United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
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September 14, 2006

Colonel Paul L. Grosskruger
District Commander
U.S. Army Corps of Engineers
701 San Marco Boulevard, Room 372
Jacksonville, Florida 32207-8175

Service Consultation Code: 41420-2006-F-0603
Corps Application No.: SAJ-2006-6166 (IP-TKW)
Formal Consultation Initiation Date: August 3, 2006
Applicant: South Florida Water Management District
Project: C-44 Reservoir and Stormwater Treatment Area
County: Martin

Dear Colonel Grosskruger:

This document transmits the Fish and Wildlife Service's (Service) biological opinion based on our review of the South Florida Water Management District's (District) proposed construction and operation of the C-44 Reservoir and Stormwater Treatment Area (RASTA) in Martin County, Florida, and its adverse effects on the eastern indigo snake (*Drymarchon corais couperi*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). Acronyms and abbreviations used throughout this biological opinion are outlined in a table located at the end of the document.

The C-44 RASTA is an Acceler8 component of the Indian River Lagoon South (IRL-S) Project Implementation Report (PIR) under the Comprehensive Everglades Restoration Plan (CERP). This component was designed to capture local basin stormwater runoff from the C-44 Canal and store it temporarily in a 3,400-acre (ac) reservoir prior to treating it with a 6,300-ac Stormwater Treatment Area (STA) before discharging it back into the C-44 Canal. This project, along with the other IRL-S components were designed to create a healthy estuarine salinity range in the St. Lucie Estuary (SLE) and remove nutrients, primarily phosphorus, from the stormwater runoff.

This biological opinion is based on information provided in the U.S. Army Corps of Engineers (Corps) Permit Application No. SAJ-2006-6166 (IP-TKW), construction drawings, and additional information. The Corps provided a determination of "may adversely affect" the eastern indigo snake. The Corps also provided determinations of "may affect, not likely to

adversely affect" for the wood stork (*Mycteria americana*), Audubon's crested caracara (*Polyborus plancus audubonii*), bald eagle (*Haliaeetus leucocephalus*), Everglade snail kite (*Rostrhamus sociabilis plumbeus*) and West Indian manatee (*Trichechus manatus*). The Service concurs with the Corps' "may adversely affect" and "may affect, not likely to adversely affect" determinations. A complete administrative record of this consultation is on file in the South Florida Ecological Services Office, Vero Beach, Florida.

THREATENED AND ENDANGERED SPECIES

Audubon's crested caracara

The District has documented that a nest likely exists just northwest of the northwestern corner of the project area (southeast quarter of Section 31, Township 38S, Range 39E). This is within the Allapattah Ranch Natural Area, land owned and managed by the District as a restoration component of the IRL-S Project. Surveys conducted in 2005 and 2006 identified caracaras in the area, and a likely nest tree was identified from a distance but not later verified. This nest tree is approximately 1,000 meters away from the project boundary. The primary protection zone for caracaras is an area within 300 meters (985 feet [ft]) from the nest, the core zone is between 300 and 1,000 meters, and the secondary zone is from 1,000 to 2,000 meters.

Caracaras are sensitive to human activity, especially during the breeding season. The primary breeding season is November through April. The Corps has made a commitment that there will be no construction activities within the primary zone and no nest trees will be removed as a result of the project. Construction will occur within the secondary zone; however, the Corps has agreed, as a condition of the permit, to ensure that construction activity will not occur in the secondary zone during the breeding season (November to April). Given the proximity of the project to the nest tree, the Corps has determined that the proposed project "may affect but is not likely to adversely affect" the Audubon's crested caracara. The Service concurs with this determination.

Everglade snail kite

The snail kite forages almost exclusively on apple snails (*Pomacea paludosa*). Surveys of the site in 2005 identified one apple snail egg mass. No snail kites or snail kite nests were observed during the 2005 and 2006 surveys. It is possible that the apple snails will inhabit the freshwater wetlands created by constructing the STA, providing additional foraging habitat for the Everglade snail kite. Water depths within the STA are anticipated to be held between 6 and 24 inches, although some dry out of the cells is possible during drought conditions. As part of normal maintenance, the District will remove any woody vegetation (*e.g.*, willows) that may grow in the STA. Similarly, the extent of cattails (*Typha domingensis*) will also be controlled because they form unwanted floating clumps that stir up sediments thereby reducing STA treatment efficiency. Woody shrubs and cattails are suitable substrates for snail kite nesting; however, because the spatial extent of these types of vegetation will be controlled, it is unlikely that the proposed project will be utilized by snail kite for nesting purposes. Due to the absence

of apples snails existing on the project site and the potential of the project to provide foraging habitat, the Corps has determined the proposed project "may affect, but is not likely to adversely affect" the Everglade snail kite. The Service concurs with this determination.

Bald eagle

The closest documented bald eagle nest is approximately 2 miles west of the project site. Bald eagle use of the proposed site is probably low at present due to the lack of large water bodies. Limited foraging opportunities for this species likely exists in the ditches and canals that would be impacted as result of the project. Eagles may forage in the C-44 Canal; however, as this activity is sporadic, and the project site is mostly removed from the C-44, it is not expected that construction or operation of the project will adversely affect these eagles. The project will result in the construction of a 3,400-ac reservoir and a 6,300-ac STA which may in the future provide foraging opportunities for the bald eagle. Noise and nighttime lighting associated with construction activities could alter foraging patterns of resident eagles using water bodies in the vicinity of project site. The Corps has indicated that implementation of the *Habitat Management Guidelines for the Bald Eagle in the Southeast Region* (Service 1987) and *Bald Eagle Standard Local Operating Procedures for Endangered Species* (Service 2005) will be required as a special condition of the permit to reduce adverse effects of human-related activities on bald eagles. Therefore, the Corps has determined the project "may affect, but is not likely to adversely affect" the bald eagle. The Service concurs with this determination.

Wood stork

The nearest active wood stork colony is approximately 10 miles east of the project site. The project is within the 18.6-mile core foraging area. Wetlands on the site are largely restricted to wet vegetated ditches and swales. During project surveys, wood storks were observed to the north in the Allapattah Ranch Natural Area and less frequently within the project site. Although the project will remove approximately 613.5 ac of ditches and canals, the project will result in the construction of 6,300 ac of wetland marsh in the form of STA cells which may provide foraging habitat for the stork following construction. Therefore, the Corps has determined the project :may affect, but is not likely to adversely affect" the wood stork. The Service concurs with this determination.

West Indian manatee

The manatee is known to utilize the C-44 Canal. An existing canal running north from the C-44 Canal will be widened and deepened and serve as the project intake canal. Reservoir intake pumps will be located approximately 3.5 miles north of the C-44 Canal. The intake will be protected with bars at a spacing of no greater than 8 inches to protect against entrainment and impingement of manatees that may swim into the intake canal per requirements of the Troup Indiantown Water Control District (TIWCD) drainage system temporary reconfiguration project and Nationwide Permit (NWP) verification issued on July 28, 2006, and the Service's (2006) manatee requirements for culverts (*Guidelines for Culverts Located in Manatee-Accessible CERP Projects*). The *Standard Manatee Protection Construction Conditions* (FWC 2001) were

also incorporated into the NWP verification as a specific condition. These standard conditions have been updated to the *Standard Manatee Conditions for In-Water Work* (Florida Fish and Wildlife Conservation Commission [FWC] 2005). For the proposed project, all in-water work in the C-44 Canal would adhere to these new FWC standard conditions in addition to the culvert guidance. Therefore, the Corps has determined that the project "may affect but is not likely to adversely affect" the manatee. The Service concurs with this determination.

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 biological opinion that 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 to be flexible to accommodate the changes 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, changes have occurred in the intervening years since the MSRP was published. The Service uses the MSRP in the context that it still presents useful information when taken in conjunction with all the new scientific information developed subsequent to its publication.

Consultation History

On January 25, 2001, the Service received a request from the Corps for a threatened and endangered species list for the IRL-S Project area.

