorus and potentially contaminated sediments from possible migration into LNWR, which should benefit this species. Noise and nighttime

lighting associated with construction activities could alter foraging patterns of resident eagles using water bodies in the vicinity. It is likely, however, that bald eagles could become conditioned to ambient noise present during operations. Based on the above, the U.S. Army Corps of Engineers (Corps) has made a determination that the proposed action may affect, but is unlikely to adversely affect, the bald eagle.

Eastern Indigo Snake

Widening of the L-40 BC with the construction of the berm could result in a 14-acre loss of nuisance mixed herbaceous shrub swamp, which is only marginal foraging habitat for the indigo snake. The 23 acres of disturbed wetlands that would be impacted as a disposal area could be used as foraging habitat but would provide only marginal to poor quality habitat for the indigo snake. Temporary impacts, including displacement of individual indigo snakes, may occur during construction. With construction of additional access roads for maintenance or recreational access, additional effects to the eastern indigo snake could occur through road mortality. However, construction of the 1,000-foot berm may provide additional upland habitat for the foraging indigo snakes. Standard indigo snake precautions will be included in project specifications for the proposed project. In consideration of these specifications and the additional upland (berm) habitat the project will create, the Corps has determined that the project may affect, but is unlikely to adversely affect, the Eastern indigo snake.

Everglade Snail Kite

Everglade snail kite use of the site may likely be directly or indirectly impacted by the proposed project. Construction activities associated with the L-40 BC project might affect Everglade snail kite nesting and forage areas. Snail kites have nested during some years in LNWR. However, they have not nested during the past two years. The edges of the Refuge are relatively marginal snail kite habitat due to the presence of undesirable invasive species growing densely. The loss of 14 acres of nuisance mixed herbaceous shrub swamp, which is marginal foraging habitat for the snail kite, could occur as a result of the berm construction and widening portion of the L-40 BC. The 23 acres of disturbed wetlands that would be impacted as a disposal area could be used as foraging habitat but would provide only marginal to poor quality habitat for the snail kite. However, it is also believed that Everglade snail kite foraging habitat may benefit from the L-40 BC project by reducing impacts related to deep penetration of the S-362 discharge into the Refuge interior. Dredging and removal of 100,000 cy of phosphorus and potentially contaminated sediments will further reduce future nutrient loads in waters overflowing into the Refuge, and inhibit the further spread of invasive species. The Corps has determined that the proposed project, L-40 BC modifications, may affect but is unlikely to adversely affect, the Everglade snail kite.

Everglade Snail Kite Critical Habitat

The LNWR is designated as snail kite critical habitat. The loss of 14 acres of marginal foraging habitat within this designated Everglade snail kite critical habitat could occur as a result of the berm construction and widening portion of the L-40 BC. The 14 acres consist of nuisance mixed herbaceous shrub swamp. However, it is also believed that Everglade snail kite critical habitat may benefit from the L-40 BC project by reducing

impacts related to deep penetration of the S-362 discharge into the Refuge interior. The Corps has determined that the proposed project, L-40 BC modifications, may affect but is unlikely to adversely affect, Everglade snail kite critical habitat.

Wood Stork

The berm and widening part of the project could result in the loss of 14 acres of nuisance mixed herbaceous shrub swamp, which is only marginal foraging habitat for the wood stork. The 23 acres of disturbed wetlands that would be impacted as a disposal area could be used as foraging habitat but would provide only marginal to poor quality habitat for the wood stork. However, it is also believed that the wood stork may benefit from the L-40 BC project because of blockage, by the berm, of high velocity discharges into the Refuge and removal of 100,000 cy of phosphorus and potentially contaminated sediments from the L-40 BC. Since the inner Refuge will be better protected from further invasive plant spread after the project is constructed, the Corps has determined that the project may affect, but is unlikely to adversely affect, the wood stork.

Florida Panther

The benefits to LNWR are expected to include reduction in the spread of invasive plant communities. These communities are of minimal habitat value for panther prey species, and therefore not attractive to panthers. Although prey habitat quality in the inner Refuge lands should be preserved, no panther foraging or breeding activities are expected in the area. The Corps has determined that the project may affect, but is unlikely to adversely affect, the Florida panther.

6. EFFORTS TO ELIMINATE POTENTIAL IMPACTS ON LISTED SPECIES:

Potential negative impacts on the species will be avoided or minimized through the implementation of the following measures:

1. The Corps would coordinate with the appropriate agencies in the event that colonial or solitary bird nests are observed within the construction footprint. A bird observer is a requirement throughout construction. This observer would also be required to note any incipient snail kite activity in the project footprint.
2. A water quality monitoring plan will be implemented until it is determined that no contaminants are found in the water column.
3. The filtered water discharging into the East Distribution Cell will be sampled weekly, unless it is determined that no contaminants are present.
4. Habitat management guidelines for the wood stork in the Southeast will be included in the construction plans and specifications.
5. Habitat management guidelines for the bald eagle in the Southeast will be included in the construction plans and specifications. In

addition, surveys for bald eagles will be conducted prior to construction.

6. Habitat management guidelines for the Eastern indigo snake will be included in the construction plans and specifications.

7. EFFECT DETERMINATION: Because of the nature of the work and the precautions to be taken as described in the previous section, the Corps has determined that the proposed action may affect but is not likely to adversely affect the bald eagle, Eastern indigo snake, Florida panther, Everglade snail kite and snail kite critical habitat, and wood stork.

