



United States Department of the Interior



FISH AND WILDLIFE SERVICE
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Service Consultation Code: 41420-2007-I-0513
Formal Consultation Initiation Date: March 5, 2007
Project: Kissimmee River Restoration Project
Contracts 10/12, 13b, 13c, and 18
Counties: Highlands and Okeechobee

Dear Colonel Grosskruger:

This document transmits the Fish and Wildlife Service's (Service) draft biological opinion based on our review of information from the U.S. Army Corps of Engineers (Corps) on the proposed Contracts 10/12, 13b, and 13c, and 18 of the Kissimmee River Restoration Project (KRRP) located in Highlands and Okeechobee Counties, Florida, and its potential effects on the threatened Audubon's crested caracara (*Polyborus plancus audubonii*) and eastern indigo snake (*Drymarchon corais couperi*). These contracts correspond to Reaches 2, 3, and 4 of the KRRP. The South Florida Water Management District (District) is the local sponsor conducting land acquisition as part of their non-Federal cost share. This biological opinion was written 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.*).

Your revised request to initiate formal consultation on Contracts 10/12, 13b, 13C, and 18 was received on December 13, 2006. Service Log Number 4-1-00-F-201 was previously assigned to this project to cover incidental take of caracaras associated with removal of spoil piles which was part of the earlier Phase I Backfilling actions under the KRRP. The Service has reassigned this project with a new number referenced above for the additional work described below. This biological opinion is based on information provided in your Revised Biological Assessment (BA) (Corps 2006); Audubon's Crested Caracara Nest Tree Survey - 2006 for the KRRP for Contract Sites 10/12, 13b, 13c, and 18 (LG² Environmental Solutions, Incorporated 2006); KRRP Environmental Impact Statement (Corps 1991); telephone discussions and meetings between the Service, Corps, and/or District; field investigations; files in the South Florida Ecological Services Office (SFESO) in Vero Beach, Florida; and other sources of updated information. A complete administrative record of this consultation is on file at the SFESO.

Based on the Corps' December 13, 2006, BA, the Corps determined the proposed project "is not likely to adversely affect" the threatened eastern indigo snake, the endangered wood stork (*Mycteria americana*), the endangered Everglade snail kite (*Rostrhamus sociabilis plumbeus*), and



the endangered bald eagle (*Haliaeetus leucocephalus*). The Service concurs with the Corps' determination of expected impacts to the wood stork, snail kite, and bald eagle, however, the Service recommended and the Corps agreed to formal consultation on the threatened Audubon's crested caracara and the eastern indigo snake.

Consultation History

On October 24, 1991, a Biological Opinion was issued to the Corps for the overall plan for the KRRP. Because detailed construction plans were still in development, incidental take was not authorized nor anticipated for any federally listed threatened or endangered species.

On December 19, 1991, the Service provided supplemental information to the Corps on alternative plans for the KRRP. The Service also concurred with the Corps' decision the project would not likely have adverse effects on the bald eagle, wood stork, eastern indigo snake, Audubon's crested caracara, or Florida grasshopper sparrow (*Ammodramus savannarum floridanus*).

On June 30, 1994, the Service provided a Fish and Wildlife Coordination Act (FWCA) report to the Corps for the Kissimmee Headwater Lakes Revitalization Project. The FWCA report provided recommendations to achieve the full restoration of wetland and aquatic resources in the project area and in the Kissimmee River. In the FWCA report the Service also concurred with the Corps' determination the project was "not likely to adversely affect" any federally listed species.

On October 28, 1999, the Service issued a Biological Opinion to cover incidental take of caracara nests that were present on spoil piles and were to be removed during Phase I Backfilling of the KRRP (Service 1999a). The location and number of these nests were not known when the Biological Opinion was written.

On November 21, 2002, the Service received a letter and project proposal from the Corps for Contract 7, a radio tower replacement and relocation project. In their letter, the Corps mentioned preliminary research indicated use of the project area by bald eagles and caracaras.

On November 25, 2002, the Corps issued the Service a letter requesting an incidental take statement for construction-related activities during the U.S. Highway 98 (US 98) project (Contract 8). The District's consultants, Johnson Engineering, told the Corps that a dead caracara was found along the road, close to the US 98 construction site. Consequently, the Corps contacted the Service to notify us that construction was occurring in this area. In response, we suggested all construction cease immediately until Service biologists were able to conduct an on-site investigation and a formal letter from the Corps documenting initial construction and describing the project.

On December 2, 2002, Service biologists met with Church Roberts of Johnson Engineering and Stefani Melvin of the District at the US 98 construction site to review data on local caracara nests and conduct a cursory investigation for possible caracara nests located near the construction site.

On December 12, 2002, the Service sent a letter to the Corps requesting: (1) caracara surveys be performed around the project area; (2) the Corps provide the Service with an effect determination

for the caracara; and (3) the Corps and District meet with the Service to discuss the need to re-analyze the potential effects of KRRP construction projects that were scheduled to commence in fiscal years 2003 and 2004 on listed species.

On December 18, 2002, a meeting was held at the SFESO to discuss upcoming KRRP contracts that were likely to be executed during fiscal years 2003 and 2004. Using data we had collected on bald eagle and caracara occurrences in the Kissimmee River area, we conducted a preliminary evaluation of the potential effects on listed species resulting from KRRP Contracts 2B1, 6A1A, 7, 8, 9, and 16.

On December 19, 2002, the Service responded in writing to the Corps' letter requesting technical assistance on Contract 7 of the KRRP by providing guidance for the location, construction, operation, and decommissioning of communication towers. In addition, the Service suggested the Corps conduct caracara, bald eagle, and other migratory bird surveys of the project area and nearby surrounding landscape before initiating construction.

On January 31, 2003, the Service received a BA from the Corps for Contracts 2B1, 6A1A, 7, 8, 9, 15, and 16. The Corps' cover letter requested a biological opinion be issued for Contracts 2B1, 8, and 9.

On February 19, 2003, during a telephone conversation between the Service (David Hallac) and the Corps (Catherine Byrd), the need for initiation of formal consultation on Contracts 7 and 15 was discussed. The Corps had determined earlier these contracts would have "no effect" on listed species. Based on the likelihood listed species were present in the project area, the Service recommended the Corps revise its determination to "may affect" on listed species. In response, the Service received an electronic mail correspondence from the Corps (Catherine Byrd) reconsidering the Corps' position and agreed to change its determination on Contracts 7 and 15 to "likely to adversely affect" the caracara and bald eagle.

On March 11, 2003, the Service sent a letter to the Corps acknowledging the initiation of formal consultation beginning February 19, 2003, for Contracts 2B1, 7, 8, 9, and 15. We concurred with the determination of "not likely to adversely affect" the listed species for Contracts 6A1A and 16.

On March 24, 2003, the Corps (Catherine Byrd) informed the Service by telephone that a previously considered site (Rolling Meadows) for disposal of spoil from dredging of the C-37 canal was no longer being considered. Instead, spoil would be partially disposed along the right-of-way of C-37, and negotiations were under way with the Zipperer family to use pasture adjacent to the C-37 canal for additional spoil disposal. Sally Kennedy, the District's KRRP project manager, confirmed that the District was negotiating with the Zipperer family for spoil disposal.

On April 17, 2003, the Corps (Catherine Byrd) informed the Service, by telephone, that the Corps now was unable to use a previously considered site for Contract 7 radio tower construction, and alternative construction sites were under investigation.

On May 21, 2003, the Service learned the Corps and District had a tentative site selection for Contract 7 that was located on the Kissimmee Prairie Preserve State Park (Preserve). However, the Service, along with the Preserve's managers, attempted to dissuade the Corps from using the site due to the Preserve's high value as habitat for the endangered Florida grasshopper sparrow.

On June 9, 2003, two Service biologists visited the CSX Railroad bridge project area, the River Acres Subdivision, and the Preserve with the Corps (Catherine Byrd and Trent Ferguson). We determined no scrub habitat was present along the CSX Railroad, despite indications in the Service's Geographic Information System (GIS) database it might be present in the area. Personnel from the Preserve were unable to confirm any portion of the Preserve was under consideration for the radio-tower project.

On July 11, 2003, the Service sent an email to the Corps as a final request for information on the location of the radio-tower project. No further information was furnished.

On November 4, 2003, the Service provided the Corps with a Biological Opinion to cover incidental take for the caracara and bald eagle that may occur as a result of Contracts 2B1, 8, 9, and 15 for the KRRP. This Biological Opinion included reasonable and prudent measures to reduce the project's potential adverse effects and conservation measures to help the recovery of these species (Service 2003).

On July 20, 2004, following a site inspection of the proposed relocation for the radio-tower project, the Service concurred with the Corps' determination of "no effect" on listed species. We asked the Corps consider a design for the radio tower that would reduce the likelihood of impacts on non-listed migratory birds. The Corps agreed to share preliminary design information with the Service to reach a design that would have less impact on migratory birds.

On December 2, 2004, the Service, Corps, and District conducted a site investigation of the completed Phase I restoration work and the proposed work under Contract 13a in Reach 4 of the KRRP. An active caracara nesting tree had been reported adjacent to southern spoil bank (Spoil Mound A), however, no caracara or nesting activity was observed at that site during the visit.

On April 8, 2005, the Corps contacted the Service via email to report a recent finding of a caracara nesting in a cabbage palm (*Sabal palmetto*) on the western edge of the northern spoil bank (Spoil Mound B) and to discuss the possible effects the proposed project could have on the caracara.

On April 11, 2005, the Corps provided a map and project scheduling information to the Service via email.

On April 12 and 13, 2005, the Service provided technical assistance to the Corps and requested additional hydrologic information via email.

On April 20, 2005, the Corps sent a letter to the Service that determined the proposed backfilling activities in Contract 13a in Reach 4 would likely have an adverse affect on the caracara and requested formal section 7 consultation with the Service. Letter enclosures supporting this determination included a BA, and an Audubon's Crested Caracara Nest Tree Survey Report (Dial Cordy and Associates, Incorporated 2005).

On May 2, 2005, the Service provided comments to the Corps via email and requested additional hydrologic and topographic information in order to initiate formal section 7 consultation.

On May 5, 2005, the Corps requested, by telephone, the Service clarify its May 3, 2005, email with comments and information request. The Service responded to the request, and the Corps indicated a Revised BA would be forthcoming.

On May 20, 2005, the Corps issued a letter along with a Revised BA, dated May 16, 2005, to the Service that addressed five federally protected species which may occur in the action area (Corps 2005a). These protected species included the threatened Audubon's crested caracara, endangered Everglade snail kite, threatened bald eagle, endangered wood stork, and threatened eastern indigo snake. The Corps determined the proposed action would have no adverse effect on the Everglade snail kite, bald eagle, wood stork, and eastern indigo snake, but may adversely affect caracara. The Corps also determined no critical habitat has been designated within the action area for any listed species.

On May 26, 2005, after a telephone discussion with the Service (Carl Couret), the Corps (Catherine Byrd) sent an electronic mail correspondence to the Service that modified its May 16, 2005, Revised BA "no adverse effect" determination for the eastern indigo snake to a "may adversely affect" determination.

On June 1, 2005, the Service (Carl Couret) sent an email to the Corps (Catherine Byrd) requesting additional project information, including estimated areas of spoil mounds by habitat types, location of off-site access and staging areas, historic floodplain topography, and an explanation of the hydrograph and monitoring maps. These were provided to the Service on May 20, 2005.

On June 14, 2005, the Service sent a letter to the Corps acknowledging initiation of formal consultation for Contract 13a. The Service concurred with the Corps' determinations of "may adversely affect" for the caracara and eastern indigo snake, and "no adverse effect" for the Everglade snail kite, wood stork, and bald eagle. Additional project information (e.g., habitat types/areas, access roads, ecological benefits) was also requested.

On July 5, 2005, the Service received a letter from the Corps dated June 29, 2005, providing the additional project information that we had requested. The Service also provided the Corps with a preliminary Incidental Take Statement for the caracara and eastern indigo snake.

