



United States Department of the Interior

FISH AND WILDLIFE SERVICE
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November 21, 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-0855
Corps Application No.: SAJ-2005-53 (IP-TKW)
Formal Consultation Initiation Date: October 20, 2006
Applicant: South Florida Water
Management District
Project: Everglades Agricultural
Area Reservoir A-1
County: Palm Beach

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) construction and flooding of the Everglades Agricultural Area (EAA) Reservoir A-1 Project (A-1 Reservoir) in Palm Beach 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 A-1 Reservoir is an Acceler8 component of the EAA Storage Reservoir Project (EAA Project) under the Comprehensive Everglades Restoration Plan (CERP). The A-1 Reservoir as outlined in the A-1 Reservoir final Environmental Impact Statement (Corps and District 2006a) consists of a single 15,200-acre reservoir with water storage capacity of 190,000 acre-feet at an approximate depth of 12 feet (ft). The A-1 Reservoir will eventually serve as the eastern cell of the EAA Project. As above, the reservoir will store a total of 190,000 acre-ft of stormwater runoff and Lake Okeechobee releases. The goals of the project as outlined in the final EIS are: (1) to capture and store Lake Okeechobee regulatory releases and EAA basin runoff; (2) to deliver water from the reservoir to downstream natural areas via Stormwater Treatment Area (STA) 3/4 at times of natural system need; and (3) to deliver water from the reservoir to meet local agricultural water supply demands that would otherwise be met via deliveries from Lake Okeechobee.



Informal consultation for the eastern indigo snake was completed on December 14, 2005, with Service concurrence with the U.S. Army Corps of Engineers' (Corps) "may affect, not likely to adversely affect" determination. Informal consultation was based on information provided in the Corps Permit Application No. SAJ-2005-53 (IP-TKW), construction drawings, and additional information relayed by the Corps and District. In a letter dated, October 20, 2006, the Corps initiated formal consultation for the eastern indigo snake due to the accidental death of a snake during construction activities, the sightings of other snakes within the project footprint, and potential changes to project design. This biological opinion is based upon information provided during informal consultation as well as additional information provided by the Corps, District, and District contractors related to construction of the project and the presence of eastern indigo snakes within the project footprint.

Previous consultation for other listed species included Service concurrence with the Corps' following determinations: (1) "no effect" determinations for the endangered leatherback (*Dermochelys coriacea*) and hawksbill (*Eretmochelys imbricata imbricata*) sea turtles, the threatened green (*Chelonia mydas*) and loggerhead (*Caretta caretta*) sea turtles, and the threatened Audubon's crested caracara (*Polyborus plancus audubonii*); (2) "may affect, not likely to adversely affect" determinations for the endangered West Indian manatee (*Trichechus manatus*), Everglade snail kite (*Rostrhamus sociabilis*), wood stork (*Mycteria americana*), and Okeechobee gourd (*Cucurbita okeechobeensis*), and the threatened bald eagle (*Haliaeetus leucocephalus*); and (3) "may affect" determination for the Florida panther (*Puma concolor coryi*) with subsequent Service development of a biological opinion. Of note, the concurrence for species thus far is based on the construction and flooding of the reservoir. Effects to species in natural areas potentially affected by the project will be revisited and determined once an operating plan is finalized. A complete administrative record of this consultation is on file in the South Florida Ecological Services Office, Vero Beach, Florida.

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, the South Florida Multi-Species Recovery Plan (MSRP) of 1999 (Service 1999), 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.

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 it still presents useful information when used in conjunction with new scientific information developed subsequent to its publication.

Consultation History

Of note, the early consultation history for the EAA Project can be linked to the A-1 Reservoir and thus is included below for purposes of clarity. On October 3, 2005, informal section 7 consultation specific to the A-1 Reservoir was initiated. The Corps requested the A-1 Reservoir consultation be based on, and developed in conjunction with, the consultation for the EAA Project. In January 2006, differences in preliminary designs for the two projects were noted and separate consultations were required (see below).

On December 4, 2002, the Corps' Planning Division initiated informal section 7 consultation for the EAA Project by providing a letter to the Service identifying threatened and endangered species and critical habitat that may be present in the proposed EAA Project area. Endangered species identified included the West Indian manatee, Florida panther, wood stork, and the Everglade snail kite and its critical habitat. Threatened species identified included the Audubon's crested caracara, bald eagle, and the eastern indigo snake.

In a letter dated January 2, 2003, the Service concurred with the federally listed species and critical habitats identified by the Corps. In that correspondence, the Service recommended that the Corps continue informal consultation by preparing a Biological Assessment (BA) for the preferred alternative, verify the current accuracy of the species list before preparing the BA in accordance with 50 CFR 402.12 (e), and contact the National Marine Fisheries Service (NOAA Fisheries) and the Florida Fish and Wildlife Conservation Commission (FWC) to solicit further input on other listed species regulated under their respective authorities.

The Service subsequently requested that the Corps include the following in the list of species that may be affected by the proposed EAA Project: the endangered leatherback and hawksbill sea turtles that may nest in the St. Lucie Estuary (SLE); the threatened green and loggerhead sea turtles that may nest in both the SLE and Caloosahatchee Estuary; and the endangered Okeechobee gourd found adjacent to Lake Okeechobee. Although these species are not expected within the project footprint and associated features, they are located in natural areas that may be affected by the project. The Corps agreed.

The Corps requested that the draft Project Implementation Report/Environmental Impact Statement (PIR/EIS) being developed for the EAA Project serve as their BA as described in 50 CFR 402.12. The Service agreed to this approach provided the draft PIR/EIS contained the information described in 50 CFR 402.12 and a letter with determinations of effect for all species concerned was generated.

From July to September 2003, the Service led an extensive interagency field survey of the EAA Project footprint. Ground and aerial surveys were performed to verify and characterize wetlands and other communities, as well as to document the presence of vegetation and wildlife. Neither

eastern indigo snakes nor indications of eastern indigo snakes (skins, etc) were observed during the survey.

The Corps provided the BA in the form of a draft PIR/EIS for the EAA Project in September 2005 (Corps and District 2005). In addition, the Corps provided a separate effects determination letter dated September 2, 2005. Both documents identified the EAA Project: (1) will have “no affect” for the Audubon’s crested caracara and the four sea turtles identified above; (2) “may affect, but is not likely to adversely affect” the West Indian manatee, Everglade snail kite, wood stork, bald eagle, eastern indigo snake, and Okeechobee gourd; and (3) “may adversely affect” the Florida panther, and thus, the Corps requested initiation of formal consultation for the panther.

In an email dated September 8, 2005, the Service informally requested additional information regarding the Florida panther in order for formal section 7 consultation to be initiated for this species.

In a letter to the Service dated September 19, 2005, NOAA Fisheries advised they had reviewed the draft Fish and Wildlife Coordination Act report (Service 2005) and had no comments or recommendations related to the Service report. They further recommended to the Corps the final PIR/EIS include an evaluation of potential impacts to essential fish habitat, including but not limited to estuarine/marine waters, mangroves, seagrasses, live bottom communities, and oyster reefs and shell banks.

In a letter to the Service dated October 3, 2005, the Corps’ Regulatory Division formally requested the effect determination, BA, and draft PIR/EIS for the EAA Project also serve as the complete section 7 initiation package for the A-1 Reservoir, and requested all related correspondence be copied to the Regulatory Division as well as the Planning Division.

A Public Notice for the A-1 Reservoir was published on October 12, 2005.