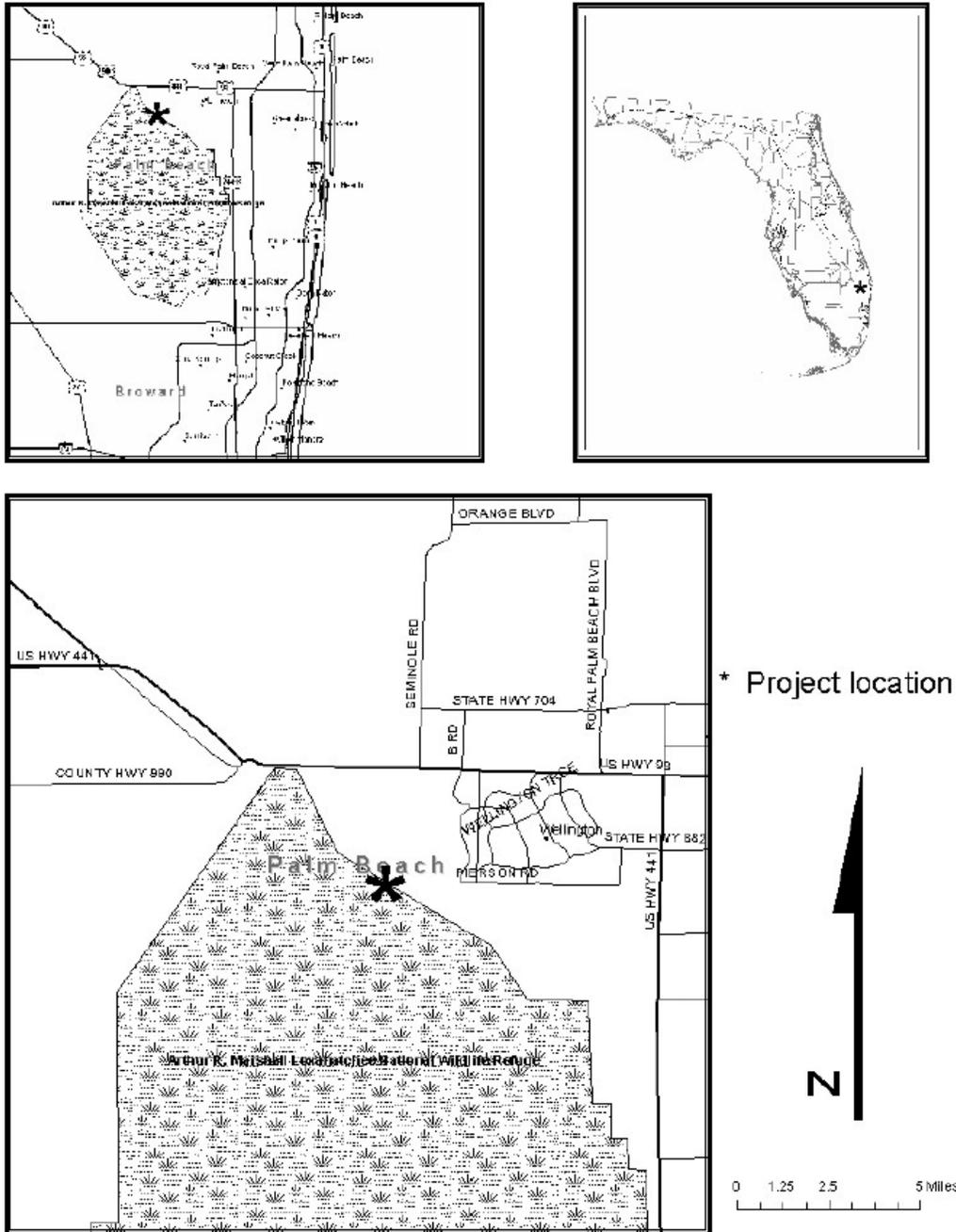


Figure 1. Project location in Palm Beach County, Florida.

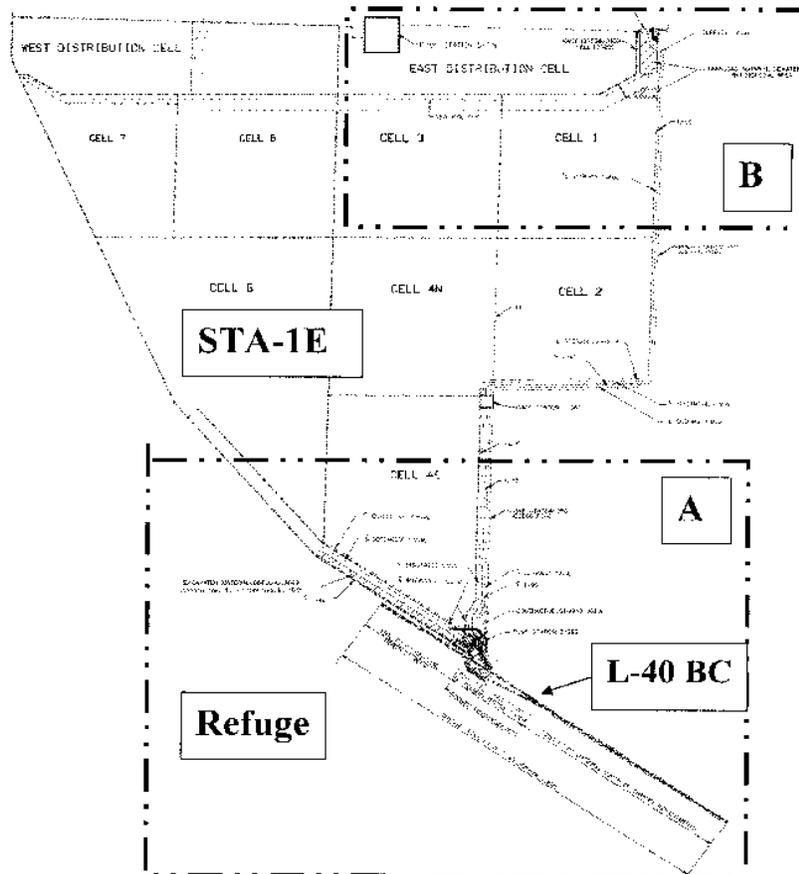


Figure 2. L-40 Borrow Canal Modifications project area, including STA-1E, L-40 BC, and Refuge (labeled on map). Part A is enlarged in *Figure 3* and Part B is enlarged in *Figure 4*.