The Service issued a formal consultation for Contract 13a on August 2, 2005, covering incidental take for both the caracara and the indigo snake.

On December 15, 2006, the Service received a request to initiate formal consultation concerning the possible effects of the proposed KRRP, Contracts 10/12 (backfilling of Canal-38 [C-38] at Reaches 2 and 3), 13b and 13c (backfilling of C-38 at Reach 4), and 18 (re-carving of historic oxbows, U-shaped weir, DX-1 structure, and construction of berms in the Pool D Area) on the threatened Audubon's crested caracara.

On February 6, 2007, the Service sent an email requesting project dates for construction, available survey data for gopher tortoises (*Gopherus polyphemus*), and the reason for not including the threatened Eastern indigo snake in formal consultation.

On February 7, 2007, the Service received an email from the Corps providing the additional project information that we had requested.

On February 9, 2007, the Service sent an email requesting information on the protection measure assurances for the Eastern indigo snake on the contracts under consultation.

On February 12, 2007, the Corps responded by email and indicated the same precautions would be implemented for indigo snakes that were used for Contract 6A2, Istokpoga Canal.

On February 12, 2007, the Service sent an email to notify the Corps that the eastern indigo snake will be part of formal consultation due to site suitability for the snake, and recently gained information from other projects.

On February 12, 2007, the Corps sent an email concurring with the Service's request for formal consultation on the eastern indigo snake, as well as the caracara.

On March 5, 2007, the Service sent a letter to the Corps acknowledging initiation of formal consultation for the proposed action. The Service concurred with the Corps' determinations of "may adversely affect" on the caracara, and "no adverse effect" on the Everglade snail kite, wood stork, and bald eagle; and requested formal consultation on the eastern indigo snake. Additional project information (e.g., habitat types/areas, access roads, ecological benefits) was also requested.

On April 6, 2007, the Corps responded to the Service's March 5, 2007, request with additional information.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

A. General Description and Authorization of the KRRP

The Kissimmee River is the largest watershed providing surface water to Lake Okeechobee. Historically, the river meandered within a 1 to 2 mile-wide-floodplain that extended about 103 miles from Lake Kissimmee to Lake Okeechobee. The river supported a mosaic of aquatic and wetland habitats and its natural flow regime inundated the floodplain for prolonged periods of time during the wet season. Between 1962 and 1971 the Kissimmee Flood Control Project was implemented which created six water control/navigation structures and confined river flows to a 56-mile canal system (C-38) to increase water conveyance and reduce flooding between Lake Kissimmee and Lake Okeechobee. This resulted in significant alterations of the river's normal flow regime and floodplain processes which caused drastic declines in wintering waterfowl, wading bird, and game fish populations, as well as the loss of ecosystem functions along this river system (Corps 1991, 2005b).

Congress recognized the need to restore this riverine ecosystem and authorized the KRRP in 1992. This project would return the Kissimmee River's flows to its original riverbed, oxbows, and floodplain, and thereby restore the basin's historical hydrologic conditions, river/floodplain connectivity, fish and wildlife resources, and ecological integrity. This would be accomplished by removing two water control structures and backfilling from 22 to 29 miles of the C-38 Canal, which would restore about 40 square miles of the river/floodplain ecosystem including 43 miles of riverbed and 27,000 acres of wetlands. It is expected a more natural flow regime and restored river-floodplain connectivity would enhance aquatic and wetland habitats, as well as their dependent fish and wildlife resources, in the lower Kissimmee River. Phase I of the KRRP, completed in March 2001 is located in Pool C. It backfilled about 7.5 miles of the C-38 Canal which restored a more natural flow regime in 15 miles of the Kissimmee River's original riverbed and improved about 11,000 acres of floodplain wetlands (Koebel 1995; Corps 2005b; District 2005).

The Biological Opinion issued in 1991 for The Feasibility Report stated that the project would have minimal adverse effects on the caracara, but did not authorize incidental take. Since the initiation of construction, four Biological Opinions have been issued (Jan 1999, Nov 2003, Aug 2005, and June 2006) to authorize incidental take for the caracara. This Biological Opinion addresses the potential impacts the proposed Contracts 10/12, 13b, and 13c (Reaches 2, 3, and 4 backfilling portion of the KRRP), and 18 would have on the threatened Audubon's crested caracara and the eastern indigo snake. This substantial construction effort, expected to last for an estimated 42 months during these contracts, is expected to result in at least temporary adverse effects, including disruption of nesting and foraging activities for any caracara located within the primary (300 meters) and secondary zones(2,000 meters).

The spoil mounds will be degraded to restore the floodplain, and the material will be used to backfill C-38. The mounds will be heavily traveled by earthmoving equipment as an access road during project construction. Access roads from a previous Contract (13a) will be used, as well as newly constructed roads (Figures 2 and 3).

B. Specific Descriptions of the Contracts Covered in this Biological Opinion

Contract 10/12

The proposed action under Contract 10/12 (Pool D) backfilling project is located along the Kissimmee River from Section 20, Township 35 South, Range 32 East through Section 16, Township 36 South, Range 33 East in Highlands and Okeechobee Counties, Florida. The purpose of this contract is to restore flow to the oxbow and floodplain system by filling in the canal and forcing the water through the oxbows. Access road locations have not been finalized. The construction, scheduled to begin in July 2009 and to be completed by March 2011, would:

1. Backfill approximately 47,520 feet of C-38 from the south end of Reach 1 (near the confluence of Istokpoga Creek and Kissimmee River) south to the new U-shaped weir to be located in C-38, 2,000 feet north of the existing CSX railroad crossing of C-38. Construction activities will involve the excavation of spoil mound material adjacent to the C-38 Canal and placing this material in the canal (C-38). In addition, this contract will include the demolition of Structure (S) 65C. The total estimated area of work for the backfill is 338.2 acres, while the estimated area for natural wetland development is 1,400 acres.

2. Construct a new weir approximately 2,000 feet north of the existing CSX railroad crossing of C-38. The intent of the weir is to act as a barrier during normal flows and as an overflow during high volumes by allowing water to go down the current C-38 Canal and under the existing CSX bridge. Weir dimensions are 25 feet-wide by 600 feet from one side of the weir to the other; and 1,000 feet in length. The U-shaped structure will consist of a double steel sheet pile wall with fill between the walls and a concrete pile cap. North of the CSX railroad crossing, the concrete structure is connected to earthen berms of approximately 1,000 feet in length on each side. These berms will prevent flows from entering the C-38 Canal from the oxbow/floodplain under average flows. In order to maintain navigation in the Kissimmee River south of the CSX bridge, a channel will be dredged south of the levee that runs between the oxbows/floodplain, and the bypass for S-65D. This will allow navigation traffic to go through the lock at S-65D. A partial backfill north of the U-shaped weir will provide a more desirable flow path for the higher flow times to the remaining C-38 Canal than the alternative of spreading the flow across the floodplain prior to entering the weir structure. The estimated area of impact for this structure is 4.13 acres.

Contract 13b

The proposed action under Contract 13b (Pool B) backfilling project is located along the Kissimmee River from Section 33, Township 32 South, Range 32 East through Section 35, Township 33 South, Range 31 East in Highlands and Okeechobee Counties, Florida. The construction, scheduled to begin in July 2007 and to be completed by August 2008, would backfill approximately 19,250 feet of C-38 from the north end of Weir 1 to north of Weir 3. Construction activities will involve the degradation of spoil mound material adjacent to the C-38 Canal and placement of this material in the canal (C-38). The total estimated area of work for the backfill is 150.3 acres.

Contract 13c

The proposed action under Contract 13c (Pool B) backfilling project is located along the Kissimmee River from Section 33, Township 32 South, Range 32 East, through Section 35, Township 33 South, Range 31 East, Section 35 in Highlands and Okeechobee Counties, Florida. The construction, scheduled to begin in July 2009 and to be completed by March 2011, would:

1. Re-carve three oxbows between Weir 1 and Weir 3. Oxbow excavation will occur in three segments; Segment 1 is 13,000 feet, Segment 2 is 4,000 feet tied into an existing remnant oxbow system on the west side of C-38, and Segment 3 is 2,250 feet tied to the southern end of Weir 3. This contract will result in a total of 19,250 feet of re-carved oxbows.
2. Additional backfilling north of Weir 3 may be necessary, and would be included as part of this contract if required. Backfilling would be south of S-65A, but the amount of fill is presently undetermined. This portion of the backfilling is not part of the proposed action and is not reviewed within the scope of this Biological Opinion, due to the lack of currently available information.

Contract 18

The proposed action under Contract 18 (Pool D) backfilling project is located along the Kissimmee River from Section 33, Township 32 South, Range 32 East through Section 35, Township 33 South, Range 31 East in Highlands and Okeechobee Counties, Florida. The construction, scheduled to begin in January 2008 and to be completed by April 2009, would:

1. Degrade approximately 1.5 miles of levee located along the western side of C-38 from the CSX railroad bridge to S-65D.
2. Degrade a levee located south of US 98 (formerly the Bass property).
3. Construct a weir in the S-65E tie-back levee approximately 1,500 to 2,000 feet in length.
4. Improve three oxbow segments in Pool D, totaling 18,269 feet in length.
5. The total estimated work area for Contract 18 is 104 acres.

C. Additional Description of Actions Incorporated by the Corps to Minimize Effects

Through informal consultation with the Corps, we have mutually agreed to a number of actions that will reduce the likelihood of adverse effects on Audubon's crested caracara and the indigo snake; these have been incorporated into the Corps' plans and are documented in their Biological Assessment (Corps 2006). To reduce the anticipated effects of the proposed action on caracara nesting in the project footprint, the Corps considered three options:

1. Avoid construction activities within the active nest trees' primary zone (300 meters) from the nest trees during the nesting season;
2. Remove the known caracara nest trees with other potential (unoccupied) nest trees in the project footprint and begin construction activities before the caracara pairs in their respective territories begin nesting in the next breeding season.
3. Allow time for caracaras that are nesting within the primary zone of construction, but not directly in the project footprint, to acclimate to construction activities. In this case, the Corps would implement the standard 300-meter zone around such active nests until the nestlings have fledged; survey during construction to identify if caracaras have acclimated to construction activities, and mark such nests for monitoring while construction continues.

The Corps chose the alternative of removing the potential nest trees during the non-nesting season as the most viable alternative. According to the Corps' BA (Corps 2006) for these contracts, removing trees from the spoil mound that might provide desirable nesting habitat would occur prior to construction and outside of the nesting season. This will allow all of the material on the spoil mounds to be degraded, and the floodplain to be continuous once backfilling the canal is complete. Because removal of the trees would occur outside of the

nesting season, no active nests will be taken. The form of take would be limited to loss of the previously used nesting tree and modification of the nesting pair's behavior in that they will be forced to construct and use a nest elsewhere in their territory. Other suitable habitat is available nearby for the caracara to relocate.

The Biological Assessment only included an agreement by the Corps to follow the Service's *Standard Protection Measures for the Eastern Indigo Snake* (Appendix C). Because of the project's large footprint and the ample opportunity for indigo snake nesting and foraging (including occupation of tortoise burrows), the Service believed that additional measures would be needed to further reduce potential impacts to the indigo snake. Because this agreement was reached late in the informal consultation process, the Corps did not include any additional measures to reduce likely adverse effects on this species in their Biological Assessment. On this basis, the Corps agreed formal consultation would be necessary.

D. The Action Area

Figure 1 is a general location map for the action area. For the purposes of this consultation, the action area includes the project footprint for the project areas (Figure 2 and 3), plus a 6,600-foot (2,000-meter) buffer around the perimeter of the project footprint. This distance corresponds to the standard secondary zone for caracara nests and is considered an adequate buffer to protect them from disturbance (Morrison 1998; Service 2002). The term "project impact area" is also used in this document, and includes both the project footprint and areas of hydrologic change (restored floodplain habitat).