In a letter dated December 14, 2005, the Service provided a concurrence letter to the Corps’ Planning Division and Regulatory Division including a “may affect, not likely to adversely affect” determination for the eastern indigo snake. The Service concurrence was based on available information and the Corps’ inclusion of conservation measures including implementing the *Standard Protection Measures for the Eastern Indigo Snake* (Service 2004) during construction activities, as well as including a sloped embankment design and slow initial flooding of the reservoir at a rate of 0.5 inch per day until a depth of 6 inches is attained in order to allow any snakes that could potentially be present to vacate the area. In addition the Service concurred with the Corps’ determinations for the caracara, sea turtles, manatee, snail kite, and Okeechobee gourd. Due to potential contaminant issues on the Woerner Farm 3 property within the EAA Project and A-1 Reservoir footprint that had yet to be resolved, the Service letter did not provide concurrence for the wood stork or bald eagle. The letter also served as the Service’s official request for additional information for the Florida panther in order for formal section 7 consultation to be initiated and to allow preparation of the biological opinion.

In January 2006, potential differences in the preliminary designs for the A-1 Reservoir and EAA Project were noted. These differences were discovered by the Corps and District during the same timeframe as the gathering of information required to initiate consultation for the Florida panther and to determine effects of potential contaminants on the Woerner Farm 3 property. From that point onward, separate consultations were required for the two projects due to differences in project design. Previous concurrence for species was determined to remain valid as long as the EAA Project and A-1 Reservoir designs did not change to the point where the species in question would be further affected.

The remaining consultation history below is based solely on the A-1 Reservoir design.

On February 10, 2006, a meeting was held at the District's Acceler8 office regarding the Woerner Farm 3 property. Participating agencies included the Service, District, Corps, and the Environmental Protection Agency. The Service advised that we had reviewed the submitted Environmental Risk Assessments and other information for the wood stork, bald eagle, and other avian species that could potentially forage within inundated Woerner Farm 3 soils. The Service relayed concerns related to the presence of residual levels of toxaphene that could become mobilized and result in direct and/or indirect negative impacts to avian species, including federal and State-listed species. During the meeting, several strategies to address the toxaphene concerns were discussed including, but not limited to, the following options: (1) remove the Woerner Farm 3 property from the project footprint; (2) remove and place all soil from the Woerner Farm 3 property in areas with no possibility of inundation; and (3) perform additional sampling in order to further define those areas of the Woerner Farm 3 property where toxaphene levels are sufficiently low that removal of soil would not be necessary.

In a February 10, 2006 letter, the Corps' Regulatory Division provided the majority of additional information for the Florida panther requested by the Service in the December 14, 2005 letter. In addition, the letter advised that the Woerner Farm 3 property would be removed from the A-1 Reservoir footprint due to the presence of toxaphene. The Service's Environmental Contaminants Program concurred that this approach addressed major concerns related to the residual levels of toxaphene found on the Woerner Farm 3 property.

On March 6, 2006, the District's A-1 Reservoir Project Manager delivered an email to the Service indicating that the upper two thirds of the Woerner Farm 3 property, approximately 600 acres, would not be included in the A-1 Reservoir footprint. In addition, the soil within the lower third of the property, covering approximately 300 acres, would be removed and used to provide soil on the northern exterior face of the reservoir. Therefore, the soil from the lower third of the property would be placed in an area that would not be inundated, and the soil would be vegetated to prevent erosion. The Service's Environmental Contaminants Program agreed that this approach addressed major concerns related to the residual levels of toxaphene found on the Woerner Farm 3 property.

As of March 23, 2006, the Service received all information necessary to complete the biological opinion for the Florida panther, thus formal consultation for the Florida panther for this project was initiated as required in the regulations governing interagency consultations (50 CFR 402.14).

In a letter dated March 24, 2006, the Service provided concurrence for the Corps' "may affect, but not likely to adversely effect" determination for the wood stork and bald eagle for the A-1 Reservoir. The letter reiterated that due to changes in project scope and design, further consultation for listed species would remain separate for the A-1 Reservoir and EAA Project. In the letter, the Service also clarified the listed species consultation for the A-1 Reservoir thus far had included those species that may be affected by the initial operating plan as identified in the revised draft PIR/EIS (Corps and District 2006b). The intent of the initial operating plan was to send water south to the Everglades Protection Area only at times of ecological need until such time that existing constraints were removed by the completion of additional CERP and non-CERP projects and it could be demonstrated that potential negative impacts to downstream habitats and listed species would not occur. Prior to formulation and implementation of the final operating plan for the EAA Project and A-1 Reservoir, we advised the Corps consult with the Service to determine whether initiation of consultation for listed species located south of the A-1 Reservoir, such as the Cape Sable seaside sparrow (*Ammodramus maritimus mirabilis*), and American crocodile (*Crocodylus acutus*), would be required.

On April 14, 2006, the Service completed the biological opinion for the Florida panther for the A-1 Reservoir, including incidental take and provisions for compliance. The completion of the biological opinion concluded section 7 consultation for the identified listed species within the A-1 Reservoir footprint that would potentially be affected by the construction and flooding of the reservoir.

On June 14, 2006, the Service delivered comments on the A-1 Reservoir final EIS (Corps and District 2006a) to the Corps' Regulatory Division Chief, Special Projects/Enforcement Branch. The comments included the following information related to construction and operation:

The Service is not assessing the system-wide potential benefits/impacts of the A-1 [Reservoir] to fish and wildlife, including listed species, until the final operating plan is developed and more detailed information is provided that can be more fully reviewed. Prior to formulation and implementation of the final operating plan for the A-1 [Reservoir], the Corps' Regulatory Division will consult with the Service to determine whether reinitiation of consultation for listed species already identified and/or initiation of consultation for other species not yet considered, located downstream of the project, such as the Cape Sable seaside sparrow and American crocodile, are needed.

Based on available information, consultation for listed species potentially affected by actual construction of the A-1 Reservoir has been completed. However, as indicated above, the Corps should coordinate with the Service in order to determine whether further consultation for listed species is needed during the formulation of the final operating plan.

The Service agrees that the Corps should re-evaluate the potential benefits/impacts of the A-1 [Reservoir] once the future operating plan is developed. The evaluation of the future operating plan should include revised hydrological modeling for all

parameters, with the results and analyses submitted to the Service for listed species consultation purposes and other ecological comments/recommendations. In addition, results provided should include those based on the A-1 [Reservoir] alone without the additional Acceler-8 projects, as other Acceler-8 projects may not all be completed and/or expected benefits not realized.

On July 12, 2006, the Corps issued a permit to the District to construct the seepage canal, borrow pits, and the borrow canal that will be located along the perimeter of the project footprint. The Corps further advised that construction must be implemented in accordance with terms identified in the permit, including the identified conservation measures for listed species such as those identified above for the eastern indigo snake. In addition, the permit indicated that an initial operating plan must be delivered to the Corps at least 6 months prior to the projected operation. The Service will re-evaluate potential effects to listed species once the District's initial operating plan for the A-1 Reservoir is delivered to the Corps.

On August 4, 2006, the Service project biologist for the A-1 Reservoir participated in the District's Threatened and Endangered Species Briefing for project contractors. During the briefing, the Project Manager advised that he had observed an eastern indigo snake that morning along a levee road in the northern portion of the A-1 Reservoir. This was the first documented observation of an eastern indigo snake within the project footprint. The Project Manager assured that the conservation measures for the eastern indigo snake as outlined in the Service concurrence letter and the permit would be implemented.

On October 10, 2006, the Service project biologist received notice from District contractors that an eastern indigo snake had been accidentally killed earlier in the day during construction activity. The Service project biologist promptly informed the Service's Office of Law Enforcement and the Corps' Regulatory Division.