On February 9, 2001, the requested list was finalized and sent to the Corps. These species were: West Indian manatee, Florida scrub-jay, Audubon's crested caracara, wood stork, red-cockaded woodpecker (*Picoides borealis*), Everglade snail kite, Florida panther (*Puma concolor coryi*), bald eagle, eastern indigo snake, tiny polygala (*Polygala smallii*), four-petal pawpaw (*Asimina tetramera*), fragrant prickly apple (*Cereus eriophorus var. fragrans*), and Florida perforate cladonia (*Cladonia perforate*).

On February 12, 2001, the Service received a letter from the Corps stating that Alternative 5 was the selected plan for the IRL-S Project. Later, it was decided that Alternative 6 was the selected plan, but the Service determined that the changes to the selected plan did not alter our conclusions relative to effects on threatened or endangered species.

On February 22, 2001, the Service received a letter from the Corps in which they determined that the IRL-S Project, as described, was not likely to adversely affect any federally threatened or endangered species or to result in adverse modification of critical habitat. Furthermore, the letter stated that "the Corps believes that this IRL-S Project will enhance or restore habitats that these listed species occupy," and that "standard protection methods for the bald eagle, [eastern] indigo snake and [West Indian] manatee will be utilized during project implementation when construction occurs in areas where these species could occur."

On March 2, 2001, the Service responded with a letter concurring with the Corps' determination for the entire IRL-S Project with the caveat that if modifications are made to the project or if additional information involving potential impacts on listed species becomes available, consultation may be reinitiated.

On May 3, 2001, the Service issued a draft Fish and Wildlife Coordination Act (FWCA) report for the IRL-S Project.

On or about October 15, 2001, the Service received the Corps' Draft Integrated Feasibility Report and Supplemental Environmental Impact Statement (SEIS) for the IRL-S Project.

On February 7, 2002, the Service issued a final FWCA report for the IRL-S Project.

On or about October 15, 2002, the Service received the Corps' Final Integrated Feasibility Report and SEIS for the IRL-S Project.

On May 13, 2003, the Service issued a Planning Aid Letter to reiterate the importance of including the full complement of components known as the Natural Storage and Water Quality Treatment Areas and to recommend that the integrity of these essential features of the plan not be compromised in the potential splitting of the IRL-S plan into several parts.

On or about December 15, 2003, the Service received the draft PIR and SEIS for the IRL-S Project from the Corps.

On January 7, 2004, the Service completed a National Environmental Policy Act Review of the draft PIR and SEIS for the IRL-S Project.

On February 6, 2004, the Service issued a supplement to the final FWCA report for the IRL-S Project.

On or about March 16, 2004, the Service received the Final PIR and SEIS for the IRL-S Project from the Corps.

On or about December 15, 2004, the Service received the Phase I and II Environmental Site Assessment for the proposed C-44 RASTA.

On May 27, 2005, the Service received a report entitled "Threatened and Endangered Species and General Fish and Wildlife Inventory Documentation" from HDR Engineering, Incorporated, a consultant for the project. The area of survey (conducted in March and April 2005) included the entire 12,000-ac project site and a buffer area surrounding the project boundary. An area of significance that was surveyed was a 3,000-ft buffer along the northern periphery of the project area including the southern areas of the Allapattah Ranch Natural Area.

On October 14, 2005, the Service received the C-44 Reservoir Final Test Cell Gopher Tortoise (*Gopherus polyphemus*) Pre-construction Survey Report.

On October 19, 2005, the Service received the Corps' effects determination letter on the construction and operation of the test cells.

On or about October 20, 2005, the Service received the Corps' and District's draft Operations and Monitoring Plan for the proposed C-44 RASTA.

On November 10, 2005 the Service issued a concurrence letter on the test cells. The Service concurred with the Corps' determination that the project would have "no effect" on the bald eagle and caracara. We concurred with the Corps' determination that the project "may affect, but is not likely to adversely affect" the wood stork and the eastern indigo snake.

On January 24, 2006, the Service provided comments on the District's Draft Basis of Design Report for the proposed C-44 RASTA.

On February 15, 2006, construction of the test cells started.

On April 14, 2006, the Service received the District's final Basis of Design Report for the proposed C-44 RASTA.

On May 30, 2006, the construction of test cell number 1 was completed.

On or about June 21, 2006, the pre-final design was issued for TIWCD reconfiguration.

On July 28, 2006, the Corps issued a NWP for the TIWCD drainage system temporary reconfiguration project .

On August 1, 2006, the Service received an effect determination letter from the Corps on the proposed C-44 RASTA Project. The letter served to reinitiate consultation on six listed species that could be affected by the proposed project. The Corps provided determinations of "may affect, not likely to adversely affect" for the wood stork, Audubon's crested caracara, bald eagle, Everglade snail kite, and West Indian manatee. For the eastern indigo snake, the Corps determined the proposed project "may adversely affect" this species and requested reinitiation of formal consultation.

On August 14, 2006, the Corps issued the Public Notice for the C-44 RASTA (permit application number 2006-6166 [IP-TKW]).

On August 16, 2006, the District and Corps stated during a conference call that tree clearing activities are anticipated to begin in October 2006, and not December 2006 as indicated in the August 1, 2006 letter.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Proposed action

The Corps proposes to permit the District to construct and operate the C-44 RASTA in order to capture and treat stormwater runoff from the C-44 basin during the wet season so that it can be released during the dry season for water supply and environmental needs in the SLE and southern portion of the IRL. The project will also allow for recreational opportunities on at least some portions of the site. The project site is approximately 12,000 ac in size.

The key features of the C-44 Project include the following:

1. A 3,400-ac, 15-ft deep reservoir with a storage capacity of approximately 50,600 ac-ft.
2. A 6,300-ac STA configured as seven separate cells.
3. A total of 10.60 miles of perimeter levees around the reservoir.
4. A total of 15.53 miles of perimeter levees around the STA cells and 10.60 miles of interior levees.
5. An enlarged 20,000-ft intake canal that will convey water from the C-44 Canal to the reservoir.
6. A 1,100-cubic feet per second (cfs) pump station that will pump water from the new intake canal into the reservoir.
7. Construct perimeter roads, located at the crest of the embankment and at the outside toe of slope of the reservoir for access and maintenance.
8. A 7.45-mile reservoir seepage collection (RSC) canal around the reservoir perimeter to collect and convey seepage from the reservoir to the intake canal.
9. A reservoir discharge structure to convey water from the reservoir to a distribution canal and to the individual STA cells.
10. Install two box culverts to convey flow from the reservoir to the STA cells.
11. A 600-cfs capacity distribution canal to discharge flow to an auxiliary spillway which bypasses flow to the seepage collection canal when all STA inlet structures are closed.
12. A connection to an existing broad-crested weir at the C-44 Canal to convey STA-treated water from the project to the C-44 Canal.
13. Construct a new bridge across Citrus Boulevard.
14. Add modifications to the TIWCD irrigation system.

The approximately 12,000-ac project site is an active citrus grove. A network of irrigation lines, drainage ditches, and canals serves the grove. Although the site is highly altered, historic hydric soils underlie the groves and associated ditches and canals. These ditches and canals have been regularly maintained through mowing and herbicide treatment to ensure proper conveyance of irrigation and drainage water. The Corps has asserted jurisdiction over the ditches and canals where these features intersect hydric soils. A total of 613.5 ac are considered Waters of the United States and are expected to be impacted by the project. Of these, 44 ac are disturbed, remnant shrub swamp. The project proposes the construction of 6,300 ac of long-hydroperiod wetland marsh in the form of STAs.