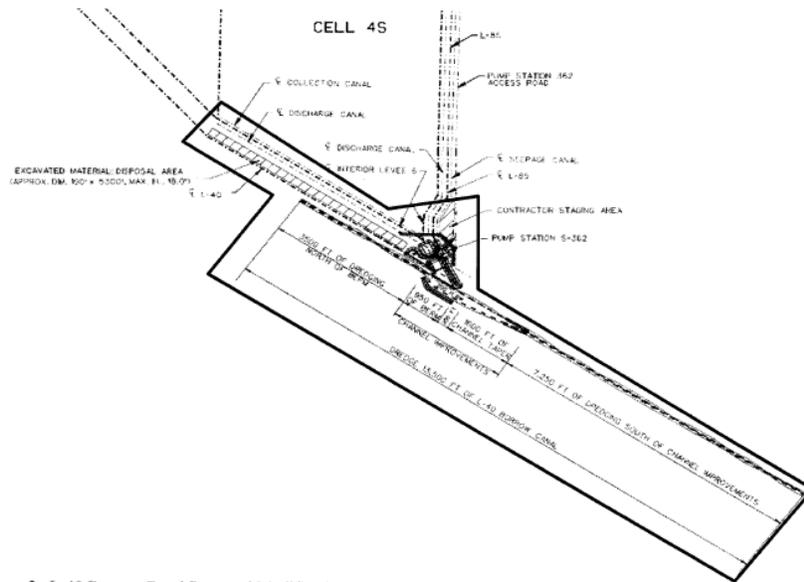


Figure 3. L-40 Borrow Canal Proposed Modifications (dredging, widening, excavated material disposal area, and berm construction only; see *Figure 4* for dredged disposal area) at vicinity of Pump Station 362.

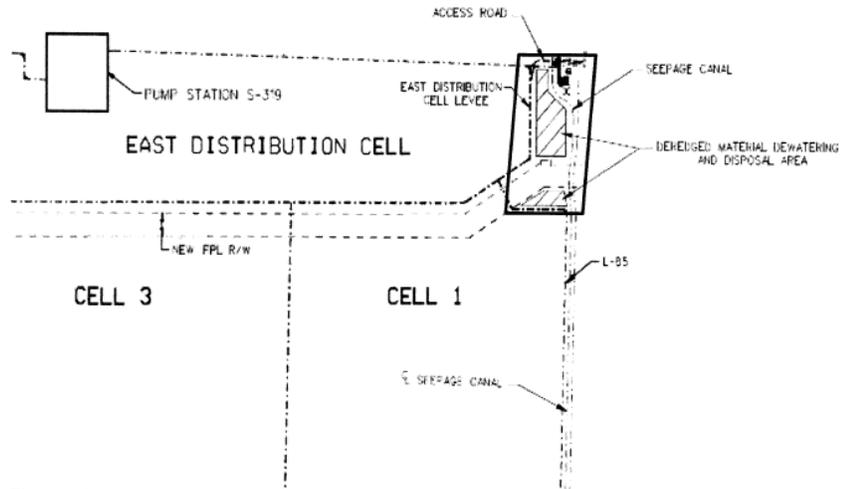


Figure 4. L-40 Borrow Canal Proposed Modifications (dredged disposal area only; see *Figure 3* for dredging, widening, excavated material disposal area, and berm construction) at vicinity of east of the East Distribution Cell in STA-1E.