On October 11, 2006, the Service project biologist conducted a site visit of the A-1 Reservoir footprint with District contractors. The Service positively identified and collected the dead eastern indigo snake. The visit included an inspection of the general construction site, the location where the snake was killed, the site of the first documented observation of an eastern indigo snake, and sites of additional eastern indigo snake observations. The contractors advised that up to eight additional snakes had been observed but as they were unsure of the exact number, they would verify the sightings documented in the A-1 Reservoir wildlife database and forward the information to the Service. Observations could have been multiple sightings of the same eastern indigo snake, multiple sightings of more than one snake, or observations of separate snakes. The site of mortality was a sediment mound approximately 10-15 ft high and 20-25 ft in diameter along the far side of a canal levee road, adjacent to fallow sugarcane fields. The sediment had been excavated from a canal and deposited along the far side of the levee road approximately one to two weeks earlier, was now dry, and was subsequently being moved to an adjacent area. The equipment operator had been trained to identify eastern indigo snakes and to stop activity if any were observed. The operator did not see the snake on the mound. As the sediment was being deposited, the operator observed an eastern indigo snake falling from the sediment. The snake had been cut in half and was placed in a freezer pending Service collection.

Other areas of observation included existing levee roads, fallow sugarcane fields, and a “haul road” adjacent to fallow sugarcane. The haul roads will be used to transport levee and other material and are currently lined with long banks of soil approximately 15 ft in height. The contractors further advised that approximately 23 miles of seepage canal will be excavated for the A-1 Reservoir and the soil and rock material will be piled alongside until used to construct the reservoir embankments in the future. During the visit, the Service noted educational materials were on-site and that *Standard Protection Measures for the Eastern Indigo Snake* (Service 2004) appeared to be adhered to, as evidenced by the operator’s awareness of the snake, his notification to his supervisor, and the contractor’s immediate notification of the Service. The Service acquired Global Positioning System (GPS) coordinates of the sites where snakes had been observed and requested the contractor immediately advise the Service of any future additional eastern indigo snake sightings, and to forward GPS coordinates.

On October 16, 2006, the contractor notified the Service by email that two snakes of different sizes had been observed in one area, and provided GPS coordinates. As the two snakes were observed at the same time, these were not multiple sightings of the same snake.

On October 20, 2006, the Corps delivered a signed letter by email to the Service initiating formal consultation for the eastern indigo snake, as required in the regulations governing interagency consultations (50 CFR § 402.14). The formal consultation is based on: (1) the mortality of a snake on October 10, 2006; (2) additional snake sightings within the project footprint; and (3) potential for changes to the A-1 Reservoir embankment design that may differ from those used for previous section 7 informal consultation and Service concurrence for the eastern indigo snake. Informal section 7 consultation for the eastern indigo snake was based on a design that included a sloped interior face of the embankment with no walls in order to allow any snakes potentially present to vacate the area during flooding of the reservoir. Potential new design changes to the embankment for the A-1 Reservoir may include steps made of Roller Compacted Concrete either above the waterline to the top of the embankment, or from the reservoir floor to the top of the embankment. A low wall along the top of the embankment is also being considered.

On October 26, 2006, the District provided a map via email containing all documented eastern indigo snake observations within the northern portion of the A-1 Reservoir. According to the map, to date there have been seven confirmed observations of eastern indigo snakes. The seven observations include: (1) the initial sighting on August 4, 2006; (2) the snake accidentally killed on October 10, 2006; (3) the two most recently observed; and (4) three additional sightings. Due to the documented observations and locations, it is likely at least four separate snakes have been observed in the northern portion of the project footprint.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

Proposed action

The Corps has issued a permit to the District to construct the first phase of the A-1 Reservoir. A permit has not been issued for operation of the reservoir. The A-1 Reservoir will eventually serve as the eastern cell of the EAA Project and will store a total of 190,000 acre-ft of stormwater runoff and Lake Okeechobee releases. The goals of the project as outlined in the final EIS are: (1) to capture and store Lake Okeechobee Regulatory releases and EAA basin runoff; (2) to deliver water from the reservoir to downstream natural areas via STA 3/4 at times of natural system need; and (3) to deliver water from the reservoir to meet local agricultural water supply demands that would otherwise be met via deliveries from Lake Okeechobee. The project is also expected to allow for recreational opportunities on at least some portions of the site.

The following discussion provides a general description of the A-1 Reservoir.

The A-1 Reservoir site is located within a portion of the EAA referred to as Compartment A-1 in Sections 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 35, 36, Township 46 South, Range 37 East; and Section 31, Township 46 South, Range 38 East, Palm Beach County, Florida. The proposed A-1 Reservoir (also referred to as Cell 1 of the EAA Project) is located in the eastern half of Compartment A and is bounded on the north and northwest by agricultural land, on the east by U.S. Highway 27 and the North New River Canal, on the south by STA 3/4, and on the southwest by the Holey Land Wildlife Management Area (WMA) managed by the FWC (Figures 1 and 2). The 15,924-acre project site is currently comprised of approximately 15,456 acres of atypical jurisdictional wetland areas (farmed sugarcane fields), 188 acres of jurisdictional nonagricultural wetlands, 150 acres of jurisdictional canals and ditches, and 119 acres of roads.

According to information presented in the A-1 Reservoir final EIS (Corps and District 2006a) and additional information requested by the Service, the District proposes to construct an approximately 15,200-acre above-ground reservoir in the eastern portion of Compartment A. The reservoir will consist of one cell capable of storing a total of 190,000 acre-ft of water at an approximate depth of 12 ft. Existing agricultural canals and an interior borrow canal excavated for fill material will provide approximately three to five percent of the A-1 Reservoir floor as deep-water refugia for aquatic organisms within the reservoir. The reservoir includes an earthen zoned embankment around the perimeter of the reservoir. The exterior face of the embankment will be planted with sod. During informal section 7 consultation for the eastern indigo snake, the interior face of the embankment was to consist of a 1V:3H slope overlain with concrete extending from the reservoir ground surface to approximately 13 ft in height (slightly above maximum water level), a wave-breaking bench, and a 1V:2H slope covered in concrete or riprap extending from the bench to the top of the levee (approximately 10 ft). The sloped surfaces would allow egress from the reservoir upon initial flooding in the event any eastern indigo

snakes were present. More recently, the District has indicated changes to the embankment design may include: (1) the interior face of the embankment composed of concrete steps from the water line to the top of the levee (Figure 3); (2) the interior face of the embankment completely composed of concrete steps from the reservoir floor to the top of the levee; and/or (3) a low wall at the top of the embankment surrounding the reservoir. In the newer designs, drain holes and ramps may be placed at intervals throughout the interior portion of the embankment. Steps covering the interior face of the embankment and the presence of a wall could potentially impede or prevent eastern indigo snakes from vacating the reservoir upon initial flooding. As the interior face of the embankment will be covered in concrete, the reservoir will not possess a vegetated littoral area. A 150-foot wide seepage buffer will be constructed along the eastern, northern, and western exterior perimeter of the reservoir (Figure 4). The seepage buffer will consist of a 50-foot wide maintenance berm with a 100-foot wide exposed caprock zone. Some areas within the exposed caprock zone, such as the solution holes and areas where muck may be spread, may contain sufficient amounts of soil to sustain small pockets of vegetation. The District has indicated the seepage buffer must remain clear and dry in order to conduct visual inspections of the embankment.

Once constructed, the sod exterior face of the reservoir embankment, will provide approximately 198 acres of grassland habitat, the seepage canal will provide 142 acres of open water habitat, and the muck covered areas along with the vegetated solution holes within the seepage buffer may provide approximately 82 acres of low quality wetland habitat.

For the purposes of this biological opinion, the Service is estimating total removal of appropriate habitat for the eastern indigo snake within the project footprint due to: (1) the conversion from existing community types to an open water aquatic reservoir and seepage canal; (2) the potential for walls and steps to preclude egress from, as well as access to, the reservoir; (3) construction and earth-moving activities presenting hazards to the snakes; (4) the presence of a seepage canal that may serve as a barrier; (5) the removal of soil and vegetation between the seepage canal and exterior embankment that will create both lack of appropriate eastern indigo snake habitat within the seepage buffer, as well as remove a corridor with appropriate cover leading to the embankment; (6) lack of appropriate cover on the grass vegetated exterior embankment; and (7) maintenance activities (mowing, etc) that will take place along the exterior face of the grass vegetated embankment further impacting the habitat potential. Therefore, the project will result in removal of 15,924 acres of habitat for the eastern indigo snake.