Construction phase

Tree clearing activities will begin in October 2006 and continue intermittently through July 2007 by the current grove operator. Trees will be knocked over with a backhoe or similar heavy equipment two rows at a time and allowed to dry for approximately 2 weeks. Trees will then be piled up and burned on-site. Construction of the C-44 RASTA Project is scheduled to begin in June 2007 and continue through December 2009. It is anticipated that construction would occur 6 days per week for approximately 10 hours per day. Construction would potentially occur as four separate contracts as follows:

1. Contract 1: C-44 Reservoir

    a. The reservoir will include the reservoir embankments, RSC canal, gated control structure and spillway, and the discharge structure. Construction activities will consist of stripping topsoil and removing borrow for the reservoir embankment from the interior of the reservoir. The borrow excavation on the interior will be limited to approximately 4 ft in depth (EL +22 ft) and will be no closer than 200 ft from the upstream toe. Earthwork calculations estimate the interior borrow area will be approximately 600-ft wide running parallel to the embankment. Borrow will be placed along the embankment centerline and compacted as specified.

    b. Construction activities associated with the RSC canal will occur along the perimeter of the reservoir site and would consist of stripping topsoil and excavating the canal. No dewatering is planned. Excavated material would be used in the embankment construction.

    c. Seepage in the RSC canal will be routed back to the intake canal through the RSC outlet structure located at the downstream end of the RSC canal. Construction activities associated with construction of this structure will include dewatering and excavation. The reservoir discharge structure will be constructed by first excavating to construct the foundation, and then building the concrete tower.

2. Contract 2: Stormwater Treatment Area

    a. Construction activities related to the STA will include the STA embankments, STA cell gated inlet structures, STA cell weir outlet structures, STA cell low-level gated outlet structures, distribution canal, STA cell seepage collection canal, interior drainage canals, system discharge structures, eastern drainage canal, and the eastern outlet canal and discharge structure. Construction activities associated with the STA embankments will occur on the interior of the site and will consist of stripping topsoil along the centerline of the embankments. The source of the borrow material for the STA embankments will be material excavated from the canals. Borrow will be placed along the STA embankment centerline and compacted as specified. Two or three gated pipe culvert inlet structures will distribute water into the upstream end of each STA cell. Two or three paired-sets of concrete broad crested weirs and attached stainless steel weir plates will be constructed at the downstream end of each STA cell.

    b. Construction activities associated with the STA seepage collection canal and discharge canal, and the eastern drainage canal will occur along the perimeter of the site and would consist of stripping topsoil and excavating the canal. Construction activities associated with the distribution canal will be located in the site interior. Dewatering and removal of surface water generated by rainfall may result in discharge through the existing drainage system. Excavated material will be used in the STA embankment construction as mentioned above.

    c. Florida Power and Light has existing easements for electric distribution and transmission power, within the project site. The transmission easements run north to south through the center of the site and east-west along the southern boundary of STA Cell-2, approximately 2 miles north of Citrus Boulevard. Interior drainage canals will be constructed to collect stormwater runoff from these easements and direct the stormwater to the new STA seepage collection and discharge canal. Distribution lines serve existing on-site users and adjacent property owners. Some of these distribution lines will have to be moved or removed before construction.

    d. All proposed system flows, as well as stormwater runoff, are controlled via the STA's gated discharge structure and broad-crested spillway. The structure is located south of STA Cell-7 on the western outlet canal, north of the existing Citrus Boulevard Bridge. Construction activities associated with this structure will include dewatering and foundation excavation.

3. Contract 3: Pump Station

Construction activities would occur at the southeast corner of the reservoir site at the northern end of the intake canal. They would consist of building the pump station and associated building and structures, including the pump station discharge structure (at the upstream slope).

Construction activities associated with the pump station will include dewatering and foundation excavation, and the installation of four 72-inch diameter pipes to convey water from the pump station to the reservoir.

4. Contract 4: Citrus Boulevard

    a. Improvements to Citrus Boulevard are required due to the project. A new bridge structure will be constructed at the southwest corner of the property. The bridge is necessary due to the construction of the new intake canal that will supply the reservoir pump station with water from the C-44 Canal. Citrus Boulevard will transition from a typical two-lane rural roadway to a two-lane bridge spanning the intake canal.

    b. A new box culvert will be required near the southeast corner of the property. A complete reconstruction and replacement of Citrus Boulevard is required as part of the new box culvert installation. A new pavement section, safety railing, striping, general roadway shoulder and slope re-grading will be included in the construction.

    c. Speed limits will be posted at the construction site and include 15 mph for off roads and 25 mph on improved roads and levees. For security the construction contractor shall erect security gates or use existing farm gates to control access. It is possible that due to the accelerated construction time, additional pieces of equipment will be required to meet the schedule. Other over-the-road trucks will be delivering materials such as culverts, ready mix concrete, pre-cast concrete, and reinforcing steel to the site.

Operation phase

The project operations and adaptive management strategy will be dependent upon a number of factors, including the stage in the C-44 Canal, the stage in Lake Okeechobee, the conditions at the S-80 structure, and the conditions in the SLE, all of which are controlled primarily by seasonal and short-term climatic conditions. Operating criteria for the project are designed to meet the project performance measures outlined in the IRL-S PIR (Corps 2004). The goals include storage, flow attenuation, water quality improvement, and meeting some of the irrigation demand of the basin. To meet the project goals, approximately 66 percent or more of the C-44 basin runoff will potentially be captured and treated prior to release back to the C-44 Canal. The operational criteria were designed to maximize the amount of water routed through the project system to maximize treatment, while regulating the discharge back into the C-44 Canal to provide flow attenuation to the estuary. In general, the C-44 RASTA facility will do the following:

1. Pump water from the C-44 Canal into the reservoir via the intake canal.

2. Store water in the reservoir to attenuate freshwater flows to the SLE, and as a secondary benefit, to allow partial treatment of the water to reduce nutrient concentrations.

3. Evenly distribute water to the STA cells where additional nutrient treatment occurs.

4. Discharge treated water back to the C-44 Canal (via the seepage collection and discharge canal).

The operational constraints are predominantly associated with the available reservoir and STA storage, the hydration of the STA cells, and the operation of S-308 and S-80 by the Corps, as minimum and maximum stages and flows are specified in Lake Okeechobee, the C-44 Canal, and at S-80 in the Lake Okeechobee Water Control Plan. In addition, ecological protection and saltwater management in the SLE will likely play a role in determining the amount of water that can be discharged from the project.

It should be noted that the C-23 diversion canal is not part of the current project. However, the C-44 RASTA canals that will be receiving the C-23 diverted water and moving that water through the project have been sized for the additional anticipated flow. Everything within the project has been designed to accommodate additional flow if and when the C-23 diversion canal is constructed.

Action area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate project area involved in the action. Therefore, the action area for the proposed project would include the 12,000-ac citrus grove (and associated canals, ditches and roads) and adjacent areas that may also be used by the eastern indigo snake. The largest reported eastern indigo snake home range in Florida was approximately 805 ac (327 hectare [ha]; Barkaszi et al. 1995). Assuming a roughly square pattern, this home range would be 5,933 ft by 5,933 ft. Therefore, the Service has defined the action area as the 12,000-ac grove plus a 6,000-ft buffer zone around the grove (Figure 1). This action area is necessary to account for intra-specific aggression by eastern indigo snakes displaced from the project site into adjacent areas as well as recolonization of the project site after construction. At this time, we anticipate that some eastern indigo snakes may recolonize the C-44 RASTA if prey items and cover are available.

STATUS OF THE SPECIES/CRITICAL HABITAT RANGEWIDE

Species description

The eastern indigo snake is the largest non-venomous snake in North America, obtaining lengths of up to 8.5 ft (2.6 meters) (Moler 1992). Its color is uniformly lustrous-black, dorsally and ventrally, except for a red or cream-colored suffusion of the chin, throat, and sometimes the cheeks. Its scales are large and smooth (the central 3 to 5 scale rows are lightly keeled in adult males) in 17 scale rows at mid-body. Its anal plate is undivided. In the Keys, adult eastern indigo snakes seem to have less red on their faces or throats compared to most mainland specimens (Lazell 1989). Several researchers have informally suggested that Lower Keys eastern indigo snakes may differ from mainland snakes in ways other than color.

Critical habitat description

Critical habitat has not been designated for this species.