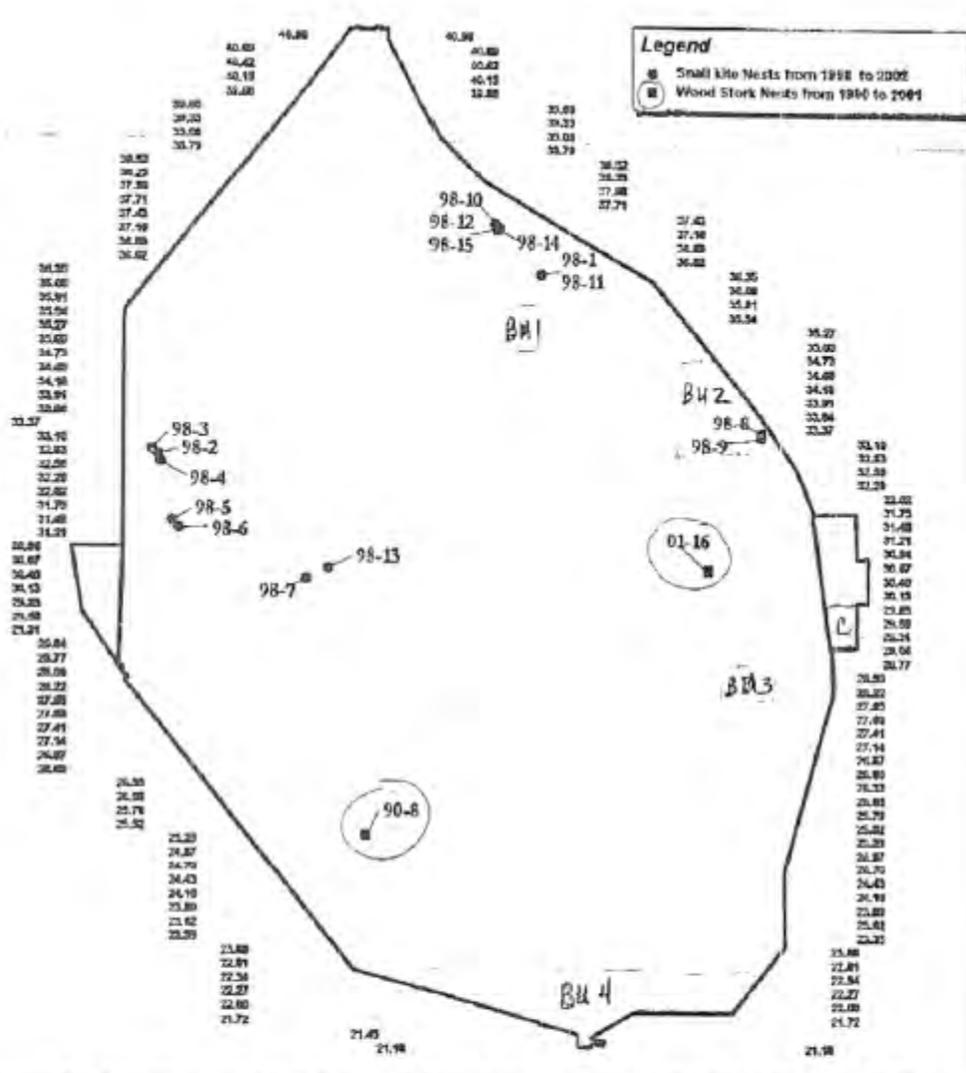


Figure 5. Locations of Snail Kite and Wood Stork Nests in the LNW from 1995 to 2002.

REFERENCES

- U.S. Fish and Wildlife Service (FWS). 1997. Revised recovery plan for the U.S. breeding population of the wood stork. U.S. Fish and Wildlife Service; Atlanta, Georgia.
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December 16, 2005

Colonel Robert M. Carpenter
District Engineer
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701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207-8175

Service Log No.: 4-1-06-CERP-13796
Dated: October 27, 2005
Project: L-40 Borrow Canal Modifications
County: Palm Beach

Dear Colonel Carpenter:

This letter responds to your request dated October 27, 2005, for concurrence under section 7 of the Endangered Species Act of 1973, as amended (ESA) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). Your letter included a biological assessment prepared by the U.S. Army Corps of Engineers (Corps) for the L-40 Borrow Canal Modifications Project. The Fish and Wildlife Service (Service) has reviewed the information presented.

PROJECT DESCRIPTION

The proposed L-40 Borrow Canal Modifications Project is a component of the C-51 West End Flood Control Project (C-51 Project) included in the Central and Southern Florida Project (Corps 1999). The L-40 Project, located on the northeast boundary of the Arthur R. Marshall Loxahatchee National Wildlife Refuge (LNWR) Sections 23 and 24, Township 44 South, Range 40 East in southern Palm Beach County, Florida (Figure 1), was proposed to amend impacts of Stormwater Treatment Area (STA) 1E discharges via the L-40 Borrow Canal into LNWR. Staff of the LNWR expressed concerns that S-362 pump station (S-362) discharges could dislodge organic sediments (muck) from the L-40 Borrow Canal bottom and that flows exceeding the canal banks could transport muck into the LNWR. The migration of muck could potentially impact LNWR water quality and wildlife habitat in the vicinity of S-362. The Corps performed an analysis in response to Service concerns, concluding the L-40 Borrow Canal is unable to contain S-362 flows within its banks under certain flow conditions and prevent overflow into the LNWR. The results of the analysis indicated modifications to the L-40 Borrow Canal were warranted.



The objective of the modification is to reduce the direct discharge from S-362 into the LNWR as well as remove sediment from a portion of the L-40 Borrow Canal. The berm and widening modifications are designed to reduce flow penetrations into the LNWR from S-362. The dredging modification is designed to remove the sediment.

The L-40 Borrow Canal will be dredged a total length of 13,500 feet. The bottom width of the canal will be 30 feet. The dredged elevation will range from -4.0 feet to 1.5 feet. This dredging will consist of approximately 100,000 cubic yards of sediment. The dredged material will be dewatered and disposed of in a designated area just east of the East Distribution Cell of STA-1E. The water resulting from the dewatering will then be pumped to the East Distribution Cell of STA-1E.

The canal widening will be approximately 2,700 feet in length. The bottom width of the widened portion of the canal will be 200 feet, for a distance of 900 feet. The canal will then taper to a width of 30 feet and excavated to elevation -2.5 feet. This excavation will consist of approximately 176,000 cubic yards of material. The excavated material will be used to construct the berm. The excess excavated material will also be disposed of in the designated area between L-40 and the STA-1E Discharge Canal.

A berm will be constructed along the widened portion of the L-40 Borrow Canal. It will be approximately 1,000 feet in length and 10 feet in height. The top width of the berm will be 30 feet, and the bottom width will be 90 feet. This construction will yield approximately 25,000 cubic yards of material.

A submerged berm is located at the outfall of S-362. This will be excavated to the existing canal bottom elevation and disposed of in the designated disposal area for excavated material.

AREA SETTING

A Wetland Rapid Assessment Procedure (WRAP) analysis conducted on July 22, 2005, documented that 7 acres of willow (*Salix caroliniana*) and 3 acres of cattail (*Typha* spp.) currently occur on the proposed project construction footprint within the LNWR. This wetland system, totaling 10 acres, is considered jurisdictional wetlands by the Corps' Regulatory Division. The L-40 Borrow Canal adjacent to the site is free of floating vegetation and the banks are vegetated with a fringe of phragmites (*Phragmites australis*) approximate 20-feet wide, for its entire length of the within the project area. Wetland consists of cattail, willow, wax myrtle (*Myrica cerifera*), bay trees (*Persea* spp.), alligator weed (*Alternanthera philoxeroides*), fire flag (*Thalia geniculata*), duck weed (*Lemna* spp.) and white twinevine (*Sarcostemma clausum*). Standing water was observed throughout the area.