STATUS OF THE SPECIES/CRITICAL HABITAT

The following discussion is summarized in part from the *South Florida Multi-Species Recovery Plan* (MSRP) (Service 1999b), as well as the detailed species accounts found in Morrison (1996a, 1996b, 1997a, 1998), Layne and Steiner (1996), the Service's *Habitat Management Guidelines for Audubon's Crested Caracara in Central and Southern Florida* (Appendix B), and subsequent scientific literature. The Service has cited the MSRP in this biological opinion while recognizing that it represented the best available science in 1999, and we have used that and the most current scientific information to reach our opinion.

Species/critical habitat description

Audubon's Crested Caracara

Audubon's crested caracara is a large, long-legged, raptor with a crest, featherless face, heavy bill, and elongated neck. Body length typically measures 50 to 60 centimeters (cm) with a wingspan of about 120 cm (Layne 1996). The long legs, flat feet, and only slightly decurved claws indicate its terrestrial habits (Morrison 1996a). Caracaras are blackish-brown overall, with a white throat and neck, bare yellow-orange facial skin, and a pale bluish bill. Sexes are similar in appearance in adult birds. The call is a high, harsh cackle, for which the bird is named. No critical habitat is designated for the caracara.

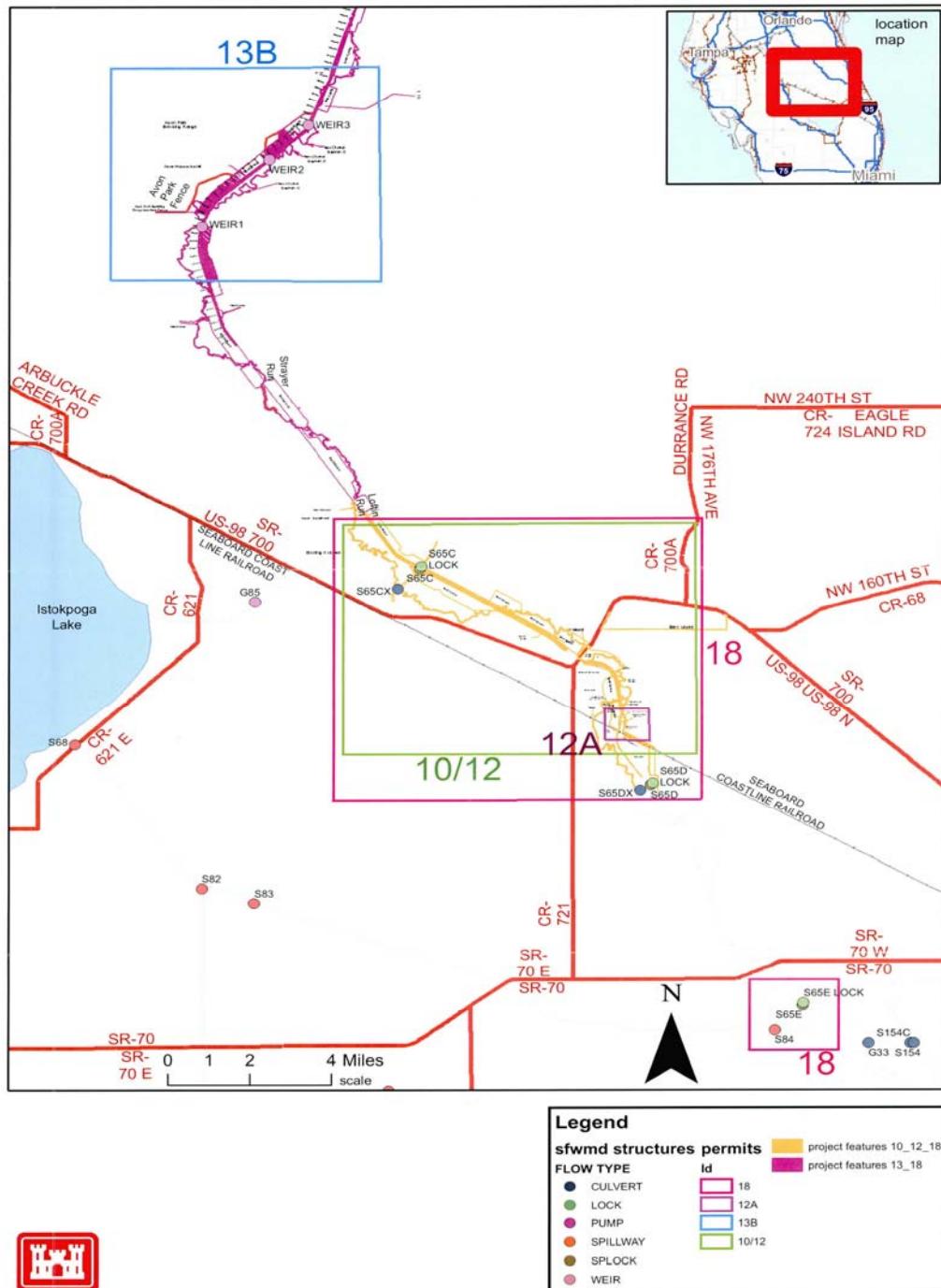


Figure 1. KRRP Contracts 10/12, 18, 13b, and 13c Location Map.



Figure 2: Project footprint for KRRP Contracts 10/12 and 18. The action area covers an additional 2,000 meters around the project footprint.



Figure 3. Project footprint for KRRP Contracts 13b and 13c. The action area covers an additional 2,000 meters around the project footprint.

Eastern Indigo Snake

The eastern indigo snake is the longest snake in the United States, reaching lengths of up to 265 cm (Ashton and Ashton 1981). 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. This species has large, smooth (the central 3 to 5 scale rows are lightly keeled in adult males) scales arranged in 17-scale rows at mid-body, and has an undivided anal plate (Service 1999b). No critical habitat is designated for the indigo snake.

Life history

Audubon's Crested Caracara

Caracaras are relatively long-lived raptors. Although age of first breeding is unknown (Palmer 1988), caracaras are thought to breed at about 4 years of age after attaining full adult plumage (Layne 1996). Pairs of breeding caracara are apparently monogamous and remain together on the territory throughout the year, although they are not easily observed outside the breeding season (Morrison 1997a, 1997b).

Caracaras forage within a variety of habitats, including improved and semi-improved pastures, adjacent to rural dwellings and farm buildings, newly plowed or burned fields, and agricultural lands, including sod and cane fields, citrus groves, and dairies (Morrison 1996a, 1996b). Humphrey and Morrison (1997) found caracara forage in wetlands more frequently than was previously thought (Morrison 1998). The caracara is a diet generalist and highly opportunistic in its feeding behavior, eating carrion and capturing live prey (Layne 1996). Road-killed animals, primarily raccoon (*Procyon lotor*), opossum (*Didelphis virginiana*), and armadillo (*Dasypus novemcinctus*), represent an important source of carrion for caracaras (Layne 1996). The caracara's wide range in diet preferences extends from a variety of invertebrate prey such as crayfish, beetles, grasshoppers, worms and insects in pastures associated with carrion and dung, to vertebrate prey including rats, mice, skunks, rabbits, squirrels, snakes, frogs, lizards, nestling birds and bird eggs, turtles, and fish (Morrison 1996a, 1996b; Humphrey and Morrison 1997; Morrison 1998).

Prior to the early 1900s, the caracara's range in Florida was more extensive and primarily north of its current range (Bryant 1859; Scott 1892). Caracaras were more common and widespread throughout St. Johns River marshes and the prairie region of central Florida (Phelps 1912; Nicholson 1929; Howell 1932; Stevenson and Anderson 1994). The breeding range in Florida is currently restricted to the south-central peninsular region. Although caracaras historically nested in native prairie habitat adjacent to marshes, they now regularly use "improved" pastures, dominated by exotic forage grasses, and a maintained low vegetative structure (Morrison 1998). Nesting habitat for caracaras in south-central Florida generally consists of large expanses of pastures, grasslands, or prairies dotted with shallow ponds and sloughs and single or small clumps of live oak (*Quercus virginianus*), cabbage palm, and cypress (*Taxodium distichum*) (Morrison 1996b). Caracaras prefer to nest in cabbage palms; however, Morrison et al. (1997) documented a nest in cypress along the edge of Lake Istokpoga that successfully fledged two chicks. Nests are usually located in trees over 5 meters in height, with large, full, closed crowns, and on the southeastern to southwestern edge of a group of trees (Morrison 1998).

Both males and females participate in nest building. Nest building activity ranges from 2 to 4 weeks with up to a 2-month time period between nest completion and egg-laying (Humphrey and Morrison 1997). In Florida, breeding activity can occur from September through June, with the primary season being November through April. Peak egg-laying occurs from late December through early February (Morrison 1998). Double brooding (two clutches successfully reared in one breeding season) has been documented in the Florida population, particularly for pairs that initiate nesting early in the season (Humphrey and Morrison 1997). A 3-year study of Florida caracaras conducted by Humphrey and Morrison (1997) found this population has a relatively high nest success and productivity compared to most raptors and in contrast to what has been previously reported for this population. This high reproductive success was demonstrated in the high territorial occupancy and breeding rates combined with relatively low nest failure rates and multiple nesting attempts of breeding pairs.

Caracaras exhibit strong fidelity to a nest site and year-round home range (Humphrey and Morrison 1997). Observations in south-central Florida indicate that pairs generally attempt breeding annually when the nesting site and surrounding feeding habitat are not substantially altered (Morrison 1997b). Nests and nest supports (trees and bushes) are often reused from year to year (Morrison 1996a, 1996b). Factors affecting nesting success may include weather, predation, and accidents, with most nest failures occurring near hatching (Morrison 1996a, 1996b).

Although the distance between caracara nests can be as close as 1.5 kilometer (km) and adjacent home ranges can overlap as much as 10 percent in Florida, adult caracaras show little social behavior and are highly intolerant of adult conspecifics within their territory (Morrison 1996a).

Juvenile caracaras exhibit a long fledgling dependency period and remain with their parents for at least 2 months after fledging from the nest (Humphrey and Morrison 1997). Juvenile and immature birds primarily use improved pasture, grassland habitats, and associated wetlands for foraging until permanently departing from the adult natal territory (Morrison 1998). After leaving the adult territory, young birds are nomadic and often join aggregations (Layne 1996). These gathering areas are used by many individual birds for varying lengths of time and will attract individuals from the periphery of the population's range (Morrison 1998).

Eastern Indigo Snake

The indigo snake ranges from the southeastern United States to northern Argentina (Moler 1992). This species has eight recognized subspecies, two of which occur in the United States (Conant 1975; Moler 1985a), the eastern indigo (*D. c. couperi*) and the Texas indigo (*D. c. erubennus*). Over most of its range, the eastern indigo snake frequents several habitat types, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, freshwater marsh edges, agricultural fields, coastal dunes, and human-altered habitats. Eastern indigo snakes need a mosaic of habitats to complete their annual cycle. Interspersion of tortoise-inhabited sandhills and wetlands improves habitat quality for this species (Landers and Speake 1980; Auffenberg and Franz 1982). Eastern indigo snakes require sheltered retreats from winter cold and desiccating conditions. Wherever the eastern indigo snake occurs in xeric habitats, it is closely associated with the gopher tortoise, the burrows of

which provide shelter from winter cold and desiccation (Bogert and Cowles 1947; Speake et al. 1978; Layne and Steiner 1996). This dependence seems especially pronounced in Georgia, Alabama, and the panhandle area of Florida, where eastern indigo snakes are largely restricted to the vicinity of sandhill habitats occupied by gopher tortoises (Diemer and Speake 1981; Moler 1985b; Mount 1975). In wetter habitats that lack gopher tortoise burrows, eastern indigo snakes may take shelter in hollowed root channels, hollow logs, or the burrows of rodents, armadillo, or land crabs (*Cardisoma guanhumi*) (Lawler 1977; Moler 1985b; Layne and Steiner 1996).