Life history

In northern Florida, eastern indigo snakes breed between November and April, with females depositing 4 to 12 eggs during May or June (Moler 1992). Young hatch in approximately 3 months and there is no evidence of parental care. Limited information on the reproductive cycle in south-central Florida suggests that the breeding and egg-laying season may be extended. In this region, breeding extends from June to January; laying occurs from April to July; and hatching occurs during mid-summer to early fall (Layne and Steiner 1996). Eastern indigo snakes in captivity take 3 to 4 years to reach sexual maturity (Speake et al. 1987). Female eastern indigo snakes can store sperm and delay fertilization of eggs. There is a single record of a captive eastern indigo snake laying five eggs (at least one of which was fertile) after being isolated for more than 4 years (Carson 1945). However, there have been several recent reports of parthogenetic reproduction by virginal snakes. Hence, sperm storage may not have been involved in Carson's (1945) example (Moler 1998). There is no information on the eastern indigo snake lifespan in the wild, although one captive individual lived 25 years, 11 months (Shaw 1959).

Eastern indigo snakes are active and spend a great deal of time foraging for food and mates. They are one of the few truly diurnal snake species, meaning that they are active during the day and rest at night. The eastern indigo snake is a generalized predator and will eat any vertebrate small enough to be overpowered. They do not kill their prey by constriction, but swallow their prey alive. Food items include fish, frogs, toads, snakes (venomous, as well as non-venomous), lizards, turtles, turtle eggs, small alligators, birds, and small mammals (Keegan 1944; Babis 1949; Kochman 1978; Steiner et al. 1983).

Population dynamics

Eastern indigo snakes require a mosaic of habitats. A study in southern Georgia found that interspersion of tortoise-inhabited sandhills and wetlands improve habitat quality for the eastern indigo snake (Landers and Speake 1980). Eastern indigo snakes require sheltered retreats from winter cold and desiccating conditions, and often use burrows of the gopher tortoise (*Gopherus polyphemus*) when available (Speake et al. 1978; Layne and Steiner 1996). In habitats lacking gopher tortoises, eastern indigo snakes may take shelter in hollowed root channels, hollow logs, or the burrows of rodents, armadillos, or land crabs (Lawler 1977; Moler 1985a; Layne and Steiner 1996). Over most of its range in Florida, the eastern indigo snake frequents diverse habitats such as pine flatwoods, scrubby flatwoods, floodplain edges, sand ridges, dry glades, tropical hammocks, edges of freshwater marshes, muckland fields, coastal dunes, and xeric sandhill communities (Service 1999). Eastern indigos also use agricultural lands and various types of wetlands, with higher population concentrations occurring in the sandhill and pineland regions of northern and central Florida. Observations over the last 50 years made by maintenance workers in citrus groves in east-central Florida

indicate that eastern indigo snakes are occasionally observed on the ground in the tree rows and more frequently near the canals, roads, and wet ditches (Zeigler 2006). In extreme south Florida (*i.e.,* the Everglades and Florida Keys), eastern indigo snakes are found in tropical hardwood hammocks, pine rocklands, freshwater marshes, abandoned agricultural land, coastal prairie, mangrove swamps, and human-altered habitats (Steiner et al. 1983). It is thought that they prefer hammocks and pine forests since most observations occur there and use of these areas is disproportionate compared to the relatively small total area of these habitats (Steiner et al. 1983).

Eastern indigo snakes range over large areas and into various habitats throughout the year, with most activity occurring in the summer and fall (Smith 1987; Moler 1985a). In Georgia, the average range of the eastern indigo snake is 12 ac during the winter (December through April), 106 ac during late spring through early summer (May through July), and 241 ac during late summer and fall (August through November) (Speake et al. 1978). Adult males have larger home ranges than adult females and juveniles; their ranges average 554 ac, reducing to 390 ac in the summer (Moler 1985b). In contrast, a gravid female may use from 3.5 to 106 ac (Smith 1987). In Florida, home ranges for females and males range from 5 to 371 ac and 4 to 805 ac, respectively (Smith 2003). At the Archbold Biological Station (ABS), average home range size for females was determined to be 47 ac and overlapping male home ranges to be 185 ac (Layne and Steiner 1996).

Status and distribution

The eastern indigo snake was listed as threatened on January 31, 1978 (43 FR 4028), due to population declines caused by habitat loss, over-collecting for the domestic and international pet trade, and mortality caused by rattlesnake collectors who gas gopher tortoise burrows to collect snakes.

Effective law enforcement has reduced pressure on the species from the pet trade. However, because of its relatively large home range, the eastern indigo snake is especially vulnerable to habitat loss, degradation, and fragmentation (Lawler 1977; Moler 1985a). The primary threat to the eastern indigo snake is habitat loss due to development and fragmentation. In the interface areas between urban and native habitats, residential housing is also a threat because it increases the likelihood of snakes being killed by property owners and domestic pets. Extensive tracts of undeveloped land are important for maintaining eastern indigo snakes. In citrus groves, eastern indigo snake mortality occurs from vehicular traffic and management techniques such as pesticide usage, lawn mowers, and heavy equipment usage (Zeigler 2006). Within the last 5 years, since the spread of citrus canker, Zeigler (2006) reported seeing at least 12 dead eastern indigo snakes that were killed by heavy equipment operators in the act of clearing infected trees.

The eastern indigo snake ranges from the southeastern United States to northern Argentina (Conant and Collins 1998). This species has eight recognized subspecies, two of which occur in the United States: the eastern indigo and the Texas indigo (*D. c. erebennus*). In the United States, the eastern indigo snake historically occurred throughout Florida and in the

coastal plain of Georgia and has been recorded in Alabama and Mississippi (Diemer and Speake 1983; Moler 1985b). It may have occurred in southern South Carolina, but its occurrence there cannot be confirmed. Georgia and Florida currently support the remaining endemic populations of the eastern indigo snake (Lawler 1977). The eastern indigo occurs throughout most of Florida and is absent only from the Dry Tortugas and Marquesas Keys and regions of north Florida where cold temperatures and deeper clay soils exist (Cox and Kautz 2000).

Tasks identified in the recovery plan for this species include: habitat management through controlled burning, testing experimental miniature radio transmitters for tracking juveniles, maintenance of a captive breeding colony at Auburn University, recapture of formerly released eastern indigo snakes to confirm survival in the wild, educational lectures and field trips, and efforts to obtain landowner cooperation in conservation efforts (Service 1999).

To protect and manage this species for recovery, large expanses of land must be protected. Management of these lands must be directed towards maintaining and enhancing the diversity of plant and animal assemblages within these properties. Where these goals are achieved, eastern indigo snakes will directly benefit because of improved habitat conditions. Land managers are encouraged to utilize fire as a tool to maintain biodiversity in fire dependent ecosystems.

ENVIRONMENTAL BASELINE

The environmental baseline includes the effects of past and present impacts of all Federal, State, or private actions and other human activities in the action area; the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation; and the impact of State or private actions, which are contemporaneous with the consultation in progress.

Status of the species within the action area

We have little information on the distribution and abundance of the eastern indigo snake in the action area. One road-killed and two live adult eastern indigo snakes were observed in the northeastern portion of the project site during surveys conducted in July 2005. Eastern indigo snakes have been observed immediately north of the grove on the southern portion of the Allapattah Ranch Natural Area (Kacvinsky 2006). It is also likely that they are present northeast of the project site on the parcel known as Cane Slough (Figure 2). Recent discussions with grove operators indicated that the roads and ditches are the most likely places to observe eastern indigo snakes. The network of ditches and canals provide prey items. Animal burrows (especially armadillo) in the canal banks likely provide refugia for the eastern indigo snake. The Corps assumes that eastern indigo snakes occupy the site, and are more prevalent where habitat and prey items are more plentiful.