In addition, a WRAP was conducted on November 9, 2005, on wetland habitats located outside, but adjacent to the LNWR (between the L-40 Borrow Canal and an interior canal of STA-1E). These wetlands are approximately 1 mile long and 200-feet wide, consisting of a mosaic of ponds and emergent wetlands interspersed with upland areas. The ponded areas have been

invaded by melaleuca (*Melaleuca quinquenervia*), which have been recently treated. This wetland is a mosaic of habitat dominated by willow, sawgrass (*Cladium jamaicense*), open water marsh, cattail, phragmites, and torpedo grass (*Panicum repens*). These wetlands are to be filled with excess dredge material from the L-40 Borrow Canal widening and berm construction that will occur within the LNWR. Wildlife species that may use the area, or have been observed on-site, include wading birds and waterbirds, including anhinga (*Anhinga anhinga*), limpkin (*Aramus guarana*), great blue heron (*Ardea herodias*), great egret (*Ardea alba*), tricolored heron (*Ardea tricolor*), white ibis (*Eudocimus albus*), and green heron (*Butorides striatus*), as well as other non-wading birds. Amphibians such as green tree frogs (*Hyla cinerea*), squirrel tree frogs (*H. squirella*), pig frogs (*Rana grylio*), southern leopard frogs (*Rutricularia*), legless sirens (*Siren lacertina*), and amphiuma salamanders (*Amphiuma means*) are also likely inhabitants of areas that remain wet for most of the year. Other herpetofauna including the swamp snake (*Seminatrix* spp.), water snake (*Nerodia* spp.), cottonmouth (*Agkistrodon piscivorus*), red bellied turtle (*Pseudemys nelsonii*), and mud turtle (*Kinosternon subrubrum*) may be present.

Based on recent information from the Corps, the proposed L-40 Project will eliminate 31 acres of wetlands (10 acres within the LNWR and 21 acres outside the LNWR). Adjacent to the LNWR approximately 21 acres of marsh and shrub wetlands will be filled between the L-40 Borrow Canal and an interior canal of STA-1E.

THREATENED AND ENDANGERED SPECIES

Your October 27, 2005, letter provided determinations that the L-40 Project "may affect, but is not likely to adversely affect" the federally endangered wood stork (*Mycteria americana*), endangered Everglade snail kite (*Rostrhamus sociabilis plumbeus*) and Everglade snail kite designated critical habitat, endangered Florida panther (*Puma [=Felis] concolor coryi*), threatened bald eagle (*Haliaeetus leucocephalus*), and threatened eastern indigo snake (*Drymarchon corais couperi*).

On September 1, 2005, the Service provided a draft Fish and Wildlife Coordination Act (FWCA) report in accordance with the FWCA of 1958, as amended (48 Stat. 401; 16 U.S.C. 661 *et seq.*). This draft FWCA report contained information on the potential effects of the L-40 Project on listed species. The Corps used this and other available information to perform its analysis of the effects of the L-40 Project on federally listed threatened and endangered species.

Following is a summary of the potential effects construction of the proposed project may have on threatened or endangered species potentially present in the project area and designated Everglade snail kite critical habitat.

Bald eagle

The bald eagle is protected under the ESA, the Bald and Golden Eagle Protection Act (16 U.S.C. § 668 *et seq.*), and Migratory Bird Treaty Act (40 Stat. 755; 16 U.S.C. § 701 *et seq.*). The Service consulted the Florida Fish and Wildlife Conservation Commission's bald eagle nest site locator (<http://wld.fwc.state.fl.us/eagle/caglenests/Default.asp>). A search in Palm Beach

County indicated no known nest locations are present in the vicinity of the L-40 Project. All known nest locations in Palm Beach County are a minimum of 4 miles from the site (Figure 2). The proposed L-40 Project also does not have large trees capable of holding bald eagle nests and no evidence of bald eagle nests in man-made structures was identified during site visits. This information indicates disturbance during construction and operation of the L-40 Project to nesting eagles is unlikely.

Although no active or inactive bald eagle nest sites are located in proximity to the proposed project, the nearest nests are located approximately 4.25 miles (last active in 2003), 8.75 miles (last active in 1991), and 10.1 miles (last active in 2003). The Corps has indicated that they will implement the *Habitat Management Guidelines for the Bald Eagle in the Southeast Region* (Service 1987). Bald eagle nesting season in the southeastern United States is from October 1 to May 15. Based on this information, the Corps has determined the proposed project "may affect but is not likely to adversely affect" the bald eagle. The Service concurs with this determination.

Everglade snail kite

The proposed L-40 Project is located within the LNWR in a portion of designated Everglade snail kite critical habitat (Figure 3). The Service's GIS database records inclusive to 2003 identified two nest sites; 0.75 mile and 0.87 mile from the project area in 1998. No known nesting locations are presently documented within the project. However, Everglade snail kites will likely forage where appropriate perching habitat and apple snails (*Rostrhamus sociabilis*) are found. Both native and exotic apple snails are consumed by Everglade snail kites. Everglade snail kite foraging habitat is present though considered insignificant due to the dense cattail coverage and lack of open-water areas.

Construction activities associated with the project may disturb Everglade snail kites in adjacent natural areas. The extent of disturbance would be dictated by the timing and duration of construction. Information on timing of construction is unavailable at this time. The Service is available to review the construction schedule, when established, to ensure potential Everglade snail kites nesting in the vicinity, are not at risk.

The principal threat to the Everglade snail kite is the loss or degradation of wetlands in central and south Florida. Nearly half of the Everglades have been drained for agriculture and urban development (Davis and Ogden 1994). This drainage has disrupted natural hydropatterns within the area, thereby, requiring water management to maintain favorable habitat conditions that are considered necessary to ensure the species survival.

Also of importance is the degradation of water quality, particularly runoff of phosphorus from agricultural and urban sources. The Everglades was historically an oligotrophic system, but major portions have become eutrophic, primarily due to anthropogenic sources of phosphorus and nitrogen. This degradation of water quality promotes dense growth of exotic and invasive native plants, particularly, cattail, water lettuce (*Pistia stratiotes*), water hyacinth (*Eichhornia crassipes*), and hydrilla (*Hydrilla verticillata*). Dense growth of these plants reduces the ability of snail kites to locate apple snails.