In the milder climates of central and southern Florida, eastern indigo snakes exist in a more stable thermal environment, where availability of thermal refugia may not be as critical to the snake's survival. Throughout peninsular Florida, this species may be found in all terrestrial habitats which have not suffered high density urban development. They are especially common in the hydric hammocks throughout this region (Moler 1985a). Eastern indigo snakes also use some agricultural lands (e.g., citrus) and various types of wetlands (Layne and Steiner 1996). Even though thermal stress may not be a limiting factor throughout the year in south Florida, eastern indigo snakes still seek and use underground refugia in the region. On the sandy central ridge of south Florida, eastern indigos use gopher tortoise burrows more than other underground refugia (Layne and Steiner 1996). Other underground refugia used by this species include burrows of armadillos, cotton rats (*Sigmodon hispidus*), land crabs, and unknown origin; natural ground holes; hollows at the base of trees or shrubs; ground litter; trash piles; and the crevices of rock-lined ditch walls (Layne and Steiner 1996). These refugia are used most frequently where tortoise burrows are not available, particularly in low-lying areas off of the central and coastal ridges.

Smith (1987) radio-marked hatchlings, yearlings, and gravid eastern indigo snakes, and released them in different habitat types on St. Marks National Wildlife Refuge in Wakulla County, Florida, and concluded that diverse habitats, including high pineland, pine-palmetto flatwoods, and permanent open ponds, were important for seasonal habitat use and reproductive activities. Monitoring studies of radio-marked eastern indigo snakes on the central ridge of south Florida indicate they use a wide variety of natural, disturbed, and non-natural habitat types in this part of the State throughout the year. On the ridge itself, eastern indigo snakes favor mature oak scrub, turkey oak sandhill, and abandoned citrus grove habitats, whereas snakes found off of the sandy ridges use flatwoods, seasonal ponds, improved pasture, and active and inactive agricultural lands. There was no apparent selection for one habitat type over another, as the use of habitats closely reflected the relative availability and distribution of the vegetation types in these areas (Layne and Steiner 1996).

The eastern indigo snake is an active terrestrial and fossorial predator that will eat any vertebrate small enough to be overpowered. Layne and Steiner (1996) documented several instances of indigo snakes flushing prey from cover and then chasing it. While rare, these snakes may also climb shrubs or trees in search of prey. An adult eastern indigo snake's diet may include fish, frogs, toads, venomous/non-venomous snakes, lizards, turtles, turtle eggs, juvenile gopher tortoises, small alligators, birds, and small mammals (Keegan 1944; Babis 1949; Kochman 1978; Steiner et al. 1983). Juvenile eastern indigo snakes eat mostly invertebrates (Layne and Steiner 1996).

Indigo snakes range over large areas and use various habitats throughout the year, with most activity occurring in the summer and fall (Smith 1987; Moler 1985b; Speake 1993). In south-

central Florida, Layne and Steiner (1996) determined adult male home ranges average about 74 hectare (ha) (up to 183 ha), whereas adult female home ranges average about 19 ha (up to 47 ha).

Population dynamics

Audubon's Crested Caracara

At present, the region north and west of Lake Okeechobee supports the greatest abundance of birds (61 percent of adult locations) where they are found almost exclusively on privately owned large cattle ranches (Layne 1996). Humphrey and Morrison (1997) indicate that the Florida population of caracara is probably stable, but contraction and fragmentation of its overall range have occurred and most suitable habitat may currently be occupied. Morrison and Humphrey (2001) stated no data are available on historic abundance, habitat use, or nest distribution of caracaras in Florida. The size of Florida's caracara population remains in question. Accurate counts become difficult because of limited access to areas of suitable habitat and because of the bird's behavior and limited detectability (Humphrey and Morrison 1997). In 1970, Heinzman published the results of a 4-year road survey, which suggested fewer than 100 individual caracaras at 58 localities remained in Florida. Stevenson (1976) concurred with this estimate in 1974. Layne (1995) monitored caracara distribution and population status in Florida from 1972 to 1989. Based on roadside surveys, he estimated the population was stable with a minimum of about 300 adults in 150 territories. The immature population was estimated to be between 100 and 200 individuals, bringing the total statewide population to between 400 and 500 birds. However, given continued landscape change in areas where caracaras have been known to occur, and the fact that not all of the probable breeding range has been adequately surveyed for breeding pairs, estimating this population's size remains difficult. A decline in numbers may be inevitable given the present rate of conversion from native prairie habitat or pasture to urban developments, pine or eucalyptus plantations, or citrus groves throughout the caracara's isolated and limited range (Morrison 1996b).

Little information is available on disease factors and parasites. Samples taken from 223 caracaras from south-central Florida indicated a 28 percent prevalence of *Haemoproteus tinunculi*, a hematozoan blood parasite (Foster et al. 1998). The impact of this parasite to the caracara's survival is unknown. Mercury levels in blood samples taken from adults (N=6) and juveniles (N=23) by Humphrey and Morrison (1997) were found to be at low levels (blood, mean=0.12 parts per million).

Eastern Indigo Snake

The evaluation of eastern indigo snake population status and trends is confounded by this species' wide distribution and the large territory size of individuals. We believe activities such as collecting and gassing of tortoise burrows have been largely abated through effective enforcement of protective laws. However, despite these apparent gains, the threats described above are acting individually and synergistically against the eastern indigo snake. Although we have no quantitative data with which to evaluate the trend of eastern indigo snakes in south Florida, we surmise the population as a whole is declining because of current rates of habitat

destruction and degradation. Natural communities continue to be altered for agricultural, residential, and commercial purposes, most of which are incompatible with the habitat needs of eastern indigo snakes (Kautz 1993). Habitat destruction and alteration are probably most substantial along the coasts, in the Keys, and along the high ridges of south-central Florida, where human population growth is expected to continue to accelerate. Agricultural interests (principally citrus) continue to alter large expanses of suitable natural indigo snake habitat throughout much of south Florida (Service 1999b).

Even with continued habitat destruction and alterations, this species will probably persist in most localities where large, non-fragmented natural habitats remain. Unfortunately, current and anticipated future habitat fragmentation will probably result in a large number of small isolated groups of indigo snakes which may not support a sufficient number of individuals to ensure viable populations (Service 1999b). However, Layne and Steiner's (1996) studies in the south-central Florida region lead them to believe that this species does not necessarily require undisturbed wilderness and can persist in semi-developed rural areas and housing subdivisions as long as adequate food resources and cover are available. Eastern indigo snakes inhabiting populated areas may become relatively tolerant of human environs, regularly moving about in the open on lawns, patios, or porches, largely ignoring humans and pets (Layne and Steiner 1996). Although these developed areas can provide suitable refugia and foraging opportunities for this species, the increased number of people, domesticated animals, and vehicles would also increase the risk of indigo snake mortality.

Status, distribution, and trend

Audubon's Crested Caracara

The overall range of the crested caracara is from Florida, southern Texas, southwestern Arizona, and northern Baja California, through Mexico and Central America to Panama, including Cuba and the Isle of Pines. Historically, this subspecies was a common resident in Florida from northern Brevard County, south to Fort Pierce, Lake Okeechobee, and Hendry County. It has been reported as far north as Nassau County, and as far south as Collier County and the lower Florida Keys in Monroe County. Available evidence indicates that the range of this subspecies in Florida has experienced a long-term continuing contraction, with birds now rarely found as far north as Orlando in Orange County or on the east side of the St. Johns River. The region of greatest abundance now is a five county area north and west of Lake Okeechobee, including Glades, DeSoto, Highlands, Okeechobee, and Osceola Counties (Service 1999b).

Audubon's crested caracara was listed as a threatened species under the Act in 1987. Loss and degradation of nesting habitat likely represent threats to Florida's caracara population, particularly the conversion of pasture to citrus crops or urban/suburban development. In addition to suspected population declines related to habitat loss, direct human-related mortality might also be a factor in the slow recovery of the species. The increase in paved roads and high-speed traffic has been implicated in an increase in numbers of caracaras either injured or killed by vehicles (Layne 1996). Humphrey and Morrison (1997) have identified highway mortalities as a major cause of juvenile mortalities, with young birds especially vulnerable within the first 6 months of fledging. Shooting and trapping are still a concern in some areas (Humphrey and Morrison 1997).

Increased habitat protection represents an important conservation strategy for the caracara (Layne 1996) and will require cooperative efforts between land management agencies and private landowners. Morrison and Humphrey (2001) found over 80 percent of active caracara nests in south-central Florida to be on privately owned cattle ranches. The protection of known nest sites, many of which occur within large cattle ranches, represents an important component of regionally-based conservation efforts (Humphrey and Morrison 1997).

Eastern Indigo Snake

The eastern indigo snake occurs throughout Florida. In south Florida, it is thought to be widely distributed and probably more abundant than in the northern limits of its range. Given their preferences for upland habitats, indigos are not commonly found in great numbers in wetland complexes of the Everglades region, even though they are found in pinelands, tropical hardwood hammocks, and mangrove forests in extreme south Florida (Service 1999b).

The eastern indigo snake was listed in 1978 as a threatened species under the Act because of dramatic population declines caused by habitat loss, over-collecting for the pet trade, and mortality from gassing gopher tortoise burrows to collect rattlesnakes (Speake and Mount 1973; Speake and McGlincy 1981; Service 1999b). At the time of listing, the main factor in the decline of this species was exploitation for the pet trade. As a result of effective law enforcement, the pressure from collectors has declined but still remains a concern (Moler 1992). Presently, habitat loss and fragmentation by residential and commercial expansion have become much more significant threats to the eastern indigo snake (Service 1999b).

Historically, the eastern indigo snake occurred throughout Florida and in the coastal plain of Georgia, Alabama, and Mississippi (Diemer and Speake 1983; Moler 1985a). It may have occupied parts of 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). In 1982, only a few populations of the eastern indigo snake remained in the Florida panhandle, and the species was considered rare in that region. Nevertheless, based on museum specimens and field sightings, this species still occurs throughout Florida, although not commonly seen (Moler 1985a, 1992). In south Florida, the eastern indigo snake is thought to be widely distributed. Given its general preference for upland habitats, this species is not commonly found in great numbers in the wetland complexes of the Everglades region, even though it occurs in pinelands, tropical hardwood hammocks, and mangrove forests in extreme south Florida (Duellman and Schwartz 1958; Steiner et al. 1983). Eastern indigo snakes also occur in the Florida Keys (Lazell 1989).

The eastern indigo snake will use most of the habitat types available in its home range, but generally prefers open, undeveloped areas (Kuntz 1977). Because of its relatively large home range, this snake is especially vulnerable to habitat loss, degradation, and fragmentation (Lawler 1977; Moler 1985b). Lawler (1977) noted that habitat for this species has been destroyed by residential and commercial construction, agriculture, and timbering, and that the loss of natural habitat is increasing because of these threats. In Florida, indigo snake habitat is being lost at a rate of 5 percent per year (Lawler 1977). Low density residential housing is also a potential

threat to this species, increasing the likelihood of snakes being killed by property owners and domestic pets. Extensive tracts of wild land are the most important refuge for large numbers of eastern indigo snakes (Diemer and Speake 1981; Moler 1985b). Additional human population growth will increase the risk of direct mortality of the eastern indigo snake from contact with property owners, domestic animals, and vehicles. Pesticides that bioaccumulate through the food chain may present a potential hazard to the snake as well. Pesticides used on crops or for silviculture would pose a pulse effect to the indigo snake (Speake 1993). Secondary exposure to rodenticides used to control black rats (*Rattus rattus*) may also occur (Speake 1993). Considering the low numbers of this species, any additional threats to its survival could cause local extirpations (Service 1999b).

ENVIRONMENTAL BASELINE

Audubon's Crested Caracara

The Service has reviewed the most current GIS database (1992-2004 observations) for caracara observations. Although these data do not represent a systematic survey throughout the species' range, they do provide a general impression of its overall range and the area of concentration of observations in the Kissimmee River Basin. From these data, it is apparent that the action area covers a small portion (less than 1 percent) of the species' range. Other available caracara nest locations were derived from Morrison (2003) who surveyed from 1996-2003 under contract with the District. From the data we have examined, the Service believes that caracara nests could be present in nearly any given month of the year where suitable habitat exists, but nests are more likely to be present in the peak period from November through April.