The project will be constructed in phases over approximately 3 to 4 years. Construction began in August 2006 and is expected to continue through June 2010. It is anticipated construction will occur 6 days per week for approximately 10 hours per day. Construction is expected to occur in the following phases:

Phase 1: Seepage Canal Construction

Construction activities are occurring along the perimeter of the reservoir project site and consist of stripping of topsoil, blasting and removal of caprock, and dewatering and excavation of the reservoir seepage canal. Excavated material is being placed upon the stripped caprock to allow optimum drying and for later use during Phase 4, embankment construction.

Phase 2: Embankment Prep and Slurry Wall Construction

Construction activities are expected to occur along the perimeter of the reservoir project site and consist of constructing a 30-inch wide by 30- to 70-foot deep trench through the caprock along the centerline of the reservoir embankment. The trench will then be backfilled with a bentonite soil mixture.

Phase 3: Borrow Pit Operations

Construction activities are expected to occur on the interior of the reservoir site and will focus on the production of rock material for the construction of the reservoir embankment. It is anticipated there will be three areas selected for use as borrow areas. These areas will be stripped of topsoil to caprock, with the caprock blasted, excavated, and fed into a rock crushing plant for use in Phase 4.

Phase 4: Embankment Construction

Construction activities are expected to occur along the perimeter of the reservoir project site and will consist of placing material excavated in Phase 1, along with rock excavated in Phase 3, along the centerline of the reservoir embankment. Concrete steps and walls may be included in the project design for the interior face of the reservoir embankment.

Phase 5: Pump Station and Gate Structure Construction

Construction activities are expected to occur along the perimeter of the reservoir project site and will consist of building the necessary pump stations and structures needed to operate the reservoir.

All construction equipment will be operated in compliance with Occupational Safety and Health Administration standards. Speed limits will be posted at the construction site and include 15 miles per hour (mph) for off roads and 25 mph on improved roads and levees. Security gates will be constructed to control access to the project sites.

The District will maintain the side slopes of the embankment by mowing and removing any larger woody vegetation that may take root. Exotic species will also be managed along the embankment and the seepage buffer through a variety of measures including mechanical removal and herbicides.

The A-1 Reservoir will be operated in accordance with the interim operations plan that will be described in the final PIR/EIS for the over-arching CERP EAA Project. According to the Corps' permit, the District must submit an operating plan for the A-1 Reservoir at least 6 months prior to the projected operation. The Service will review the operating plan to determine additional potential effects to listed species. The A-1 Reservoir is intended to store water from the S-2, S-6, and S-7 Basins, collected from the North New River Canal and then eventually release it as needed.

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 15,924-acre project footprint (with 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 central Florida was approximately 805 acres (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 15,924-acre footprint plus a 6,000-ft buffer zone (roughly approximated to be 18,000 acres) for a total of 33,924 acres. This addition to the action area is established to describe potential 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. Although additional negative impacts within the 6,000-ft buffer are possible, it is difficult to estimate the amount of take that would be associated with the buffer area. In addition, any or all of the eastern indigo snakes potentially affected within the 6,000 ft buffer may be those already accounted for within the project footprint. Therefore, for the purposes of this biological opinion, take is only estimated for eastern indigo snakes within the 15, 924-acre project footprint.

STATUS OF THE SPECIES/CRITICAL HABITAT RANGEWIDE

Species description

The eastern indigo snake is the largest non-venomous snake in North America, reaching 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. The anal plate is undivided. In the Florida 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 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 four 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 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 reach sexual maturity in three to four years (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 four 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 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 interspersed 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 most frequently observed near the canals, roads, and wet ditches (Zeigler 2006). Although eastern indigo snakes are likely found in other areas within citrus groves, the majority of observations in the above types of areas would be expected due to more human activities taking place in those areas, thereby increasing the opportunity to observe the snakes. Although the A-1 Reservoir footprint consists primarily of fallow sugarcane fields rather than citrus groves, observations of eastern indigo snakes are expected near similar manmade areas. King snakes (*Lampropeltis getula floridanus*) are prey of eastern indigo snakes and have been documented in sugarcane fields (Krysko 2002). In extreme southern 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 they prefer hammocks and pine forests as 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 acres during the winter (December through April), 106 acres during late spring through early summer (May through July), and 241 acres 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 acres, reducing to 390 acres in the summer (Moler 1985b). In contrast, a gravid female may use from 3.5 to 106 acres (Smith 1987). In Florida, home ranges for females and males range from 5 to 371 acres and 4 to 805 acres, respectively (Smith 2003). At the Archbold Biological Station (ABS), average home range size for females was determined to be 47 acres and overlapping male home ranges to be 185 acres (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). As in citrus groves, mortality of eastern indigo snakes due to equipment operation would also likely occur in sugarcane fields in the event snakes are in the vicinity. Periodic burning of the sugarcane fields could also potentially result in snake mortality.

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). The snake 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 as well as 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: (1) all Federal, State, or private actions and other human activities in the action area; (2) the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation; and (3) 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 no information on the distribution and abundance of the eastern indigo snake within the project footprint of the A-1 Reservoir prior to construction. Construction began in August 2006 and since that time four to seven snakes have been documented in the northern portion of the project footprint. See Figure 5 for a map indicating the general locations, dates, and status of the eastern indigo snake observations. One eastern indigo snake was observed along a levee roadside on August 4, 2006. Construction personnel reported two additional observations in August and one observation in September. On October 10, 2006, an eastern indigo snake was accidentally killed during construction activities and the Service was immediately notified (see the Consultation History for additional information). The site of mortality was a mound of excavated canal sediment along a levee road adjacent to a fallow sugarcane field. The mound had been present and drying in that location for one to two weeks. It is unknown as to why the snake was in or on the mound. Hypotheses include the snake may have entered the mound through an animal burrow or may have been basking on the far side of the mound out of visual range of the equipment operator. Two additional snakes were observed on October 16, 2006, at the same time. Although some of the observations could be repeat sightings of the same eastern indigo snake, as evidenced above, it is likely that at least four separate snakes have been observed with three additional observations indicating additional snakes or repeat sightings of already documented snakes. It is likely eastern indigo snakes also occur in adjacent areas including Holey Land WMA, STA 3/4, and agricultural fields. As expected from the locations of observations during construction activities within the A-1 Reservoir footprint, and as seen in citrus grove areas, most eastern indigo snake sightings seem to occur primarily along existing roads, along new roads under construction, and/or along canals and ditches. The network of

ditches and canals and the fallow fields likely provide prey items. Animal burrows in the canal banks may provide refugia for the eastern indigo snake. The Service assumes eastern indigo snakes are more prevalent where habitat and prey items are more plentiful.

Past Federal actions affecting the eastern indigo snake within the action area included the construction, operation, and monitoring of two reservoir test cells. Construction of the test cells began in January 2005 and was completed in May 2005 on 92.4 acres of fallow sugarcane fields. The test cells were constructed under a Nationwide Permit Verification from the Corps' Regulatory Division. No sightings of eastern indigo snakes were documented during construction of the test cells.