Past and ongoing Federal actions affecting the eastern indigo snake within the action area include the construction, operation, and monitoring of two reservoir test cells and two STA test cells (totaling approximately 31 ac). Construction began in February 2006 and monitoring is anticipated to continue until June 2007. Tree clearing and burning occurred on approximately 500 ac to accommodate the test cells. The Service informally consulted on the test cells in a letter dated November 10, 2005, and concurred with the Corps' effect determination that the project "may affect, but is not likely to adversely affect" the eastern indigo snake. The Service's concurrence was based on an understanding at that time that not all 500 ac were to be cleared, just the 12 to 15 ac needed for the test cells.

Factors affecting species environment within the action area

With the exception of the test cells and the area previously cleared, the citrus grove is actively managed. Additional tree clearing activities are not anticipated to begin until the fruit is harvested (starting in October 2006) and would proceed intermittently as additional citrus varieties are harvested. The current irrigation practice in the grove is accomplished through micro irrigation. Pesticide usage is typical for this type of crop and includes a copper-based fungicidal spray twice a year. Canal banks and tree rows are regularly mowed. Maintenance vehicles regularly travel on the roads in the grove.

On the Allapattah Ranch Natural Area, exotic plant control was initiated in 2003 by the District. A Wetland Reserve Program agreement for Allapattah between the U.S. Department of Agriculture, Natural Resources Conservation Service, and the District has dictated a low-density cattle management plan for control of exotic pasture grasses until such time that Allapattah can be restored as part of the CERP IRL-S Project. Wetland restoration through ditch filling or blocking began on the northern portions in 2004, and is anticipated to occur throughout Allapattah, but as yet has not occurred on the southern portion (*i.e.*, C-44 Project action area). The Cane Slough parcel is currently managed as cattle pasture, but also has a high percentage of wetlands. We anticipate that both these natural areas have populations of eastern indigo snakes and could serve as sources of immigrating eastern indigo snakes on the project site. These sites could be a source of recruitment for eastern indigo snakes that may eventually recolonize the constructed C-44 RASTA.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action on eastern indigo snakes, including beneficial effects, interrelated and interdependent actions, and species response to the proposed action.

Factors to be considered

Eastern indigo snakes have been documented in the project area and to the north on the Allapattah Ranch Natural Area. Because eastern indigo snakes use a variety of habitats, and have very large home ranges, they may occur throughout the project site and adjacent citrus groves and natural areas. This action will take place when this species is likely to be present

in the area. The duration of the tree clearing and construction will be from October 2006 to December 2009 (with construction commencing in June 2007). The operation and maintenance of the project is anticipated to last approximately 50 years. Potential impacts to eastern indigo snakes may occur due to citrus tree removal and burning, habitat destruction and degradation, earthmoving, and construction of the reservoir and STAs (including associated structures and canals), and operation and maintenance of the project. The action may also cause eastern indigo snakes to leave the area, abandon den sites, and possibly miss foraging and mating opportunities. Individual eastern indigo snakes fleeing the area may be more vulnerable to predation or intraspecific aggression. Potential direct impacts to the eastern indigo snake or its habitat include direct injury (including harm and harassment) or mortality; and loss of available habitat for foraging, breeding, and dispersing. Potential indirect impacts include: (1) future operation and maintenance associated with the RASTA that may result in mortality or injury from vehicular traffic, mowing, and pesticide usage; (2) fluctuations in prey density in the STA as water levels fluctuate and potentially become dry; and (3) mercury or pesticide contamination within the STA.

Analyses for effects of the action

Direct effects

Direct effects are those effects that are caused by the proposed action. The direct impacts evaluated by the Service include direct injury (including harm and harassment) or mortality and loss or degradation of available habitat for foraging, breeding, and dispersing. The direct effects that this project may have on eastern indigo snakes within the action area are discussed below.

Injury and mortality: It is not easy to estimate the density of eastern indigo snakes at the C-44 RASTA using existing data. However, a 26-year study conducted by Layne and Steiner (1996) at ABS estimated a population density of 2.6 eastern indigo snakes (1.9 males, 0.7 females) per 247 ac (100 ha). ABS is approximately 40 miles west of the project area and contains better snake habitat (*i.e.*, the study area was comprised of 60 percent xeric pine and oak uplands, and 40 percent pine flatwoods, bayheads, swale, and seasonal ponds). Eastern indigo snakes have been observed at ABS in all natural and man-altered habitats with no obvious habitat preferences (Layne and Steiner 1996). The ratio of adult males to adult females at ABS was estimated to be approximately 4:1. The juvenile sex ratio was closer to 1:1. These estimates were consistent with other studies of captive eastern indigo snakes and museum specimens (Moulis 1976, Smith 1941, Duellman and Schwartz 1958).

The C-44 Project area likely contains or intersects many eastern indigo snake home ranges. Based on population density estimates at ABS, one could estimate that as many as 126 adult eastern indigo snakes may be present within the C-44 RASTA area (12,000 ac/247 ac x 2.6 snakes = 126.3 snakes). However, due to the differences in habitat between ABS and the project site, we anticipate that the density of eastern indigo snakes at the C-44 RASTA would be lower than that at ABS. Regular mowing, vehicular traffic, and pesticide usage on the project site are also likely to have decreased the suitability of the habitat for eastern indigo snakes and

their prey. We are currently developing an eastern indigo snake habitat suitability index for citrus groves that is based on the degree on intensive management. However, this index will not be ready prior to the issuance of this biological opinion. Therefore, we have made a very conservative estimate that the quality of the eastern indigo snake habitat at the project site is half that of ABS. In that case, then there could be up to 63 adult eastern indigo snakes within the C-44 RASTA area.

It is difficult to determine the percentage of eastern indigo snakes that would be directly harmed or killed by the project. However, due to the nature of the proposed construction (*i.e.*, complete disturbance of the site by tree removal, canal filling or dredging, levee construction and then flooding of the site), erring on the side of caution the Service estimates that 100 percent of the eastern indigo snakes present at the time of the action could be adversely affected by the project. The incidental take is expected to be primarily in the form of direct mortality. The Service estimates that up to 95 percent of the eastern indigo snakes potentially impacted by the C-44 RASTA may be killed by the proposed action. The remaining 5 percent of the snakes would not be killed but would be harmed or harassed. These individuals could leave the area, abandon den sites, and possibly miss foraging and mating opportunities. Above ground refugia may also be lost during clearing and construction. Individual eastern indigo snakes fleeing the area may also be more vulnerable to predation and intraspecific aggression.

Loss of habitat: In general, citrus groves are not optimal eastern indigo snake habitat (Bolt 2006). Some citrus growers maintain a higher herbaceous vegetative structure along canals, roads, and wet ditches as well as in between the rows of trees. Islands of more natural areas (hydric hammocks, cypress, other wetlands) may also be present either centrally or on the periphery of the groves. These groves would have more prey items for eastern indigo snakes and also provide more cover than a grove that is more intensively managed (Zeigler 2006). Also, a furrow-irrigated grove would have less eastern indigo snake habitat than a micro-irrigated grove, because furrow irrigation floods the areas between the tree rows. The C-44 grove is a micro-irrigated grove and therefore, would have comparatively more snake habitat. For this project, we are assuming that the entire 12,000-ac grove is potential habitat for the eastern indigo snake even though the areas around the wet ditches and canals are likely to have better snake habitat and prey than the interior portions. Therefore, were are considering the entire 12,000 ac to be habitat lost as a result of construction.

Indirect effects

Indirect effects are those that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. The indirect impacts evaluated by the Service include: (1) post-construction maintenance of the roads, levees, pump stations, reservoirs, and STAs (including vegetation management methods such as mowing, herbicide application, and physical removal); (2) fluctuations in the prey populations from STA or reservoir dry down; and (3) chemical contamination. The indirect effects that the proposed action may have on eastern indigo snakes within the action area are discussed below.

Operation and maintenance: Routine operation and maintenance may result in temporary and insignificant disturbance to the eastern indigo snakes. However, mowing of levees, vehicular activity, or heavy equipment operation associated with maintenance has the potential to crush or injure individual eastern indigo snakes and eggs, and destroy or degrade potential habitat. In general, the District uses the following guidelines for mowing levees:

1. Mowing occurs approximately 4 times per year.
2. Mowing occurs when vegetative height reaches 8 to 10 inches.
3. Mowers are set at 6 inches height.
4. Mowing occurs slightly beyond the toe of the slope if water levels allow.
5. No wildlife is to be harmed in the mowing of any levees.