A survey (LG² Environmental Solutions, Incorporated 2006) for caracara was conducted in the action area from February through April 2006. The survey indicates that there is an active caracara nest on the spoil mound by S-65C (Contract 10/12) (Figure 4), one confirmed nest site and one potential nest tree (Figure 5) located in the primary construction zone of Contracts 13b and 13c, and a large gathering area for caracaras along US 98 on the east side of the C-38 within the project footprint of Contract 18 (Figure 6). Of these nests, one potential nest site and two confirmed nests are on spoil mounds. Spoil mounds in all three contract areas will be degraded to restore the floodplain, and the material will be used to backfill C-38.

A significant factor impacting caracara habitat and populations in the general project area was the channelization of the Kissimmee River between the Kissimmee Chain of Lakes and Lake Okeechobee, which drained most of the Kissimmee River floodplain and adjacent wetlands. As a consequence, the hydrologic characteristics of this river system were eliminated (*e.g.*, flowing waters, floodplain inundation, slow recession of floodwaters) and long-term degradation of the natural ecosystem occurred (Corps 1991). These changes in hydrology and habitat had negative effects on wetlands, water quality, fishery, waterfowl, wading birds, and other natural resources (Corps 1991). However, it is possible these ecosystem alterations have had a slightly positive effect on the caracara by creating more preferred habitats (*e.g.*, pasture/open forest and drained wetlands) within the Kissimmee River floodplain.

Another factor affecting caracara habitats and populations is increasing private development in the Kissimmee River floodplain. Purchases of large tracts of land in the Pool D and E areas of the Kissimmee River by private development interests have occurred recently (Corps 2005a). Similar development pressures may occur near this project area which could affect caracara habitat and populations in this reach of the Kissimmee River floodplain. Many large cattle ranches and dairy operations in the Kissimmee prairie are likely to be converted to suburban housing or rural “ranchettes” in the coming decades.

There are two active caracara nest trees within the projects’ footprint. The primary zone around these nest trees (300-meter radius) covers only a small area of the spoil mounds. However, this would be sufficient to affect construction activities within the project area if caracaras use the nest tree again during next year’s breeding season. Caracara re-nesting in or near the project footprint is likely because of past nesting success by this caracara pair, as well as the presence of suitable caracara habitat (*e.g.*, pasture/spoil mounds and drained floodplains with scattered cabbage palms) within and adjacent to the project footprint.

Eastern Indigo Snake

The proposed action area covers a small percentage (much less than 1 percent) of the known range of the eastern indigo snake in Florida. No surveys were conducted for the eastern indigo snake in the action area; however, it is likely that this species uses at least some habitats within the project footprint. Because of the lack of suitable cover over much of the proposed project footprint, it is anticipated that this species is more likely to occur in portions of the existing spoil mounds that contain upland/wetland forest and shrub, and wet prairie, well as along the edges of the spoil mounds, the C-38 Canal, and roadways providing access to the project site. If gopher tortoise burrows are found on the spoil mounds, then the potential for the indigo snake to occur in the project footprint would be increased.

Probably the most significant factor impacting eastern indigo snake habitat and populations in the Kissimmee River floodplain was the channelization of the Kissimmee River between the Kissimmee Chain of Lakes and Lake Okeechobee. As mentioned above, these changes in hydrology and habitat had negative effects on wetlands, water quality, fishery, waterfowl, wading birds, and other natural resources (Corps 1991). However, contrary to the caracara, it is likely these ecosystem alterations had an adverse effect on the eastern indigo snake. The private development pressures noted above for the caracara are also likely to reduce overall habitat suitability and to increase fragmentation of indigo snake habitat in the action area.

EFFECTS OF THE ACTION

This section includes an analysis of the direct and indirect effects of the proposed action, as well as interrelated and interdependent activities, on the Audubon’s crested caracara and eastern indigo snake. To determine whether the proposed action would likely jeopardize the continued existence of these species, we focused on the expected consequences of the proposed action on the potential for future caracara nesting and habitat use, and for impacts on suitable habitats that might be occupied by the eastern indigo snake.

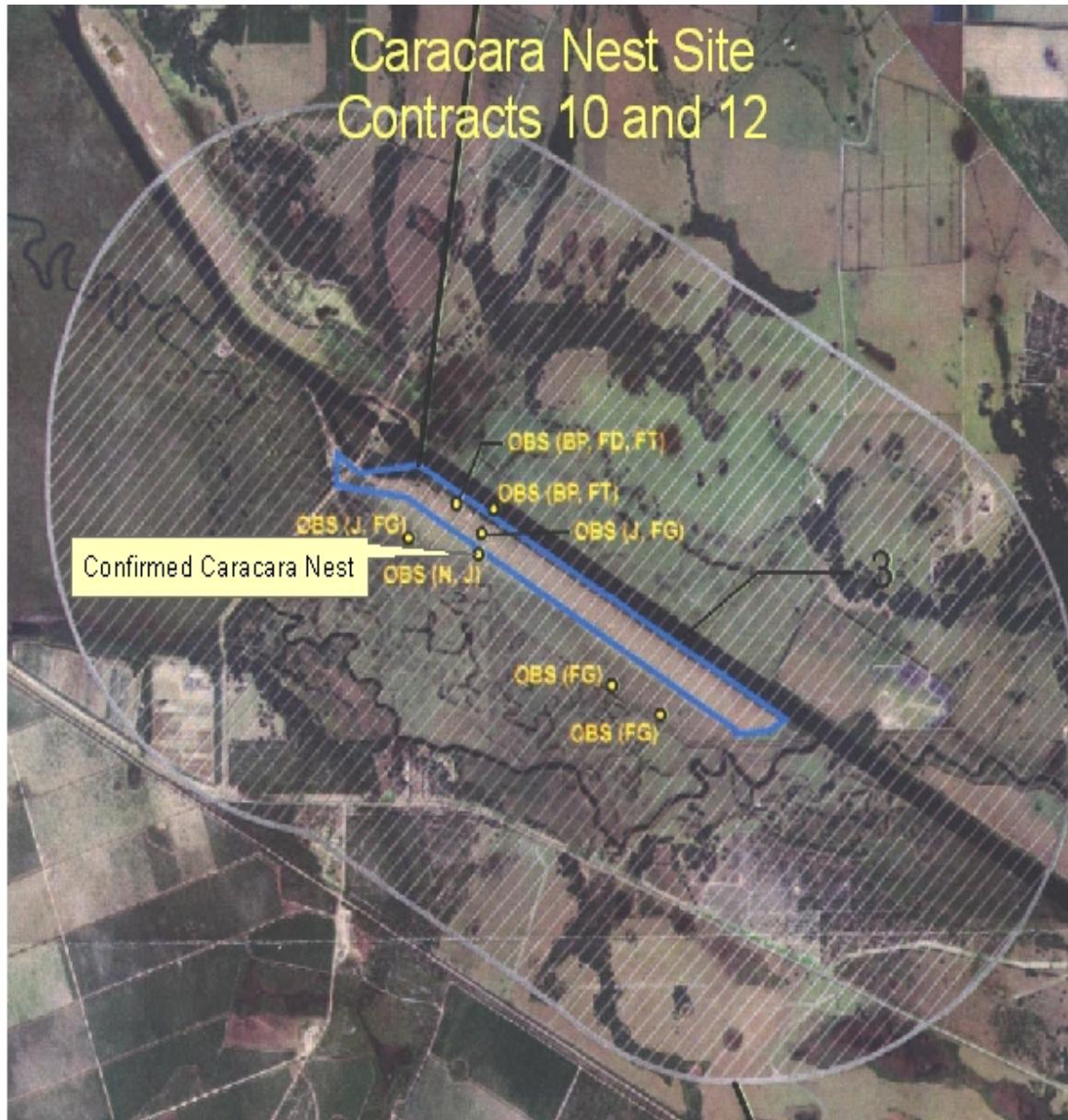


Figure 4. Caracara Nest Sites for KRRP Contract 10/12 June 2006 Survey.



Figure 5. Caracara Nest Sites for KRRP Contracts 13b and 13c June 2006 Survey.

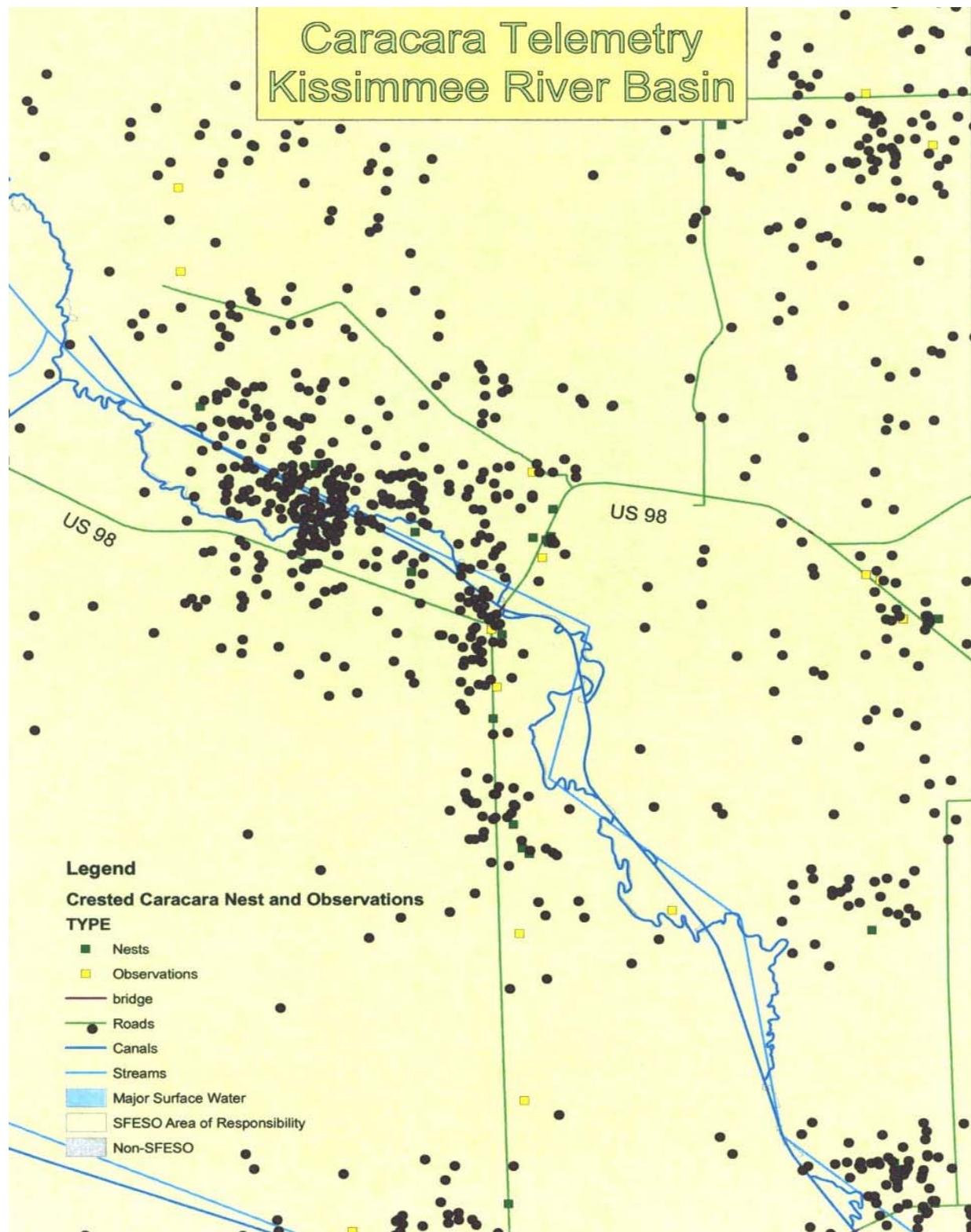


Figure 6. Telemetry of Caracara for Contract 18.