Factors affecting species environment within the action area

The sugarcane fields along the perimeter of the project footprint where construction of the seepage canals and levees is currently taking place have not been actively farmed since at least January 2006, the date the District advised farmers they must vacate the lands. However, the farmers may have ceased actively farming the land for some limited time prior to January 2006, depending on the timing of harvest activities. Therefore, the sugarcane fields along the perimeter have been fallow for at least 9 months and possibly slightly more. The District advises that active farming of sugarcane within the interior portion of the reservoir is ongoing and will continue to be allowed until the 2008-2009 growing season when the area must be vacated for continued A-1 Reservoir construction. The current construction site was, and the interior portions of the reservoir footprint are, actively managed including planting, pesticide application, periodic burning of the fields, harvesting activities, and periodic flooding of the fields. It is likely that prior to beginning construction activities, the fallow sugarcane fields provided improved habitat over fields that continued to be actively managed and/or where farming activities have recently ceased. Agricultural vehicles and equipment continue to access some roads and levees within the project footprint but, as stated above, access will likely cease in the 2008-2009 season. Construction automobiles and equipment are currently the most prevalent vehicles on both the existing levee roads and new roads within the project footprint.

The Holey Land WMA is adjacent to the southwestern perimeter of the project footprint and consists primarily of 35,000 acres of wetlands. The STA 3/4 adjacent to the southern perimeter of the project footprint is primarily composed of 17,000 acres of manmade filter marshes (wetlands), canals, levees, and other incidental upland sites. We anticipate both areas and potentially adjacent sugarcane fields contain populations of eastern indigo snakes and could serve as sources of immigrating eastern indigo snakes onto the project site.

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 A-1 Reservoir footprint during construction activities. Because eastern indigo snakes use a variety of habitats, and have very large home ranges, they may occur throughout the project site and/or on the adjacent farms, Holey Land WMA, and STA 3/4. As the eastern indigo snake has been observed within the project footprint during construction activities, this action is taking place in areas where this species is known to be present. The completion of project construction is slated for 2010. The operation and maintenance of the project is anticipated to last approximately 50 years. Potential impacts to eastern indigo snakes may occur due to mortality during the movement of construction equipment and vehicles, construction activities, earth moving, operation and maintenance of the project, and habitat destruction and degradation including conversion of current habitat to open aquatic areas with a non-vegetated seepage buffer. There is potential the eastern indigo snake will be extirpated from the project footprint. Construction and maintenance activities may particularly affect sensitive periods in the life cycle of the snake such as breeding, egg laying, hatching, etc. The action may also result in eastern indigo snakes leaving the area, abandoning den sites, and possibly losing 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 due to construction and flooding of the reservoir, and the loss of available habitat for foraging, breeding, and dispersing. Potential indirect impacts include: (1) future operation and maintenance associated with the reservoir that may result in mortality or injury from vehicular traffic, mowing, and/or pesticide usage; (2) fluctuations in prey density in the reservoir as water levels fluctuate and the reservoir potentially dries down; (3) potential inundation of snakes during rehydration of the reservoir in the event the reservoir becomes dry after initial flooding; and (4) mercury or pesticide contamination.

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 difficult to estimate the density of eastern indigo snakes within the A-1 Reservoir footprint 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 acres (100 ha). ABS contains fairly optimal habitat for the eastern indigo snake (*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).

As snakes have been observed within the project footprint, the A-1 Reservoir likely contains or intersects several eastern indigo snake home ranges. If we were to base population density within the A-1 Reservoir on estimates at ABS, we could estimate that as many as 168 adult eastern indigo snakes may be present within the A-1 Reservoir footprint (15,924 acres/247 acres x 2.6 snakes = 167.7 snakes). However, due to the poorer quality of habitat of sugarcane fields when compared to habitat at ABS, we anticipate that the density of eastern indigo snakes at the A-1 Reservoir would be considerably lower than that at ABS. Regular mowing, burning, flooding, harvesting, vehicular traffic, and pesticide usage on the project site due to farming activities has likely decreased the suitability of the habitat for eastern indigo snakes and their prey within the project footprint. Therefore, we have made a conservative estimate that the quality of the eastern indigo snake habitat associated with the A-1 Reservoir footprint is approximately 25 percent of that within ABS. Based on the 25 percent quality of habitat compared to ABS, we estimate there could be up to 42 adult eastern indigo snakes within the A-1 Reservoir footprint.

Although some additional negative impacts are possible within the 6,000-ft buffer due to intra-specific aggression by eastern indigo snakes displaced from the project site into adjacent areas and due to other forms of harassment, it is difficult to estimate the amount of take associated with the buffer area. In addition, any or all of the eastern indigo snakes potentially affected within the 6,000 ft action area buffer may be those already accounted for within the project footprint. Therefore, take is only estimated for eastern indigo snakes estimated to be within the project footprint.

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.*, almost complete disturbance of the site by construction and flooding), and 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 up to 95 percent of the eastern indigo snakes potentially impacted by the A-1 Reservoir 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, sugarcane fields would not be considered optimal eastern indigo snake habitat. However, due to multiple observations during 3 months of construction activities in only the northern portion of the project footprint, and as indicated in the Description of the Proposed Action above, we are assuming the entire A-1 Reservoir footprint is potential habitat for the eastern indigo snake. Therefore, we are considering the entire 15,924 acres 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, and reservoir (including vegetation management methods such as mowing, herbicide application, and physical removal); (2) fluctuations in prey density in the reservoir as water levels fluctuate and the reservoir potentially becomes dry; (3) potential inundation of snakes during rehydration of the reservoir in the event the reservoir becomes dry after initial flooding; and (4) chemical contamination. The indirect effects the proposed action may have on eastern indigo snakes within the project footprint 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 have 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 four 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.

Once construction is completed, eastern indigo snakes are not expected to occupy the perimeter of the project area (from the seepage canal to the exterior face of the levee) for long periods of time due to lack of appropriate cover. However, given the large size of the project site and the proximity to natural areas, STA 3/4, and adjacent agricultural lands, the Service anticipates eastern indigo snakes may occupy the area for short periods of time during operation and maintenance. Therefore, these snakes could be at risk to some extent from the operation of maintenance vehicles and equipment, although the precise impacts are difficult to measure.

Prey populations and reservoir drydowns: Due to the presence of an aquatic reservoir and seepage canal, and lack of a vegetated buffer, it is unlikely appreciable populations of prey items will colonize the project footprint. However, depending on the operation of the project and available water, the reservoir may occasionally dry out in low-precipitation years to some unknown extent, and could potentially attract prey for the eastern indigo snake. In the event the project design allows potential access to the reservoir floor by eastern indigo snakes, in the event the reservoir becomes dry, and in the event a prey base becomes established, the snake may be attracted to the reservoir floor and could potentially be vulnerable to inundation upon rehydration. The Service has previously recommended drydown of the reservoir be prevented or minimized to the practicable extent possible in order to prevent the potential remobilization and/or formation of contaminants into the water column. Maintaining water in the reservoir under dry conditions could also reduce the opportunity for establishment of a prey base for the eastern indigo snake, thereby not serving to attract snakes to the reservoir and limiting the

potential for adverse impacts. Due to the water available for this project, drydown is anticipated to occur infrequently and this potential effect should be re-evaluated as more data becomes available regarding inundation frequency.

Rehydration of the reservoir: A conservation measure for slow flooding of the reservoir upon initial startup has already been defined during informal consultation for the eastern indigo snake in order to allow the snake to vacate the reservoir. In this biological opinion, to err on the side of caution we are also including a term and condition to include slow rehydration of the reservoir after complete drydowns.

Contaminants: Recent sampling by the District has indicated that mosquito fish in some of the currently operating STAs south of the 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. Because the source of mercury is atmospheric, it is assumed this could become problematic in the A-1 Reservoir if suitable sulfate concentrations exist. However, a CERP Guidance Memorandum and a monitoring plan are in effect to detect any problematic mercury or pesticide contamination that may be found in the reservoir; and the Service has previously recommended, and continues to recommend, minimizing drydown events. In addition, we do not anticipate extensive use of the A-1 Reservoir footprint by the eastern indigo snake. Therefore, we anticipate 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 action is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent action is an activity that has no independent utility apart from the action under consultation. No interrelated or interdependent actions are expected to result from the project.