The Corps should perform pre-construction surveys for the L-40 Project for the Everglade snail kite. These surveys will allow the Service to ensure construction activities do not occur in proximity to nesting Everglade snail kites and, therefore, will not disturb them. Based on this information, the Corps has determined the proposed project "may affect but is not likely to adversely affect" this species. The Service concurs with this determination.

Everglade snail kite designated critical habitat

Critical habitat was designated for the snail kite in 1977 and has not been revised. Critical habitat includes LNWR. A complete description of the critical habitat is available in 50 CFR §17.95. Although the critical habitat was designated for the Everglade snail kite, the primary constituent elements (such as: nesting, foraging, space [size], roosting and perching) of Everglade snail kite designated critical habitat were not defined or described. The Service will attempt to describe them in this letter.

Nesting

Nesting almost always occurs over water, which deters predation (Sykes 1987). Nesting substrates include small trees (usually less than 10 meters in height), including willow, bald cypress (*Taxodium distichum*), pond cypress (*Taxodium ascendens*), melaleuca, sweetbay (*Magnolia virginiana*), swamp bay (*Persea borbonia*), pond apple (*Ammonia glabra*) and dahoon holly (*Ilex cassine*). Shrubs used for nesting include wax myrtle, cocoplum (*Chrysobalanus icaco*), buttonbush (*Cephalanthus occidentalis*), sesbania (*Sesbania* spp.), elderberry (*Sambucus simpsonii*), and Brazilian pepper (*Schinus terebinthifolius*). Nesting also can occur in herbaceous vegetation, such as sawgrass, cattail, bulrush (*Scirpus* spp.), and reed (*Phragmites australis*) (Sykes et al. 1995).

An important feature for snail kite nesting habitat is the proximity of suitable nesting sites to foraging areas. Thus, extensive stands of contiguous woody vegetation are generally unsuitable for nesting.

Foraging

Suitable foraging habitat for the Everglade snail kite is typically a combination of low profile (less than 3 meters) marsh with an interdigitated matrix of shallow (0.2 to 1.3 meters deep) open water, which is relatively clear and calm. Marsh vegetation is dominated by spike rush (*Eleocharis cellulosa*), maidencane (*Panicum hemitomon*), sawgrass, and/or cattails. The shallow open-water areas are with or without sparse vegetation, such as white water lily (*Nymphaea odorata*), arrowhead (*Sagittaria lancifolia*), pickerel weed (*Pontederia lanceolata*), and floating heart (*Nymphoides aquatica*). Giant bulrush (*Scirpus validus*) is common at the deep-water edge of marshes in the lakes. Low trees and shrubs also are often interspersed with the marsh and open water. These often include willow, dahoon holly, pond apple, bald cypress, pond cypress, wax myrtle, buttonbush, and melaleuca, an invasive exotic species.

The Everglade snail kite requires foraging areas that are relatively clear and open in order to visually search for apple snails. Therefore, dense growth of herbaceous or woody vegetation is not conducive to efficient snail kite foraging or for apple snails.

Roosting

Roosting sites are also almost always located over water. On average, in Florida, 91.6 percent are located in willows, 5.6 percent in melaleuca, and 2.8 percent in pond cypress. Roost sites tend to be located in the taller vegetation among low-profile marshes. Snail kites typically roost around small openings in willow stands at a height of 1.8 to 6.1 meters, in stand sizes of 0.02 to 5 hectares. Roosting also has been observed in melaleuca or pond cypress for stands with tree heights of 4 to 12 meters (Sykes 1985).

The L-40 Project could directly affect foraging habitat for the Everglade snail kite and Everglade snail kite designated critical habitat in a positive manner. The anticipated benefits from the construction of the L-40 Project are the removal of phosphorus-laden and potentially contaminated sediments from being potentially transported into the LNWR into areas that have already shifted from native plant communities to ones that consist of monocultures of cattail and willow. It is expected that approximately 134 acres of degraded habitat may be protected from further degradation.

The L-40 Project will directly impact approximately 10 acres of willow and cattail wetlands within the LNWR. These species have proliferated within the project area and vicinity because of increased phosphorus levels from S-362 discharges. These species are considered nuisance species within the Everglades system due to their rapid and dense growth that allows them to out compete and dominate other native species that characterize the Everglades natural plant communities.

Although the L-40 Project will remove approximately 10 acres of willow and cattail wetlands within designated critical habitat for the Everglade snail kite, approximately 134 acres of marsh will be protected from further degradation, resulting in a net benefit to designated critical habitat. The size of the removal area is negligible (0.00002 percent of total area designated as critical habitat), and the habitat loss is unlikely to appreciably diminish or preclude the role of critical habitat in the survival and recovery of the species. The Corps made a determination of "may affect but is not likely to adversely affect" Everglade snail kite designated critical habitat. However, the Corps recognizes that the intended language for the L-40 Project is "will not adversely modify Everglade snail kite designated critical habitat" (Carrie Bond, Corps, Telephone communication, November 28, 2005). The Service concurs with the determination that the L-40 Project "will not adversely modify Everglade snail kite designated critical habitat".

Wood stork

The Service's Geographic Information System database records identified two active wood stork colonies within the LNWR during 2003 and 2004 breeding season on the eastern edge of the LNWR. These nest colonies are approximately 7.1 and 7.2 miles from the project location,

placing them within the Core Foraging Area (18.6 miles) for wood storks (Figure 4). The proposed L-40 Project location currently provides little opportunities for wood stork foraging. The wetlands present are degraded and contain nuisance and exotic vegetation; however, the canal widening and berm construction will eliminate wood stork use of those wetlands in the future. A loss of 10 acres of poor quality foraging habitat (willow and cattail wetlands) will result from the dredge and fill-related construction.