Factors to be considered

Audubon's Crested Caracara

One factor that has affected the caracara in south Florida is habitat modification. In Florida, the caracara's historical habitat consisted of native prairie with associated marshes, cabbage palm, and cabbage palm/live oak hammocks. Consequently, management practices for livestock grazing on improved pasture or semi-improved pasture at either dairy farms or beef cattle ranches are normally highly compatible with the habitat requirements of the species (Humphrey and Morrison 1997). The general project area contains suitable habitat structure to support the species, although drainage of many of the historic wetlands, suppression of the natural fire regime, and conversion of dry prairie into agricultural lands in the Kissimmee River valley have affected the overall suitability of the available habitat. The preferred habitat type for the caracara, improved pasture, is present on lands adjacent to the edge of the Kissimmee River floodplain that will be restored. However, we are unable to accurately predict if the net change in habitat availability for the pair currently nesting on the spoil mound will simply entail a shifting of their habitat utilization to those adjacent areas. Because suitable habitat is generally occupied to its fullest extent, the KRRP is likely to result in the net loss of territories, but the shifting, displacement, and intraspecific competition among adjacent occupied territories would have to be monitored empirically following the habitat changes.

Another factor affecting the caracara is the potential loss of nesting trees. Trees that contain previously used caracara nest structures or are potentially usable for caracara nesting will be eliminated during construction (*e.g.*, spoil mound removal) or project operation (*e.g.*, seasonal flooding). Audubon's crested caracara regularly occupies, refurbishes, and reuses old nests or builds new nests in the same tree which, in Florida, is usually a cabbage palm (Morrison 1996a, 1996b). Although potentially suitable cabbage palms are generally available to support nests in the general project area, loss of an existing nest structure could be disruptive to breeding by forcing the mated pair to expend energy in finding another site and building a new nest. The excavation of spoil banks and backfilling of the canal to restore the historic floodplain in this reach of the Kissimmee River will increase the extent, depth, and duration of surface water inundation and raise ground water levels. This change in hydrology could adversely affect or kill trees that remain within the restored floodplain, including existing cabbage palms that could support alternate nest sites within the caracaras' territory. This will likely result in a temporary disruption to the caracaras' established nesting behavior by requiring the pair to construct a new nest in surviving cabbage palms, elsewhere in their territory.

A third factor that could affect caracaras is construction activity or other human disturbance during the breeding season. Caracaras are generally tolerant of some human activity and moderate habitat changes, as long as they are not harassed and the nest site is left intact. For example, normal ranching activities are well tolerated, including burning of pastures. Controlled fires during winter and spring often sweep through an active nest stand with little effect on nesting success. However, introduction of human activities to which the pair has not become acclimated can result in nest failure and foraging disruption, particularly during nest building, incubation, and early nesting stages, when the birds seem most sensitive to disturbance (Humphrey and Morrison 1997).

Eastern Indigo Snake

During project construction, fill material will be excavated from the existing spoil mounds and placed within the C-38 Canal, weirs constructed, and oxbows created and reconfigured; in non-concurrent periods spanning July 2007 through March 2011. In addition, increased vehicular traffic and human activity along the access roads serving the project site could adversely affect the indigo snake. If gopher tortoise burrows are found on the spoil mounds during pre-construction surveys, the likelihood that indigo snakes will be affected is increased because this species frequently seeks shelter in these burrows.

Following project construction, an estimated 2,970.8 acres of historic floodplain in the project impact area would be restored and subject to periodic inundation during wet seasons and high-river flows. The restoration of a more natural flood regime would change the vegetation and soil characteristics within the project impact area and affect existing habitats that are currently used by the eastern indigo snake in this reach of the Kissimmee River floodplain.

Analyses for effects of the action

Audubon's Crested Caracara

The goal of the KRRP is to restore the historic floodplain habitat along the Kissimmee River without inundating historic uplands. This would favor re-establishment of a more natural distribution of upland and wetland habitats along the Kissimmee River. Native prairie and its associated marshes and cabbage palm/live oak hammocks are the caracara's historic habitat. The existing pasture/spoil mounds at the project site provide habitat characteristics and requisites that are similar to their historic open prairie habitats. Because the historic floodplain habitats that would be restored by this project are not considered optimal habitat for this species, a slight decrease in caracara habitat suitability is expected in the project impact area.

Caracaras appear to prefer to nest near open, structurally simple habitats. However, the characteristics that caracara prefer in selecting specific nesting trees are not fully understood. Caracara nests have not been associated with any particular size or height of cabbage palms, and Humphrey and Morrison (1997) suggest that the dispersion and orientation of trees may be a more important factor. Caracara apparently select for structure that would provide adequate nest support and orientation to provide suitable microclimate. Ideal orientation for the nest and nesting tree may involve facing toward the early morning sun and away from prevailing northwesterly winter winds (Chen and Gerber 1990). The availability of cabbage palms for potential caracara nesting does not appear to be a limiting factor within the general project area because of their abundance. Nevertheless, the direct removal of this active nest tree, even during the non-nesting season, could result in incidental take of this species.

Cabbage palms tend to be relatively tolerant of flooding and the *National List of Plant Species that Occur in Wetlands: Southeast (Region 2)* (Service 1988) classifies cabbage palm as facultative, which means it is equally likely to occur in wetlands or uplands (estimated probability in wetlands 34 to 66 percent). Although cabbage palms can occur in seasonally flooded soils (*e.g.*, edges of tree islands in the Everglades), the cabbage palms growing within the project area have likely experienced a much dryer flood regime since channelization of the Kissimmee River. Consequently, the probability of survival for those trees that have adapted to

the project's upland pastures/spoil mounds may be reduced when they are subjected to increased flooding frequency and/or raised groundwater levels after project completion. The Corps estimates the seasonal range of water levels in the project site floodplain will rise 6 or 7 feet after project completion (Corps 2005a). Even if the project is properly designed to re-hydrate only historic wetlands, the Service considers it likely some cabbage palms, including active or potential caracara nest trees, may be indirectly killed following floodplain restoration and re-hydration (*i.e.*, increased flood and groundwater levels).

As noted above, caracaras appear most sensitive to disturbance during foraging, nest building, incubation, and early nesting stages. This can cause interruption of regular food delivery to chicks, which can in turn cause nest failure (Morrison 1996a, 1996b). Adults are more tolerant of human activity near the nest after the chicks have hatched and have become partially feathered than during the period between nest construction and the third or fourth week of the nestling stage (Morrison 1998). During winter months when caracara nesting is more prevalent, eggs and small chicks may perish from exposure if adults are frequently flushed from the nest or avoid the nest for extended periods of time (Morrison 1998). Project construction activities would likely have a direct adverse effect (*e.g.*, nest abandonment, feeding disruption, and lower productivity) on any caracara nesting within 300 meters of the project site.

Eastern Indigo Snake

The removal of the existing spoil mounds and backfilling of approximately 9 miles of canal, re-carving of three oxbows (3.6 miles), construction of the S-65 tie-back levee (0.4 mile), improvement of 3.46 miles of oxbows, and degrading of 1.5 miles of levee will directly affect about 4,000 acres of fish and wildlife habitat. Of this total, 2,601 acres are in spoil mounds. Upland herbaceous constitutes the greatest acreage for both Pool B and D, with 63 percent and 74 percent, respectively. The Service estimates that a minimum of 4,000 acres (Pool D 2,960 acres, Pool B 1,015 acres) of suitable eastern indigo snake habitat would be directly affected by construction of the proposed action. The acreage extent of backfilling north of Weir 3 (Contract 13c) is yet to be determined. Consequently, the Service expects some eastern indigo snakes (egg clutches, juveniles, and/or adults) occupying suitable habitats within the project footprint would be taken during construction. In addition, it is also likely that some individuals will be at greater risk to road mortality due to increased traffic along access ways serving the project site during construction.

After project completion, the estimated 2,970.8 acres of restored floodplain would be subject to a more natural flood regime and exhibit conditions and habitats more characteristic of the historic Kissimmee River floodplain. The Service anticipates that eastern indigo snakes will adapt to this habitat shift and eventually benefit from these changes after these floodplain habitats recover.

Species' response to the proposed action

Audubon's Crested Caracara

The Service believes the net effect of this phase of the KRRP would be the restoration of a more natural and diverse mosaic of wetland and upland habitats in the action area. However, because the project will convert existing habitat (spoil mound/pasture and drained wetlands) that is

preferred by caracara to less preferred habitat (historic floodplain and wetlands), we anticipate that caracara will be less likely to use the restored floodplain habitat for nesting. Therefore, it is the Service's opinion the proposed habitat restoration efforts would have an adverse effect on this species within the project impact area (*i.e.*, floodplain affected by the proposed project).

The loss of an active caracara nest tree and other potential nest trees on the spoil mounds will occur as a direct result of the proposed action. This could result in the loss of caracara eggs/chicks or reduced caracara nest productivity due to nest relocation to less suitable habitat within their territory during subsequent nesting seasons. Other potential nest trees adjacent to the project footprint and elsewhere in the project impact area may also be lost by changes in the river floodplain and flow regime (*e.g.*, increased flood frequency and duration, increased groundwater levels) after project construction. The loss of an active nest tree and other potential nesting trees in the project footprint would require, at a minimum, a change in the breeding behavior and energy expenditure of the caracara pair that occupies this territory. Therefore, the Service believes the removal of the active nest tree and potential nest trees in the project footprint, as well as the potential for reduced survival among the cabbage palms remaining in the restored floodplain, would constitute an adverse effect on the caracara pairs occupying this territory.

The Service believes some level of disturbance to caracara nesting within 300 meters of the project footprint would likely occur as a direct result of project construction activities. Although protection of nesting from disturbance is an important element in recovery of the species (Service 1999a), Humphrey and Morrison (1997) point out the species exhibits relatively high nesting success in Florida. If, prior to the next caracara nesting season, the active nest trees are removed and construction begins prior to nesting, it would be reasonable to expect the caracara pair to establish a nest at another location during the next breeding season within their territory but outside the action area. Because suitable nesting habitat appears to be available in the general project area, successful nesting by this caracara pair would likely continue uninterrupted following construction. Therefore, we find the unavoidable level of disruption to breeding during construction would likely have a temporary adverse effect on caracara reproduction.

Eastern Indigo Snake

Although no surveys for the eastern indigo snake have been conducted at the project site, this species is known to use a great variety of habitats and the Service assumes it occurs at least in portions of the project footprint that provide suitable habitat (*e.g.*, forest, shrub, prairie, and herbaceous [pasture]). In removing most of spoil mounds to backfill the adjacent C-38 Canal, we expect eastern indigo snakes occupying suitable habitats within the project construction zones and access ways may be killed, injured, or displaced. Because of the frequent association between eastern indigo snakes and gopher tortoises, the proposed plan calls for gopher tortoise burrow surveys to be conducted prior to construction to determine if tortoises occur at the project site. In addition, the Service's *Standard Protection Measures for the Eastern Indigo Snake* (Appendix C) would also be implemented during project construction. These pre-construction surveys and standard protection measures will avoid or minimize additional adverse impacts to this project and could have on the eastern indigo snake within the project footprint. Surveys for the indigo snake are not planned. This federally listed species prefers sandy upland habitats, but can also be found in many kinds of habitats, including canal banks (Service 1999b).

The Service recommends additional protection measures beyond those listed as standard precautions (Service 2004). Our recommended protective actions include a survey immediately prior to construction initiation, scoping of gopher tortoise burrows immediately prior to their disturbance; removal and release of indigo snakes by trained authorized personnel that are in harm's way; surveillance, management, and control of construction activities to avoid or minimize negative impacts; signs posted on construction sites; and personnel briefings on indigo snakes. Fatality of an indigo snake will be cause to cease work in the project action area, and the Service will be immediately notified of the occurrence.