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, blasting, 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. In the event snakes are unable to vacate the reservoir during initial flooding or rehydration, there is the potential for mortality to occur. Individual eastern indigo snakes fleeing the area may be more vulnerable to predation and intraspecific aggression. The Service anticipates the eastern indigo snake population within the A-1 Reservoir is unlikely to recover from the effects of the proposed action.

It is anticipated all 15,924 acres of potential eastern indigo snake habitat within the A-1 Reservoir footprint would be impacted by the proposed action. The number of individuals present at the time of the action is not known. However, the Service has estimated as many as 42 eastern indigo snakes present on the site including as many as 31 adult males and 11 adult females. These estimates are based on population density estimates at ABS (Layne and Steiner 1996) and reduced from those densities based on inferior habitat quality in the sugarcane fields. It is not possible to estimate the number of juvenile eastern indigo snakes that may be present within the project footprint.

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. As the 6,000 acres of eastern indigo snake buffer lands identified as part of the action area outside of the project footprint are considered jurisdictional wetlands and require separate consultation pursuant to section 7 of the Act, no cumulative effects are expected.

SUMMARY OF EFFECTS

The Service anticipates that approximately 15,924 acres of eastern indigo snake habitat will be lost through conversion to the reservoir and associated roads and canals. The Service anticipates up to 42 eastern indigo snakes within the A-1 Reservoir footprint will be incidentally taken. The incidental take is expected to be primarily in the form of mortality. Although some additional negative impacts are possible within the 6,000-ft action area buffer, due to difficulty in estimating take associated with the buffer and because eastern indigo snakes potentially affected within the buffer may be those already accounted for within the project footprint, the Service is estimating take for eastern indigo snakes only within the project footprint.

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 of 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 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 fails to assume and implement the terms and conditions or 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 the proposed action will incidentally take the federally listed eastern indigo snake, though the level of incidental take may be difficult to detect due to the difficulties associated with noticing a dead or impaired specimen. It is possible the eastern indigo snake could be extirpated from the project footprint. The incidental take is expected to be in the form of harass, harm, wound, or kill. Due to difficulty in estimating take associated with the 6,000 ft action area buffer and because eastern indigo snakes potentially affected within the buffer may be those already accounted for within the project footprint, the Service is estimating take for eastern indigo snakes only within the project footprint.

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 vegetation and soil clearing, earth moving, construction, flooding of the reservoir, conversion of existing habitats to open water aquatic habitats, potential inclusion of steps and/or walls along the interior face of the reservoir, 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.

Based on the locations and circumstances surrounding observations of the snake within the A-1 Reservoir to date, we estimate at least four separate eastern indigo snakes, and perhaps as many as seven, are present within the northern portion of the project area since construction began in August 2006. One of the seven snakes was accidentally killed during construction activities. Because eastern indigo snakes use a variety of habitats, and have very large home ranges, eastern indigo snakes may occur throughout the A-1 Reservoir footprint. Consequently, the implementation of the project has, and may continue to, negatively impact the eastern indigo snake.

Starting with the reported density of eastern indigo snakes at ABS, and reducing that density to 25 percent based on the inferior habitat characteristics of sugarcane fields, the Service anticipates up to 42 eastern indigo snakes within the project footprint 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 (40 snakes). The remaining 5 percent of snakes would be harmed or harassed (2 snakes).

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 minimized 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 *Standard Protection Measures for the Eastern Indigo Snake* (Service 2004) will be incorporated into special conditions of the permit.
- b. District and contractor personnel, or other observer trained in the identification of eastern indigo snakes, shall visually evaluate the area to be cleared immediately prior to, during,

and following construction activities such as moving earth, blasting, etc. Although observing all sides of a mound or bank of earth to ensure an eastern indigo snake is not present would be optimal prior to construction activities (see Conservation Recommendation, Item 4), equipment operators may act as observers while seated in equipment as long as they are trained in identification and can clearly see the site they are approaching. However, only individuals who have been 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 physical contact with an eastern indigo snake. All others must observe from a distance.

- c. For avoidance and safety reasons, a speed limit of 25 mph will be posted for all vehicular traffic.
- d. Following completion of construction, the initial flooding of the reservoir will be at a rate of one-half inch per day until a depth of 6 inches is attained.
- e. Levee mower operators will scan the areas as they are mowing and also where vegetation has been cut immediately afterwards to 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 on-site personnel during construction and operations will be educated to recognize the eastern indigo snake. All vehicle and equipment operators will be notified to avoid all snakes and burrows if at all possible. 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 educational kiosks on the site.

3. Coordination with the Service

- a. Observations of live eastern indigo snakes associated with construction and operation activities shall be provided within 2 weeks of sighting to the Service's A-1 Reservoir biologist (Cindy Fury, A.R.M. Loxahatchee National Wildlife Refuge; 10216 Lee Road; Boynton Beach, Florida; 33437; 772-532-9776 or 561-735-6038). Additional information required to be reported to the Service includes GPS coordinates of the site of observation, as well as an approximate length of the snake. As approaching the snake is prohibited, observers can note where the snake was seen on the site and use reference points on the ground to later estimate size once the snake has left the area.

- b. In the event an eastern indigo snake is killed or injured during construction, operation, or other activities associated with the A-1 Reservoir, or if a snake appears to be sick, on-site personnel will immediately contact Service Law Enforcement at (Fish and Wildlife Service Office; 305-526-2789) as well as the A-1 Reservoir biologist (Cindy Fury, A.R.M. Loxahatchee National Wildlife Refuge; 10216 Lee Road; Boynton Beach, Florida; 33437; 772-532-9776 or 561-735-6038). Secondary notification should also be made immediately to the FWC, South Region; 8535 Northlake Boulevard; West Palm Beach, Florida; 33412-3303; 561-625-5122; 1-888-404-3922. If dead, the snake must be put on ice pending retrieval by the Service (see item “c” below). If the snake is injured and moves away from the project area, observers are to allow the snake to leave as observers are not authorized to handle the snake. If the snake is injured or sick and remains visible or is not moving, activities in the area must cease and the Service must be notified immediately, as above.
- c. If appropriate permits are obtained, care should be taken in handling sick or injured specimens to ensure effective treatment and care. In addition, care should be taken 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 or parts of 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.
- d. Annually, a report of all snakes killed or injured by operation or maintenance of the A-1 Reservoir must be submitted to the Service’s A-1 Reservoir biologist (Cindy Fury, A.R.M. Loxahatchee National Wildlife Refuge; 10216 Lee Road; Boynton Beach, Florida; 33437; 772-532-9776 or 561-735-6038). This report should contain the location, dates, times, and approximate size for any sightings of eastern indigo snakes, as well as indicating whether the snake was alive and moved away, was injured, appeared to be sick, was dead due to unknown causes, or was dead due to project activities. 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.

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. The Service will also review the potential need for re-evaluating the population estimate.

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. As recommended in past coordination with the Corps and District, and to the extent practicable for engineering and safety specifications, the interior face of the embankment should be designed and built as a continuous slope of at least 1V:3H with no walls or steps in order to allow egress of the eastern indigo snake upon initial filling of the reservoir, and also potentially during rehydration events.
2. In the event steps are included in the design for the interior face of the embankment, the steps should be designed and built with the smallest practicable height and include as many ramps as possible at intervals along the interior embankment to provide potential slopes for eastern indigo snakes to evacuate the reservoir.
3. In the event a wall is included along the top of the embankment, include gaps in the wall at the smallest practicable interval to allow eastern indigo snakes to evacuate the reservoir. If drain holes are to be included in the reservoir, design the holes to be at least 6 inches in diameter as eastern indigo snakes could potentially use the holes to evacuate the reservoir.
4. To the extent practicable, direct equipment operators or other personnel to visually inspect all sides of dirt mounds, berms, and other sites prior to commencing construction, earth-moving activities, and operational activities.
5. Following construction, maintain an educational kiosk for the public and operations personnel indicating listed species and other wildlife that may be observed in the A-1 Reservoir footprint.
6. Provide long-term ecological monitoring on eastern indigo snake prey densities and habitats in the project area.
7. If large snake skins are found, collect and dry them and send them to the Service's A-1 Reservoir biologist (Cindy Fury, A.R.M. Loxahatchee National Wildlife Refuge; 10216 Lee Road; Boynton Beach, Florida; 33437; 772-532-9776 or 561-735-6038) 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 Cindy Fury at 772-532-9776.