Given the large size of the project site and the anticipated abundance of prey items that could become established in the STA (and possibly in the reservoir), the Service anticipates that eastern indigo snake may occupy the project area during operation and maintenance. It follows then that these snakes may be at risk from the operation of maintenance vehicles and equipment, although the precise impacts are difficult to measure.

Prey populations: Following the establishment of vegetation in the STA (about two to five years after completion), prey items may colonize the STA. However, depending on the operation of the project and available water, the STA may occasionally dry out in low-precipitation years. Any eastern indigo snake that had become accustomed to prey in the STA may have to move off the site to find a suitable substitute. Maintaining water in some of the STA cells under dry conditions could reduce the lag time needed to rebuild the prey base. This could limit the potential for adverse impacts to eastern indigo snake prey base. The Service anticipates that the reservoir may dry out on a more frequent basis than the STA (also based on climatic conditions); however, it is not clear whether an eastern indigo snake prey base could become established in the reservoir. Due to the water available for this project, this is anticipated to occur infrequently and this potential effect should be re-evaluated as more of these features become operational in Florida.

Contaminants: Recent sampling by the District has indicated that mosquito fish in some of the currently operating STAs south of the Everglades Agricultural Area (EAA) are contaminated with potentially problematic levels of mercury. Sulfate concentrations in the EAA discharges to these STAs facilitate the mercury methylation process and allow methyl mercury to bioaccumulate. Since the source of mercury is atmospheric, it is assumed that this could become problematic in the C-44 STA if suitable sulfate concentrations exist. However, there is a CERP Guidance Memo and monitoring plan in place that was designed to detect and remediate any problematic mercury or pesticide contamination that may be found in the biota of the STAs. Therefore, we anticipate that there would be a low likelihood of adverse effects on eastern indigo snakes in the project area from ingesting contaminated prey.

Interrelated and interdependent actions

An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. The management of the C-44 RASTA is considered to be an interrelated and interdependent action which may result in potential benefits to the eastern indigo snake. The loss of eastern indigo snake habitat when the citrus grove is cleared, may be offset after vegetation in the STA has stabilized and prey items for the eastern indigo snake become available at sufficient densities (two to five years following construction). At that time, there should be habitat suitable for the eastern indigo snake on the interior side of the STA levees and the edges of the RSC. Interior portions of the reservoir are anticipated to be a harder material (soil cement or concrete) and therefore, would not provide the necessary herbaceous plant cover needed by eastern indigo snakes and their prey. The width of the side slopes of the STA levees would be 21 ft. For perimeter STA levees, this equals 39.5 ac (82,000 ft of perimeter STA levee x 21 ft). For interior STA levees, both side of the levees are considered usable, therefore, this area would equal 54.0 ac (56,000 ft of interior levees x 21 ft x 2). The RSC is 90-ft wide but only the edges are anticipated to be suitable eastern indigo snake habitat. Therefore, we estimated that approximately 10 ft on each side would be suitable. The anticipated total acreage of RCS eastern indigo snake habitat is 18.1 ac (39,330 ft of RSC x 10 ft x 2). The tops of levees were not considered eastern indigo snake habitat, even though snakes may be found there, due to the offsetting consequence of potential road mortality and lack of prey. The total potential eastern indigo snake habitat created by this project was estimated to be 111.6 ac (39.5 + 54.0 +18.1). Using the density data for ABS, if this acreage was in one block (instead of linear) it would only support one (*i.e.*, 1.2) eastern indigo snake. However, since this habitat covers the perimeter of the site, we expect that eastern indigo snakes from outside the project area will occasionally use this habitat, assuming prey and cover are suitable. It is difficult to estimate how many eastern indigo snakes will actually use the site following construction. Therefore, we recommend monitoring to determine eastern indigo snake usage at this site following construction.

Species' response to the proposed action

Construction, operation, and maintenance of the project can result in actions that may kill or injure individual eastern indigo snakes and destroy nests, and destroy or degrade occupied and potential habitat and foraging areas. Due to their large home ranges and relative low density, risk of direct mortality would not normally be considered substantial. However, due to the large size of the project area, the likelihood of mortality or injury increases. Any clearing, burning, earthmoving, construction, operation, and maintenance activities may also adversely affect eastern indigo snakes by causing them to leave the area, and possibly miss foraging and mating opportunities. Individual eastern indigo snakes fleeing the area may be more vulnerable to predation and intraspecific aggression. The Service anticipates that the eastern indigo snake population at the C-44 RASTA will not fully recover from the effects of the proposed action.

It is anticipated that all 12,000 ac of potential eastern indigo snake habitat within the citrus grove portion of the action area would be impacted by the proposed action. The number of individuals present at the time of the action is not known. However, the Service estimates that as many as 47 adult male and 16 adult female eastern indigo snakes may be present within the site. These estimates are based on population density estimates at ABS (Layne and Steiner 1996) and reduced based on inferior habitat quality in the groves. It is not known how many juvenile eastern indigo snakes may be present at the time of the action.

We believe that some eastern indigo snakes may move to the STA levees following construction and stabilization of the vegetation and prey items within the STA cells. We cannot estimate the number of eastern indigo snakes that may move into the area. These individual eastern indigo snakes may be affected by on-going maintenance and management activities.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

A portion of the funding for the acquisition of the lands for the C-44 RASTA came from Martin County with the caveat that at least 100 ac of adjacent land be set aside for a county park. We believe that this is a cumulative effect in that the people using the park may be allowed to participate in recreational activities that include fishing, hiking, horseback riding, and possibly duck hunting in the C-44 RASTA. The increase in human disturbance may result in harm and harassment to the eastern indigo snake. At this time, it is not anticipated that the vehicular traffic from the Martin County park would be allowed into the C-44 RASTA.

SUMMARY OF EFFECTS

The Service anticipates that approximately 12,000 ac of eastern indigo snake habitat will be lost through conversion to reservoir, STA, and associated roads and canals. We also anticipate that 111.6 ac of habitat will be created on the STA cell levees and usable 2 to 5 years following construction. The Service anticipates up to 63 eastern indigo snakes will be incidentally taken. The incidental take is expected to be primarily in the form of mortality.

The Service anticipates a potential beneficial effect of the project to be interrelated to the management of the RASTA. We anticipate that up to 111.6 ac of levee-based eastern indigo snake habitat could be generated by the project. However, because this potential habitat is linear in shape, we estimate that it may intersect several future eastern indigo snake home ranges, and as such provide potential benefits to more than just one eastern indigo snake (which we estimated if it were all in one evenly-shaped block).

CONCLUSION

After reviewing the status of the eastern indigo snake and the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the species. No critical habitat has been designated for the eastern indigo snake; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Sections 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns, which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken by the Service so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in action 7(o)(2) to apply. The Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Service (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the applicant must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement.

Section 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plants species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulations or in the course of any violation of a State criminal trespass law.

AMOUNT OR EXTENT OF TAKE

The Service anticipates that the proposed action will incidentally take the federally listed eastern indigo snake, though the level of incidental take may be difficult to detect because finding a dead or impaired specimen may be difficult. It is possible that the eastern indigo snake could be temporarily extirpated from the project area. The incidental take is expected to be in the form of harass, harm, wound, or kill. It is not expected that this species will be permanently extirpated from the project site.

We anticipate take of the eastern indigo snake will be difficult to detect for the following reasons: (1) wide-ranging distribution; (2) patchy distribution within suitable habitat; (3) seemingly suitable habitat may not be occupied; and (4) use of cryptic sheltering areas that may be temporarily established during construction (*e.g.,* brush piles, equipment stockpiles, and dirt mounds). The incidental take is expected to be in the form of harassment, injury, and direct mortality due to tree clearing and burning, construction, and operation and maintenance of the project. Due to the lack of surveys, in conjunction with the wide-ranging activity and use of a variety of habitat types by the eastern indigo snake, it is difficult to determine the exact number of eastern indigo snakes that will be taken.