After construction is completed for this phase of the KRRP, the affected river and floodplain will begin to recover as the Kissimmee River system's flows, hydrologic connections, ecological functions, and diverse habitats are restored. Because the eastern indigo snake's habitat requisites include wetlands and floodplains, it is expected this species will adapt to the expected changes in hydrology, continue to use the project impact area, and eventually benefit from these changes after these floodplain habitats recover.

Interrelated and interdependent actions

The principal activities near the proposed action area would be related to subsequent construction/restoration phases of the KRRP and would be subject to continued consultation. The Kissimmee Headwater Lakes Revitalization Project is interrelated with the KRRP, as it will provide additional waters through the restored reaches of the river system. The Service concurred on June 30, 1994, with the Corps' determination of "not likely to adversely affect" any federally listed species.

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.

The cumulative effects in the study area will have different effects on the two species considered in this biological opinion. Conversion of ranchland to citrus production or suburban sprawl is the most significant long-term threat to the caracara (Layne 1996; Humphrey and Morrison 1997) and many of these land use conversions are likely to occur without the need for a Corps' permit. The eastern indigo snake is known to frequent citrus groves, but is rarely observed in residential or commercially developed areas. Consequently, land use changes from ranchland to citrus groves would not have as great an effect on the indigo snake over the long-term as compared to conversions of ranchland to suburban development which would have significant adverse effects on this species. Because the District has acquired the floodplain areas to be restored, we do not anticipate development of the historic floodplain. Portions of this project are adjacent to the Avon Park Bombing Range, and unless this military land is passed to private hands, we do not anticipate major land use changes there. Other private lands adjacent to those acquired by the District in the floodplain would be subject to the land use changes described above, but the rate of this is difficult to predict in an area currently with little supporting infrastructure.

CONCLUSION

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

INCIDENTAL TAKE STATEMENT

Section 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 special exemption. Take is defined as 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 behavior patterns, including 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, 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 Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

The measures described below are non-discretionary and must be undertaken by the Corps for the exemption under section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps fails to assume and implement the terms and conditions or fails to adhere to the terms and conditions of the incidental take statement through enforceable terms, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impact on the species to the Service as specified in this incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

Audubon's Crested Caracara

The Service anticipates disturbance will alter the behavior of two caracara mated pairs. This incidental take is expected to be in the form of harassment of the adults. In the best case scenario, the caracara pairs may move to suitable habitat and establish a new nest site and territory, and successfully reproduce. In the worst case, we do not find it likely this disturbance would cause death of the adult caracaras, but it might preclude successful reproduction in the year of the disturbance. Caracara surveys of suitable habitat within 600 meters of the proposed

project footprint will be conducted immediately before construction begins to determine if any additional nests occur (which may vary in location from year to year in the same nesting territory) that could be affected by the proposed action.

No direct killing or injuring of adults is allowed under this incidental take statement. The allowed harassment of adults is limited to flushing the adults off the nest, modification of their feeding and nesting behavior, and the possible displacement from their home territory to adjacent suitable lands, due to a net loss of habitat quality for this species in restoring this reach of the Kissimmee River floodplain.

Eastern Indigo Snake

The Service anticipates the proposed action would result in the take of eggs/juvenile/adult eastern indigo snakes within the project footprint (removal of about 4,000 acres of indigo snake habitat) and along project access roadways (an undetermined length of temporary and permanent access roads). This incidental take is expected to be in two forms: kill/injury (eggs, juveniles, and adults) and harassment (juveniles/adults). Kill/injury or harassment would occur as a result of increased vehicular traffic to and from this area (including increased threat of road kill), degradation of the spoil mounds and oxbow improvements and creation (habitat removal, burying/crushing), and placement of fill material (habitat removal, burying/crushing) between the banks of the existing C-38 Canal. These actions would result in the loss of home range territory, foraging habitat, and sheltering/denning refugia. Harassment would occur as a result of the increased human activity in the project action area and access ways which would disrupt their normal breeding, feeding, or sheltering activities.

The Service anticipates incidental 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; and (3) apparently suitable habitat may not be occupied. However, the Service anticipates incidental take of the eastern indigo snake associated with increased vehicular traffic to and from this area (road mortality), degradation of the spoil mounds (habitat removal, burying/crushing), and placement of fill material (habitat removal, burying/crushing) within the C-38 Canal. The incidental take is expected to be in the form of harm, harassment, and direct mortality. Due to the lack of surveys, in conjunction with the wide-ranging activity and use of a variety of habitat types by the indigo snake, it is difficult to determine the exact number of snakes that will be taken. Layne and Steiner (1996) determined average home range for female indigo snakes to be 19 ha (47 acres) and overlapping male home ranges to be 74 ha (183 acres) on Archbold Biological Station in Lake Placid, Florida. The removal of existing spoil mounds, backfilling and oxbow improvements and creation will directly affect about 4,000 acres of indigo snake habitat, and would be directly affected by construction of the proposed actions. Assuming these estimates are comparable to the action area, it is possible for there to be as many as 106 indigo snakes (85 female and 21 male) on the 4,000 acres of indigo snake habitat proposed for restoration. Because of the indigo snake's assumed capability to escape and find refugia during restoration activities, and considering the activity of scoping immediately prior to burrow excavation, we anticipate that roughly 75 percent of the snakes may escape without being killed. This would mean that up to 25 snakes may be killed or injured during the construction phase of this project. All indigo snakes within the project footprint would be harassed during the

construction phase. Additionally, we anticipate loss of up to 50 nests destroyed through construction activities. This authorized level of incidental take assumes completion of gopher tortoise surveys within the project footprint before construction activities begin, an observer to look for indigo snakes during the excavation of burrows, and implementation of the Service's *Standard Protection Measures for the Eastern Indigo Snake* (Appendix C). If gopher tortoise surveys determine the presence of active/inactive tortoise burrows, then the potential for indigo snakes to be directly impacted by the project may increase and reconsideration of incidental take of this species may be necessary.

EFFECT OF THE TAKE

Audubon's Crested Caracara

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the continued existence of the caracara. We expect, under a worst-case scenario, two mated pairs of caracaras will not successfully nest during the first breeding season following the initiation of construction activities and will avoid nesting in the project impact area during subsequent breeding seasons over the life of the project.

Eastern Indigo Snake

In the accompanying biological opinion, the Service determined this level of anticipated take is not likely to result in jeopardy to the continued existence of the eastern indigo snake. We expect up to 50 egg clutches may be destroyed, up to 25 juveniles/adults may be killed or injured, and up to 81 juveniles/adults of this species may be displaced during the construction of this project.

REASONABLE AND PRUDENT MEASURES

Audubon's Crested Caracara

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Audubon's crested caracara:

1. Perform surveys for the presence and location of caracara nests that could be affected by the proposed action.
2. Minimize disturbance and harm to caracara resulting from construction activities and loss of caracara habitat resulting from project design and construction.
3. Report on the effectiveness of measures to reduce incidental take of caracara.

Eastern Indigo Snake

1. Perform gopher tortoise burrow surveys by scoping immediately prior to their disturbance; to determine the presence and location of eastern indigo snakes that could be affected by the proposed action.
2. Provide an observer to look for indigo snakes during the excavation of burrows.

3. Minimize disturbance and injury to eastern indigo snakes resulting from construction activities; and loss of indigo snake habitat resulting from project design and construction.
4. Cease work activities if an indigo snake is encountered in the work area. Remove and release indigo snakes that are in harm's way, into suitable habitat by authorized personnel prior to reinitiating work in that area.
5. Provide surveillance, management, and control of construction activities to avoid or minimize negative impacts to indigo snakes.
6. Educate on-site staff to indigo snake issues by personnel briefings and signs posted on construction sites.
7. Report indigo snake injuries or fatalities immediately to the nearest Service Law Enforcement Office. Secondary notification should be made to the Florida Fish and Wildlife Conservation Commission (FWC); South Region; 3900 Drane Field Road; Lakeland, Florida 33811; Wildlife Alert Number 1-800-404-3922.
8. Report on the effectiveness of measures to reduce incidental take of the eastern indigo snake.

TERMS AND CONDITIONS

Audubon's Crested Caracara

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline the necessary reporting/monitoring requirements. These terms and conditions are nondiscretionary.

1. Contract 13b construction activities are scheduled from July 2007 through August 2008. Normally, the Service recommends that caracara nest surveys be conducted during the peak season of nesting (January through April) immediately prior to proposed construction. The caracara survey (LG² Environmental Solutions 2006) completed in June 2006, includes this contract area. To insure no caracara nests were initiated since June 2006 in the project footprint, a caracara nest survey will be conducted in the project action area up to 600 meters from the project footprint and will be completed before project construction (including tree clearing) begins. Because this project is expected to be constructed over a 12-month period, we expect one peak nesting period will occur during construction. Therefore, in addition to the immediate surveys prior tree clearing, a survey should also be conducted, at a minimum, during the peak nesting season throughout construction (*i.e.*, January through April 2008). If construction extends beyond the 12-month period, additional surveys will be required in the 2008 and 2009 nesting season. These surveys will follow the appropriate nest survey procedures in the *Survey Protocol for Finding Caracara Nests* (Appendix A).
2. Contract 18 construction activities are scheduled from January 2008 through April 2009. To reduce potential impacts to this species, a caracara nest survey will be conducted in the project area up to 600 meters from the project footprint and will be completed before project construction (including tree clearing). Because this project is expected to be constructed over a 16-month period, we expect that two peak nesting periods will occur during construction.

Therefore, in addition to the survey immediately prior to tree clearing, a survey should also be conducted, at minimum, during the peak nesting seasons throughout construction (January through April 2008 and 2009). If construction extends beyond the 16-month period, additional surveys will be required in the 2010 nesting season. These surveys will follow the appropriate nest survey procedures in the *Survey Protocol for Finding Caracara Nests* (Appendix A).

3. Contracts 10/12 and 13c construction activities are scheduled from July 2009 through March 2011. To reduce potential impacts to this species, a caracara nest survey will be conducted in the project areas up to 600 meters from the projects' footprint and will be completed before project construction (including tree clearing). Because these projects are expected to be constructed over a 21-month period, the Service recommends that caracara nest surveys be conducted during the peak season of nesting (January through April 2009, 2010, and 2011) immediately prior to proposed construction. If construction extends beyond the 21-month period, additional surveys will be required in the 2012 nesting season. These surveys will follow the appropriate nest survey procedures in the *Survey Protocol for Finding Caracara Nests* (Appendix A).
4. Removal of active and potential caracara nest trees within the project footprint shall only occur between May 1 and October 31 and only if these trees are not being used by caracara for nesting. The Corps will insure no active nest trees or potential nest trees are removed within the project action area during the caracara's primary breeding season (November through April).
5. The Corps will ensure the project's detailed design, including the location of temporary/permanent structures and storage/staging areas, as well as the transition slope between restored floodplain and upland forest, will minimize the removal of cabbage palms which may contain inactive caracara nest structures or may serve as suitable support for future caracara nests.
6. The Corps will fund a radio telemetry monitoring study to document the effects of construction and land conversion of the proposed project on caracaras (*e.g.*, nest location, nest and fledgling success, and adult and juvenile survival) during pre and post construction; and the change in habitat availability within their territory. The monitoring will initiate within a 45-day period following construction initiation, and continue for at least 1 year post-construction (March 2011 or the date of project completion.). It should be designed to fulfill the following objectives:
 - a. Conduct annual surveys for caracara nests and territories within the proposed project area and within 1.5 miles of the project area boundary) to provide information on caracara nest sites and densities within these areas. This will also allow evaluation of how changes in habitat use may affect other caracara territories in the vicinity.
 - b. Capture and radio tag caracaras at nests within this area to track caracara movements, habitat use, and survival during the monitoring period. Monitoring or radio-tagged birds must be sufficient to document movements away from the territory if they occur. The agency personnel or contractor who will conduct the monitoring will be responsible for obtaining a section 10(a) (1)(A) recovery permit that authorized effects to caracaras that

result from caracara trapping, transmitter attachment, nest monitoring and other associated activities.