Sincerely yours,



Paul Souza

Field Supervisor

South Florida Ecological Services Office

cc:

Corps, Jacksonville, Florida (Pauline Smith, Nancy Allen)

Corps/SFRPO, West Palm Beach, Florida (Tori White)

District, West Palm Beach, Florida (Ken Ammon, Shawn Waldeck, John Mitnik)

FWC, Sunrise, Florida (Michael Anderson)

FWC, Vero Beach, Florida, (Joe Walsh)

FWC, West Palm Beach, (Ricardo Zambrano)

Service, Atlanta, Georgia (Dave Flemming) (electronic copy only)

Service, Atlanta, Georgia (Joe Johnston) (electronic copy only)

Service, Jackson, Mississippi (Linda LaClaire) (electronic copy only)

Service, Jacksonville, Florida (Miles Meyer) (electronic copy only)

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Table of acronyms and abbreviations used in this biological opinion.

Acronym/Abbreviation	Definition
A-1 Reservoir	Everglades Agricultural Area Reservoir A-1 Project
ABS	Archbold Biological Station
Act	Endangered Species Act of 1973, as amended
BA	Biological Assessment
CERP	Comprehensive Everglades Restoration Plan
Corps	United States Army Corps of Engineers
District	South Florida Water Management District
EAA	Everglades Agricultural Area
EAA Project	Everglades Agricultural Area Storage Reservoir Project
EIS	Environmental Impact Statement
ft	feet
FWC	Florida Fish and Wildlife Conservation Commission
FWCA	Fish and Wildlife Conservation Act
GPS	Global Positioning System
ha	hectare
mph	Miles per hour
MSRP	Multi-Species Recovery Plan
NOAA Fisheries	National Marine Fisheries Service
NWP	Nationwide Permit
PIR	Project Implementation Report
Service	United States Fish and Wildlife Service
SLE	St. Lucie Estuary
STA	Stormwater Treatment Area
WMA	Wildlife Management Area

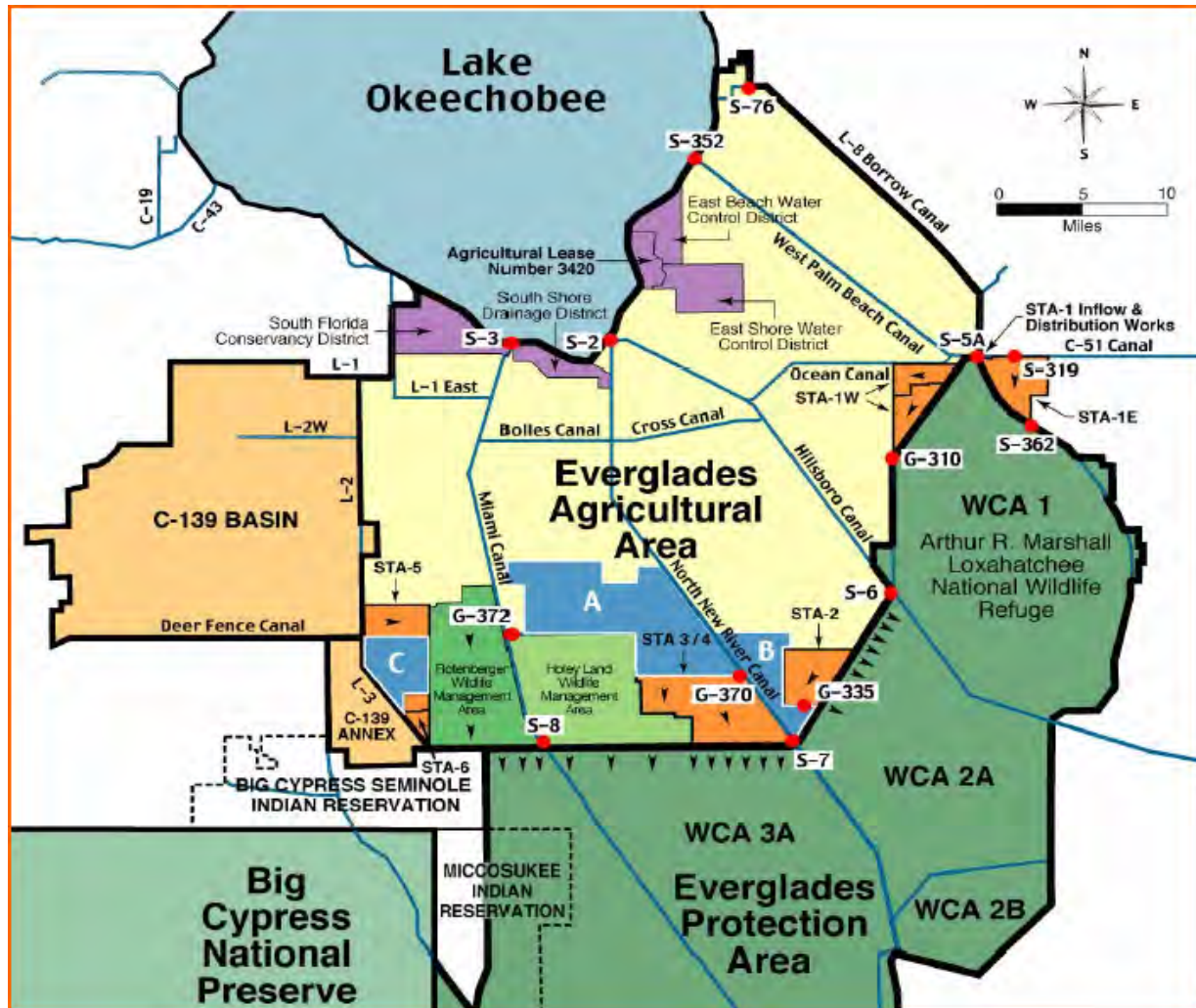


Figure 1. Location of the study area, including Compartments A, B, and C, within the Everglades Agricultural Area (EAA). The EAA Reservoir A-1 Project footprint is located in the eastern portion of Compartment “A”.