In addition to the direct habitat conversion, prolonged construction may disturb the foraging patterns of nesting wood storks in LNWR. The Corps will implement the roosting, feeding, and nesting restrictions in the *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (Guidelines) (Ogden 1990) to minimize the potential effects of the proposed project on this species. The Guidelines implemented will depend on timing of construction (*i.e.*, nesting season Guidelines would not be necessary if construction takes place outside the nesting season). Based on the commitment to implement these Guidelines, the Corps has determined the proposed project "may affect but is not likely to adversely affect" this species. The Service concurs with this determination.

Florida panther

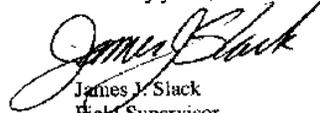
The Florida panther occurs in most of the counties in central and south Florida. Florida panthers are rarely located east of Lake Okeechobee in Palm Beach County and the closest telemetry points are located to the west of Water Conservation Area 2A. The Florida panther was historically observed near the LNWR and was assumed to forage in the vicinity. There have been no confirmed sightings in recent years although panthers could potentially range along levees near the LNWR. Florida panthers are not known to inhabit the area because of habitat degradation due to altered hydrologic conditions. The L-40 Project is outside the panther consultation area (Figure 5) (Service 2000). The L-40 Project will benefit the LNWR through a reduction of impacts to habitat for Florida panther prey species decreasing the rate of cattail expansion. The Corps has determined the proposed project "may affect but is not likely to adversely affect" the Florida panther. The Service concurs with this determination.

Eastern indigo snake

Eastern indigo snakes use a mosaic of upland and wetland habitats. Approximately 31 acres of the L-40 Project footprint could be considered suitable eastern indigo snake habitat. Conversion of the existing wetlands to open water habitat would result in a loss of habitat for the eastern indigo snake. However, construction of the proposed L-40 Project will also result in removal of nuisance vegetation and the berm could provide habitat for eastern indigo snakes after completion of construction. The Corps has also agreed to implement the Service's *Draft Eastern Indigo Snake Standard Protection Measures* (Service 2002). Based on this information, the Corps has determined the proposed project "may affect but is not likely to adversely affect" the eastern indigo snake. The Service concurs with this determination.

If modifications are made to the project, additional information involving potential effects to listed species becomes available, or if a new species is listed, reinitiation of consultation may be necessary. If you have any questions regarding this letter, please contact Steve Mortellaro at 772-562-3909, extension 322.

Sincerely yours,



James V. Slack
Field Supervisor
South Florida Ecological Services Office

cc:

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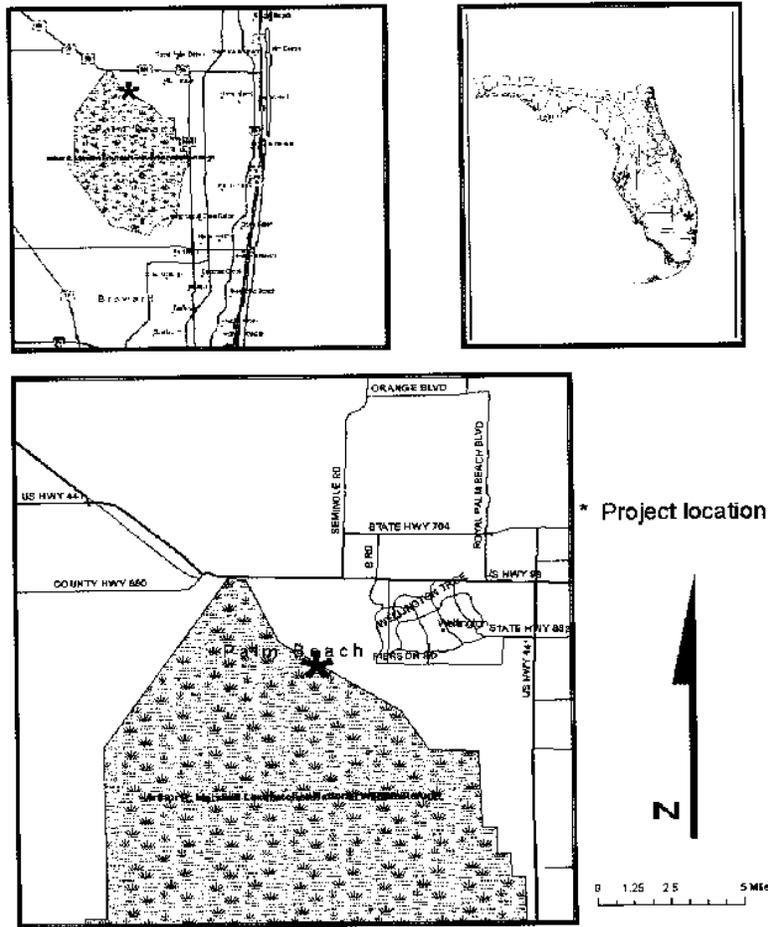


Figure 1. Location of L-40 Project.



Figure 2. L-40 Project site and bald eagle nest locations. Bald eagle nests PB010 and PB013 were active during the 2003 nesting season and nest PB005 has been inactive since 1992.