Eastern indigo snakes have been documented in the northeast corner of the project area and on the adjacent Allapattah Ranch Natural Area. Because eastern indigo snakes use a variety of habitats, and have very large home ranges, eastern indigo snakes may occur throughout the C-44 RASTA site. Consequently, the implementation of the project would potentially impact the eastern indigo snake, including injury or direct mortality.

Starting with the reported density of eastern indigo snakes at ABS, and reducing that density by half based on the inferior habitat characteristics of the C-44 grove, the Service anticipates up to 63 eastern indigo snakes will be taken incidental to project construction operation and maintenance. Ninety-five percent of this take is expected to be in the form of mortality. The remaining 5 percent of snakes would be harmed or harassed.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the eastern indigo snake. Disturbance and injury to eastern indigo snakes should be minimize during construction activities. Education of personnel on the site will facilitate minimization of impacts and conservation of the species. The District staff will coordinate and report on their activities to the greatest extent practical to minimize potential adverse effects on natural resource compliance, management, and monitoring requirements.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps shall ensure that the District complies with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. **Minimization of impacts**

   a. Precautions for the eastern indigo snake will be required to avoid injury to any individual animal. Standard construction precautions for the eastern indigo snake *i.e.*, the *Draft Standard Protection Measures for the Eastern Indigo Snake* (Service 2002) will be incorporated into special conditions of the permit.

   b. The District shall provide at least one qualified observer during ground clearing activities. The observer's sole function would be to visually evaluate the area to be cleared immediately prior to, and following vegetation removal and to record any eastern indigo snake activity. Only individuals who have been either authorized by a section 10(a)(1)(A) permit issued by the Service, or by the State of Florida through the FWC for such activities, are permitted to come in contact with an eastern indigo snake.

   c. During initial removal of the citrus trees the canal banks will not be altered. The trees will be up-rooted, allowed to dry, and subsequently pushed into piles and burned. Brush piles would be located as far away from the ditches (snake habitat) as possible in order to keep snakes from recolonizing brush piles before they are burned. Removal of trees would proceed at a relatively slow pace, thus allowing eastern indigo snakes the opportunity to move away.

   d. During tree clearing, the equipment operators will start work at the farthest point from the ditch or canal and work towards the ditches or canals so that the eastern indigo snake, if encountered, would be encouraged to move away from the disturbance and towards the canals.

   e. For avoidance and safety reasons, a speed limit of 25 miles per hour will be posted for all vehicular traffic.

   f. Following completion of construction, the initial manual flooding of the reservoir will be at a rate of one-half inch per day until a depth of 6 inches is attained.

   g. Levee mower operators will scan the areas where vegetation has been cut immediately afterwards and count and record the number of all species of dead or injured snakes observed with particular attention to identifying and counting any potential eastern indigo snakes. Any dead eastern indigo snake (or suspected eastern indigo snake) or parts thereof, should be placed on ice until such time that they can be frozen and the Service contacted.

2. Education of on-site personnel

a. All vehicle and equipment operators will be notified to avoid all snakes and burrows if at all possible. All on-site personnel will be educated to recognize the eastern indigo snake. If any snake is encountered, it will be avoided and allowed to leave the area on its own before vehicle or equipment use is resumed.

b. Educational information on the eastern indigo snake will be posted at the educational kiosks on the site.

3. **Coordination with the service**

a. The District shall provide the Service a one-week advanced notice on the schedule for ground clearing of citrus trees or other vegetation so that we may participate in on-site observational activities.

b. Results of all observations associated with ground clearing activities (as required in Terms and Conditions 1.a.) shall be provided to the Service's C-44 Project biologist (Fish and Wildlife Service, South Florida Ecological Services Office; 1339 20th Street Vero Beach, Florida; 32960; 772-562-3909) within 30 days following the activity.

c. Annually, a report of all snakes killed or injured by operation or maintenance of the C-44 RASTA (as indicated in Terms and Conditions 1.g.) must be submitted to the Service's C-44 Project biologist (Fish and Wildlife Service, South Florida Ecological Services Office; 1339 20th Street; Vero Beach, Florida; 32960; 772-562-3909). This report should contain the location, dates, and times for any sightings of eastern

indigo snakes and the disposition of all eastern indigo snakes found. A site map with observation locations should also be included in this report. If no snakes are encountered, a report should be submitted indicating that fact. Upon locating a dead, injured, or sick federally listed species, initial notification must be made to the nearest Service Law Enforcement Office (Fish and Wildlife Service; 1339 20th Street; Vero Beach, Florida 32960; 772-562-3909). Secondary notification should be made to the FWC, South Region; 8535 Northlake Boulevard; West Palm Beach, Florida; 33412-3303; (561) 625-5122; 1-888-404-3922.

d. Care should be taken in handling sick or injured specimens to ensure effective treatment and care or in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. Dead eastern indigo snakes should be placed on ice and frozen as soon as possible. In conjunction with the care of sick or injured specimens or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take would represent new information requiring reinitiation of consultation and review of the reasonable and prudent measure provided. The District must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. We recommend the following:

1. Following construction, maintain an educational kiosk for the public on the listed species and other wildlife that may be observed in the RASTA.

2. Provide long-term ecological monitoring on eastern indigo snake prey densities and habitats in the project area.

3. If large snake skins are found, they should be collected, dried, and sent to the Service's C-44 Project biologist (Fish and Wildlife Service, South Florida Ecological Services Office; 1339 20th Street; Vero Beach, Florida; 32960) for positive identification and genetic studies. Information on the collection date and location should be included.

REINITIATION NOTICE

This concludes formal consultation on the proposed action. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded, as defined by the action area measures provided in this project description; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this biological opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation and effort in protecting wildlife resources. If you have any questions regarding this project, please contact Steve Schubert at 772-562-3909, extension 249.

Sincerely yours,

Paul Souza
Acting Field Supervisor
South Florida Ecological Services Office

cc:
FWC, Vero Beach. Florida, (Joe Walsh)
Service, Atlanta, Georgia (Noreen Walsh) (electronic copy only)
Service, Atlanta, Georgia (Dave Flemming) (electronic copy only)
Service, Jackson, Mississippi (Eastern Indigo Snake Species Lead)
Service, Vero Beach, Florida (Marilyn Knight) (electronic copy only)
Service, Jacksonville, Florida (Miles Meyer)
District, West Palm Beach, Florida (Susan Ray, Beth Kacvinsky, John Mitnik)
Corps, Jacksonville, Florida (Mike Rogalski, Paul Stodola)
Corps/SFRPO, West Palm Beach, Florida (Tori White)

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Table of acronyms and abbreviations used in this biological opinion.