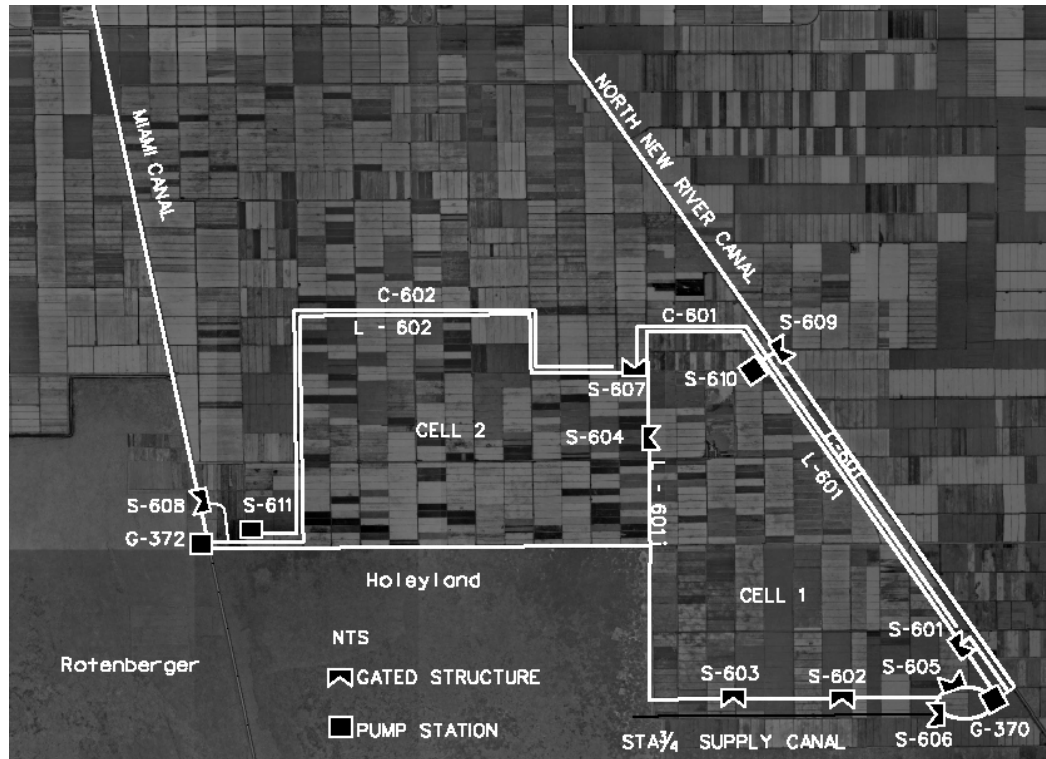


Figure 2. The Everglades Agricultural Area Reservoir A-1 Project footprint in Compartment A is labeled here as Cell 1. Cell 2 will be the western cell to be constructed as part of associated EAA Storage Reservoir Project.

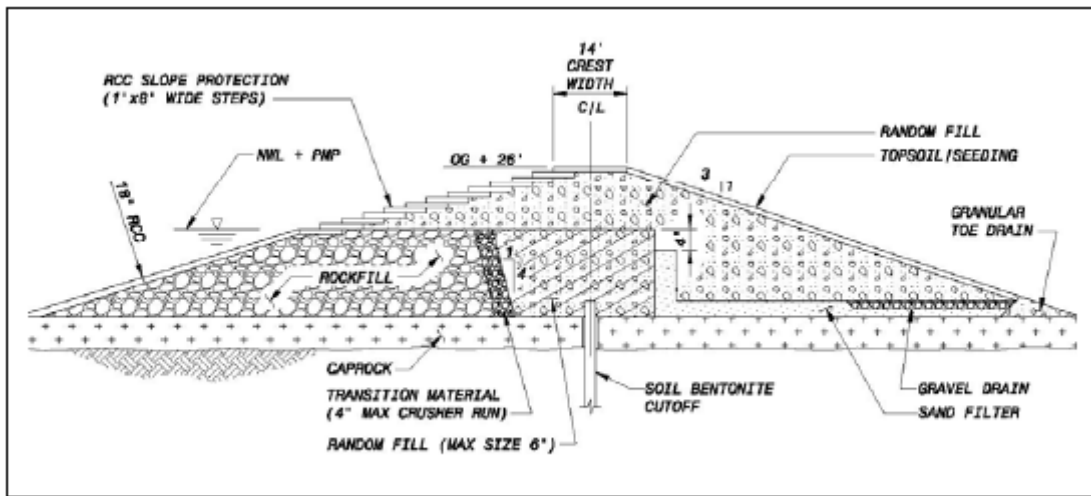


Figure 3. Cross section of the Everglades Agricultural Area Reservoir A-1 Project indicating a potential design change to include concrete steps on the interior face from the waterline to the top of the embankment.

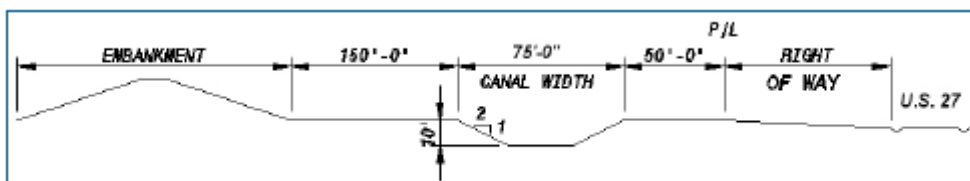


Figure 4. Cross section of the eastern side of the Everglades Agricultural Area Reservoir A-1 Project indicating a 150-foot seepage buffer between the reservoir and seepage canal.

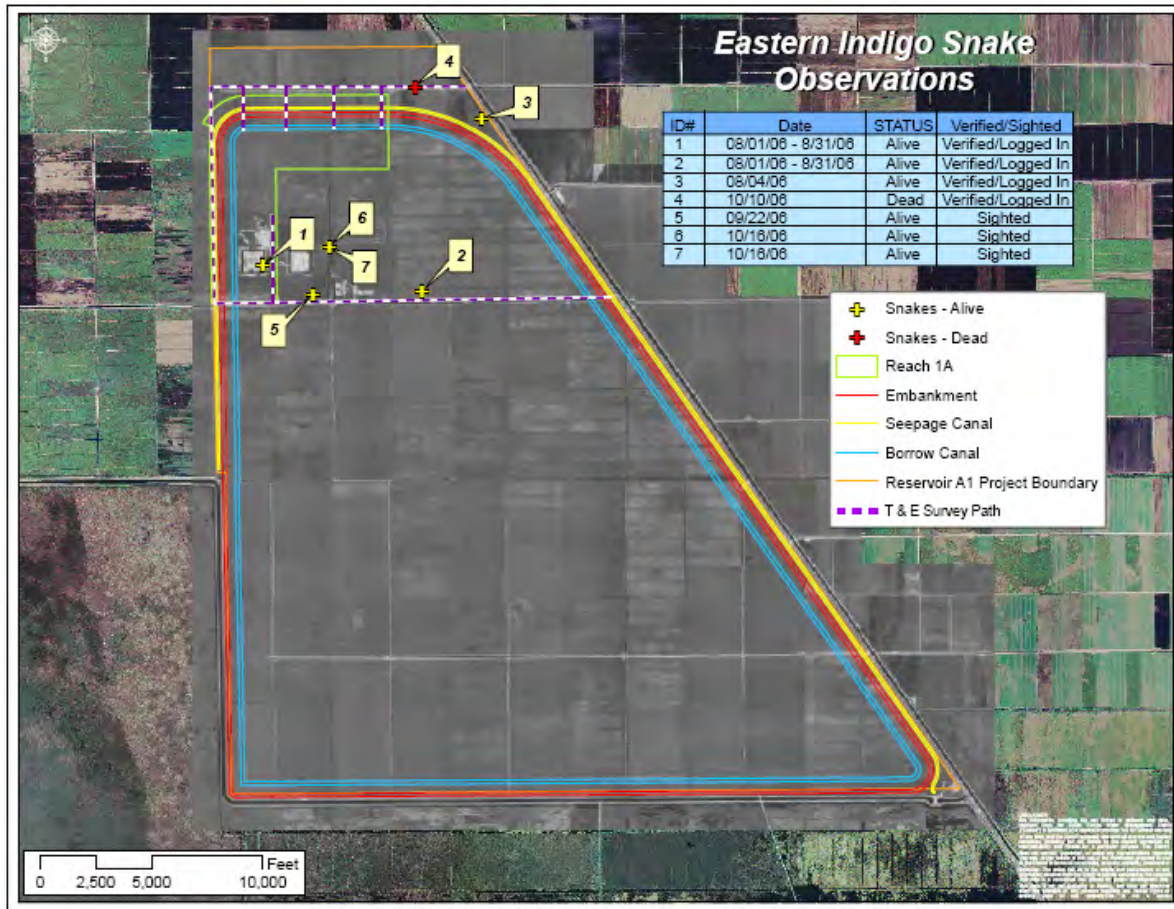


Figure 5. Locations, dates, and status of eastern indigo snake observations within the Everglades Agricultural Area Reservoir A-1 Project footprint as of October 26, 2006. The first documented observation was on August 4, 2006.