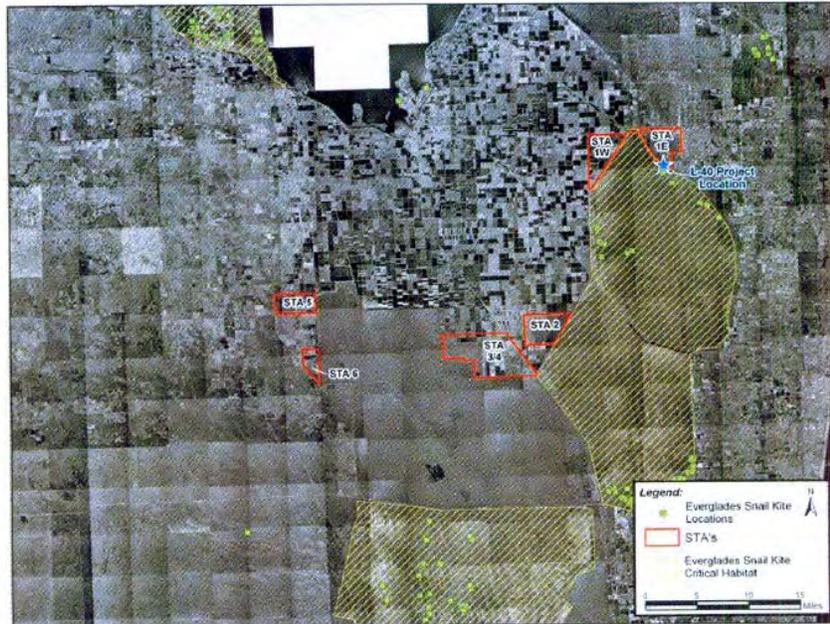


Figure 3. L-40 Project site and Everglade snail kite nest locations and designated critical habitat. Everglade snail kites have nested in the northeastern region of the LNWR, though not in recent years.

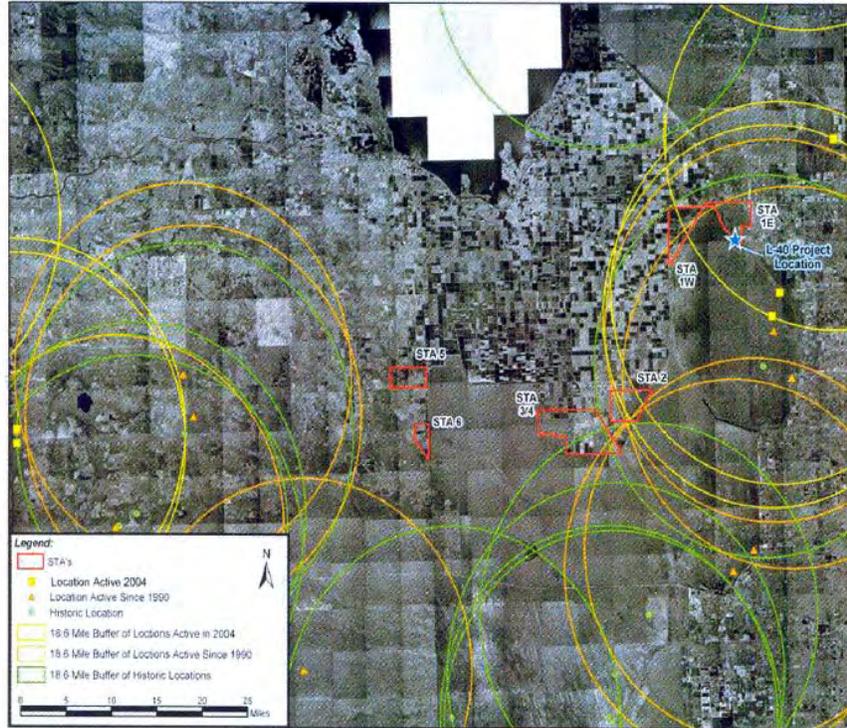


Figure 4. L-40 Project site and wood stork nest colonies. The L-40 Project is within the 18.6-mile Core Foraging Area of two wood stork nest colonies which were active in 2003 and 2004 in the LNWR.

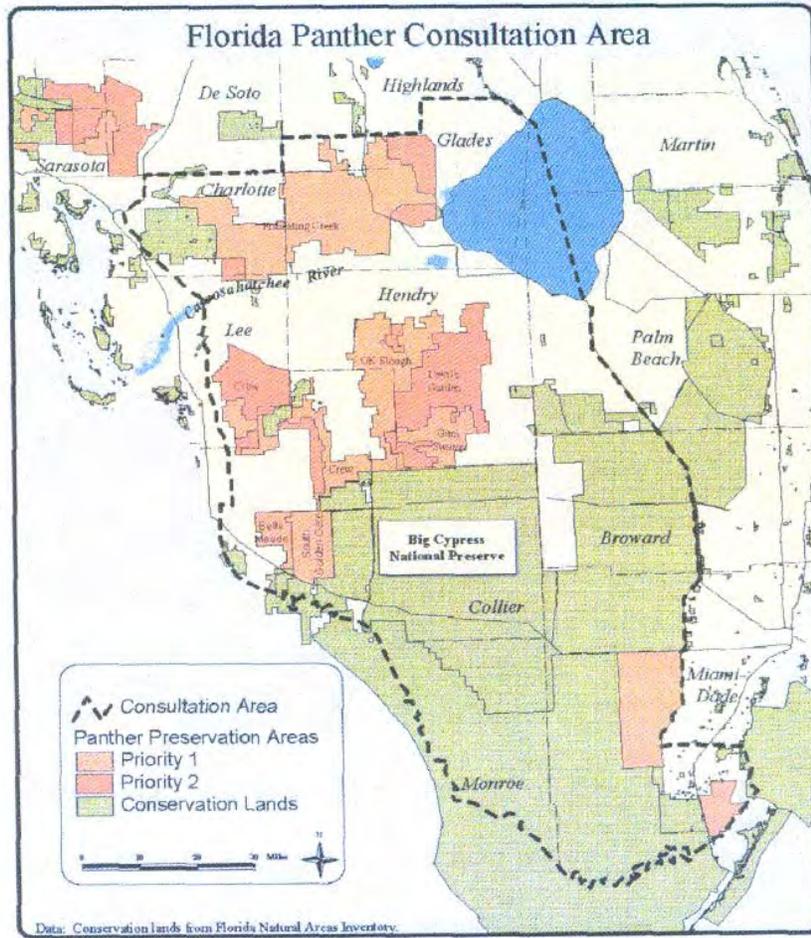


Figure 5. Florida panther consultation area.