Acronym/Abbreviation	Definition
ABS	Archbold Biological Station
Act	Endangered Species Act of 1973, as amended
ac	acre(s)
BA	Biological Assessment
CERP	Comprehensive Everglades Restoration Plan
cfs	cubic feet per second
Corps	United States Army Corps of Engineers
District	South Florida Water Management District
EAA	Everglades Agricultural Area
ft	feet
FWC	Florida Fish and Wildlife Conservation Commission
FWCA	Fish and Wildlife Conservation Act
ha	hectare
IRL-S	Indian River Lagoon - South
MSRP	Multi-Species Recovery Plan
NWP	Nationwide Permit
PIR	Project Implementation Report
RASTA	Reservoir Assisted Stormwater Treatment Area
RSC	Reservoir Seepage Collection
SEIS	Supplemental Environmental Impact Statement
Service	United States Fish and Wildlife Service
SLE	St. Lucie Estuary
STA	Stormwater Treatment Area
TIWCD	Troup Indiantown Water Control District

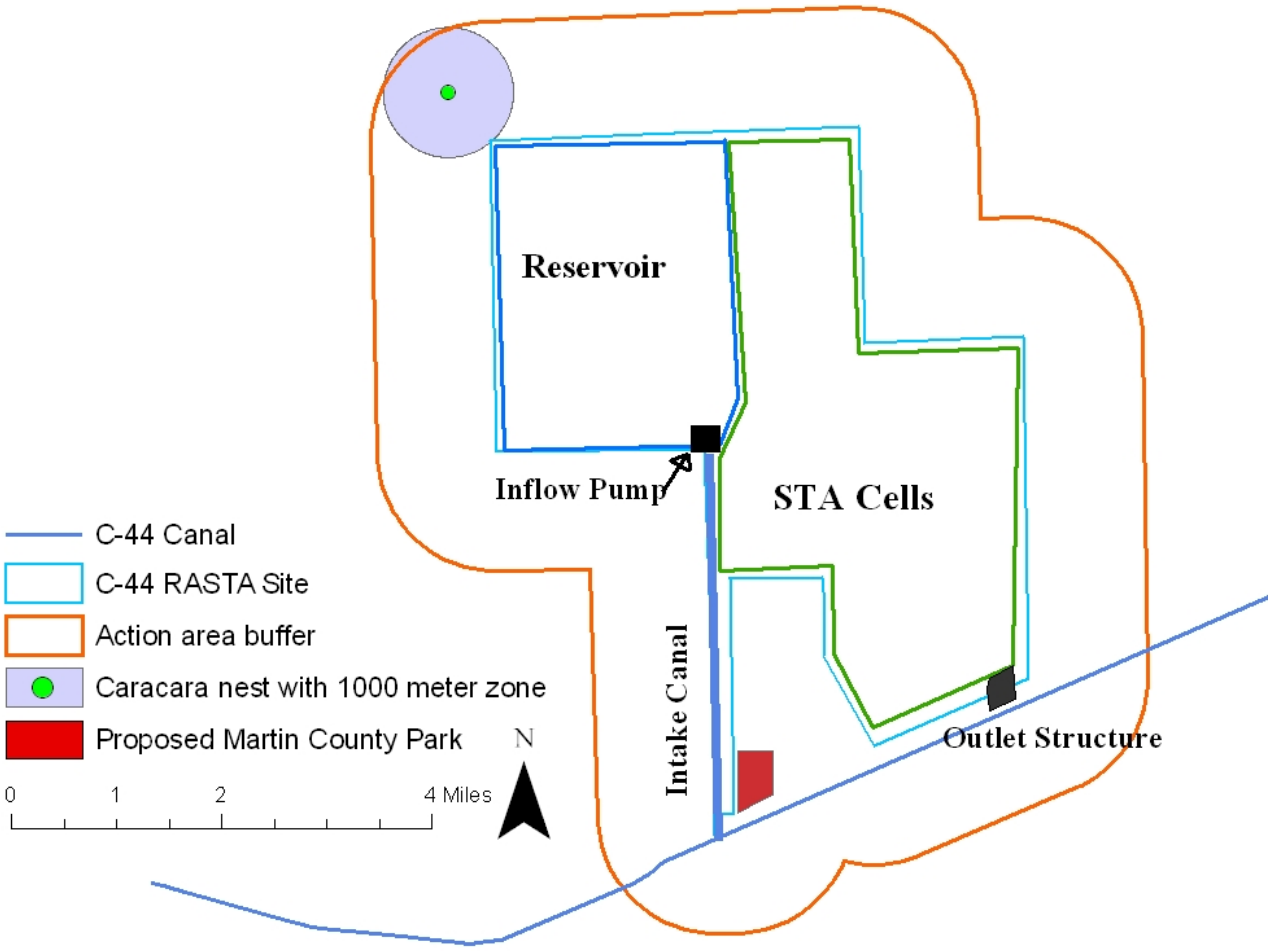

Figure 1. Action area for the C-44 RASTA Project.

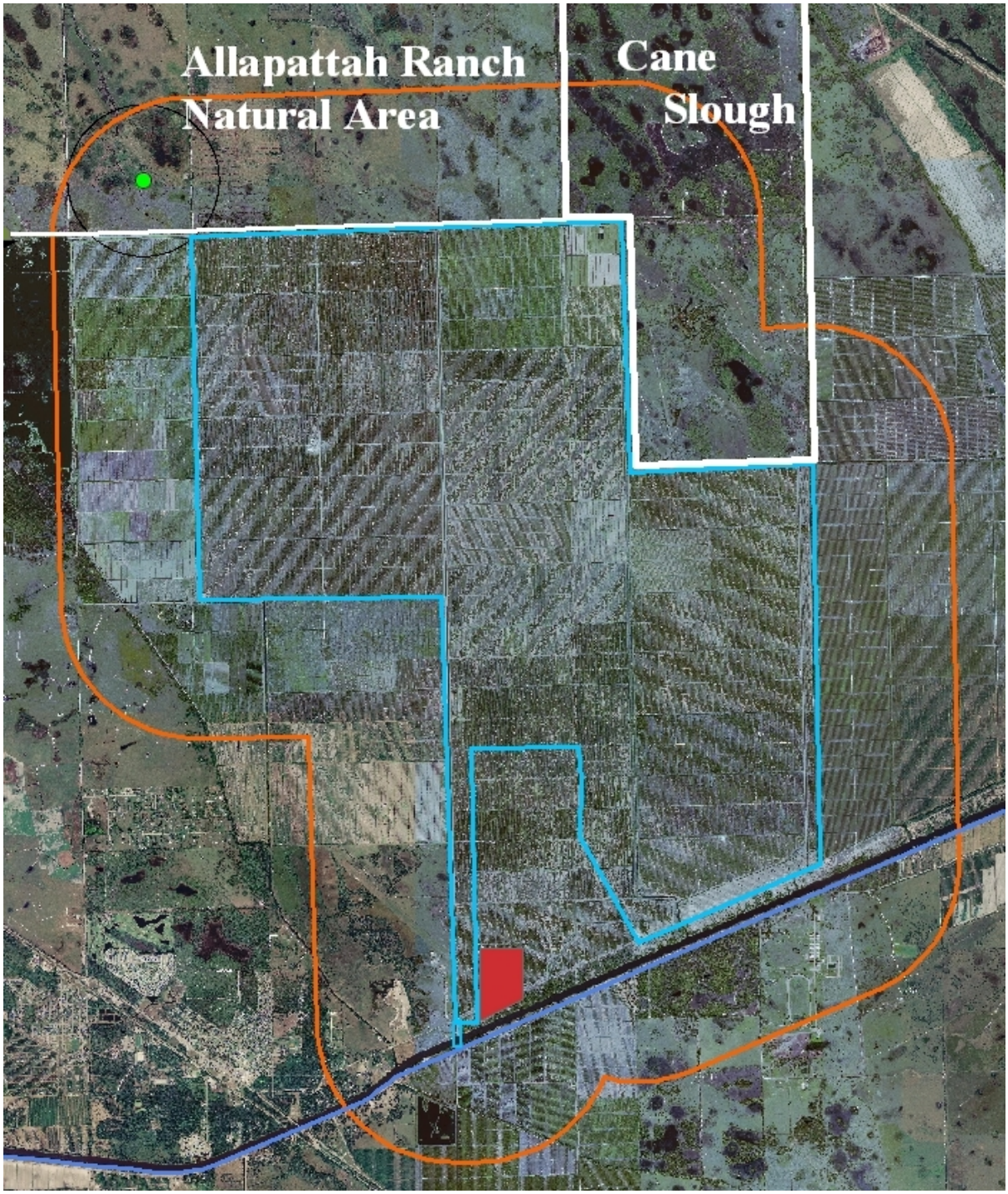

Figure 2. Action area for the C-44 RASTA Project overlain on 2004 natural color aerial photography. This shows the more natural areas of Allapattah Ranch and Cane Slough to the north and east of the project site. It also depicts the approximate location of the closest caracara nest (green dot) and the proposed Martin County park (red polygon).