- c. Monitor reproductive effort, nest success, fledging success, and adult and juvenile survival of all caracara nests within 1.5 miles of the proposed project.
 - d. Submit a monitoring proposal that details monitoring and reporting methods to the Service for review and approval at least 30 days prior to the initiation of the monitoring program. The proposal's monitoring methods should be sufficiently rigorous to determine which of the following hypotheses about caracara responses to habitat conversion are exhibited by each caracara pair whose territory overlaps the project area:
 - Caracara pairs may move to the nearest suitable habitat and establish a new nest site and territory. This suitable habitat may already be occupied by other caracaras, but if the habitat is suitable and sufficient in size, territory boundaries may shift and all pairs may be able to coexist and reproduce successfully.
 - Caracara pairs may leave the project area and travel some distance to find another area of suitable habitat where they can establish a new nest site and territory. If they can find new areas, they may be able to survive and reproduce successfully.
 - Caracara pairs may attempt to establish new nest sites and territories either near or far from the development area but may be unsuccessful either because of territorial aggressiveness from resident pairs or because no other suitable habitat exists.
 - In the absence of being able to establish a new territory and nesting site, the caracaras may become nomadic, traveling around south-central Florida, perhaps joining sub-adult flocks, or if not, surviving but being unable to establish nests and breed. In this case, these pairs' reproductive contribution to the overall population is lost.
 - Displaced caracaras could die prematurely. As nomads, displaced adults may incur higher risk of mortality because of either a) being killed by caracaras defending territories into which displaced caracaras attempt to move, or b) through collision with vehicles or other trauma associated with scouting unfamiliar areas.
 - The effects of the project do not result in any changes to the territory location and habitat use, and do not affect survival or productivity of the caracara pair at the site.
 - e. Submit annual reports on the caracara monitoring project to the Service which include information on the monitoring effort to date, preliminary results of analyses and data sets.
 - f. Submit a final report to the Service that provides results and final analyses after completion of all data collection and analyses.
7. The Corps and Service will work together to identify habitats within and/or adjacent to the KRRP that have the potential to be improved for caracara. When potential habitat improvement sites are identified, the Corps, Service, and interested Federal/State agencies will take the appropriate actions and cooperate with the respective land management entities

and landowners to improve caracara habitats. Habitat restoration could include a number of actions, including prescribed burning and vegetative plantings on the edge or remaining uplands of the restored floodplain. The specific details of habitat restoration efforts will be worked out between the Corps and Service at a later date.

8. The Corps will provide annual reports to the Service by September each year during project construction. These reports will identify the timing and location of each phase of construction, assess the effectiveness of all protective measures used to minimize incidental take, and maintain a running tally of all project-related incidental take of this species. A summary report will be provided to the Service within 3 months after completion of project construction that will include the following:
 - a. Description of all protective measures implemented to minimize incidental take;
 - b. Detailed description (*e.g.*, number, type, location) of incidental take that occurred during project construction;
 - c. Assessment of effectiveness of protective measures employed during construction and recommendations to further reduce the level of incidental take; and
 - d. Coordination of incidental take outlined in this biological opinion with other laws, regulations, and policies.
9. If a dead, injured, or sick caracara is found in the project footprint or along access ways to the project site, notification should be made to the nearest Service Law Enforcement Office. Secondary notification should be made to the FWC; South Region; 3900 Drane Field Road; Lakeland, Florida 33811; Wildlife Alert Number 1-800-404-3922. A dead specimen should be bagged and frozen. In conjunction with the care of sick or injured caracara or preservation of biological material from a dead animal, the finder also has the responsibility to carry out instructions provided by the Service Law Enforcement officer to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

Eastern Indigo Snake

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures, described above and outline required reporting/monitoring requirements. The following terms and conditions are nondiscretionary:

1. Gopher tortoise burrow surveys of the project area will be conducted immediately prior to construction. This survey will follow the standard tortoise survey procedures recommended by the FWC (FWC 2001). If an eastern indigo snake is encountered during tortoise burrow surveys, it should be allowed to leave the immediate area without additional harassment, or removed by authorized personnel. If, during scoping or excavation of a gopher tortoise burrow, an eastern indigo snake is observed in the burrow, then excavation must be conducted with particular caution to prevent potential injury to the snake. Once excavated, construction activities will cease long enough to allow the snake to leave the area or be physically moved the minimum distance necessary (no more than the width of the spoil

mound [1200 feet] from its original location) to place it in suitable habitat and out of harm's way. Excavation and removal of this species from the project footprint should not occur without proper permits from the State.

2. The Corps will comply with the Service's *Standard Protection Measures for the Eastern Indigo Snake* (Appendix C).
3. Post informational signs (*e.g.*, Appendix D) containing the following information throughout the construction site and along access roads:
 - a. Description and picture of the eastern indigo snake, as well as its habits and protection under Federal Law;
 - b. Instructions not to injure, harass, or kill this species;
 - c. Directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and
 - d. Telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered.

Other useful educational materials may consist of a combination of posters, videos, pamphlets, and lectures (*e.g.*, presentation by expert trained in identifying eastern indigo snakes to construction personnel before clearing/construction activities begin).

4. The Corps will ensure the project's detailed design, including the location of permanent structures and storage/staging areas, as well as the transition slope between restored floodplain and historical uplands, will minimize the removal of upland habitats (*e.g.*, mature oak forest near the temporary road crossings) which may be occupied by eastern indigo snakes or may serve as potential habitat for this species in the future.
5. The Corps will provide an annual monitoring report to the Service on the effectiveness of the protective measures in minimizing incidental take, including an account of the level of incidental take during the previous year. This monitoring report should contain the location, dates, and times for any sightings of eastern indigo snakes, as well as the results of all tortoise burrow searches and the disposition of all 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. The report should be sent to the SFESO, Vero Beach, Florida within 3 months after project construction begins, each subsequent year during construction, and within 60 days of completion of this phase of the KRRP.
6. If a dead, injured, or sick eastern indigo snake is found in the project footprint or along access ways to the project site, notification should be made to the nearest Service Law Enforcement Office. Secondary notification should be made to the FWC; South Region; 3900 Drane Field Road; Lakeland, Florida 33811; Wildlife Alert Number 1-800-404-3922. A dead specimen should be thoroughly soaked in water, and then frozen. In conjunction with the care of sick or injured eastern indigo snakes or preservation of biological material from a

dead animal, the finder also has the responsibility to carry out instructions provided by the Service Law Enforcement officer to ensure evidence intrinsic to the specimen is not unnecessarily disturbed.

7. Report any eastern indigo snake observations that occur during project activities. Handling and moving the snakes are not allowed without a special permit. If large snake skins are found, they should be collected and sent to the Service for positive identification. Information on the collection date and location should be included.

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. The Service believes no more than the productivity (eggs and/or nestlings) of two caracara nests (mortality) and two mated pair of adult caracaras (harassment) will be incidentally taken as a result of the proposed action. The Service believes no more than 25 eastern indigo snakes (juveniles/adults) will be incidentally taken within the projects' footprint or access ways as a result of the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency 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.

Audubon's Crested Caracara

1. Support scientific studies to determine the response of breeding caracaras to habitat restoration efforts (*e.g.*, flooding of pasture, general construction activities) within their established territories. This information would be useful in predicting the effects of other restoration efforts in the Comprehensive Everglades Restoration Plan (CERP) that are planned within the caracara's existing range, as well as in developing measures to reduce potentially adverse project effects on caracara and assist in the recovery of this species.
2. Implement the procedures in the Recommended Management Practices and Survey Protocols for Audubon's Crested Caracara in Florida (Morrison 2001) (Appendix B) during project planning and construction, as appropriate. The implementation of these guidelines by land managers and Federal action agencies would help in the recovery of this species.
3. Monitor the long-term responses of caracara to altered habitat conditions over broad areas. This would provide useful information in determining the potential affects of large-scale projects, such as the CERP, agricultural conversion, and residential development, on this species.

Eastern Indigo Snake

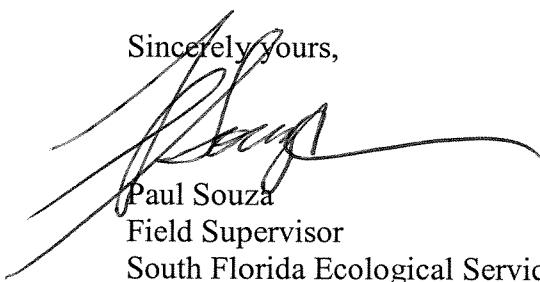
1. Fund studies (*e.g.*, radio tagging of released individuals) to determine the movement patterns of indigo snakes that have been displaced from home territories as a result of project construction activities. This would provide information to help determine when, where, and/or if relocation efforts are appropriate measures for reducing take.
2. Fund studies to better determine the average density/average home range/preferred habitat types of indigo snakes in south Florida. This information would be useful in improving our take estimates for this species in south Florida.

REINITIATION NOTICE

This concludes formal consultation on this action under section 7 of the Act as required by 50 CFR Section 402.16. Reinitiation of formal consultation is required if: (1) the amount or extent of incidental take is exceeded (*i.e.*, the project scope increases to involve additional lakes or the lakes require a change in regulation schedule that is greater than currently proposed); (2) new information reveals effects of the 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 adverse effect to the listed species or critical habitat that was not considered in this biological opinion; or (4) if a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation and effort in protecting fish and wildlife resources. If you have any questions regarding this project, please contact Darla Fousek at 772-562-3909, extension 252, or Robert Pace, extension 239.

Sincerely yours,



Paul Souza
Field Supervisor
South Florida Ecological Services Office

cc:

Corps, Jacksonville, Florida (Catherine Byrd, Weiner Cadet)
Service, Atlanta, Georgia (Noreen Walsh) electronic copy
Service, Jacksonville, Florida (Miles Meyer)
FWC, Vero Beach, Florida (Rick Brust)
FWC, West Palm Beach, Florida (Chuck Collins)
DEP, West Palm Beach, Florida (Inger Hansen)
District, West Palm Beach, Florida (Raul Pellegrino)

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April 20, 2004

Appendix A. Survey Protocol for Finding Caracara Nests.

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

The observer should position themselves in a location where the largest open area (unobstructed by trees) can be viewed. The survey area should be no more than about 500 hectare, which is the largest area easily observable from one point. An aerial photograph of the property and buffer zone can be used to identify areas of suitable habitat and map observation blocks to facilitate surveying the whole area. Use the map and a site visit to select strategic points where caracaras are more likely to be seen going to and from potential nesting sites. From a stationary position search for caracara activity, especially birds moving to the nest tree carrying sticks or food. Watch for other birds, such as American crows (*Corvus brachyrhynchos*), red-tailed hawks (*Buteo jamaicensis*), and turkey vultures (*Cathartes aura*), that might elicit an aggressive response from caracaras present. Nesting caracaras will often chase potential predators away from the nest; thus, revealing their presence. Also circling vultures can indicate the presence of naturally occurring carrion that may attract caracaras. If a potential nesting tree is detected then the observer can reposition to improve observing the bird's behavior. Weather condition should be adequate to clearly view the whole area. The area should be viewed from sunrise to 11am and again 3 hours before sunset. During midday potential nest trees can be examined close up for evidence of nests (Morrison 2001). The area viewed during each survey should be marked on a site map. All caracara activity observed should be recorded by time of day and distinguished between juvenile and adult birds. Record flight direction to identify foraging areas and the nesting tree. Mark any nesting tree locations on a map and obtain GPS coordinates. Weather conditions including temperature, wind speed and direction, cloud cover, visibility, and precipitation, should be recorded at the start and end of each survey period.

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

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

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

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

TECHNICAL REPORT NO. 18

Joan L. Morrison



September 2001



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

TECHNICAL REPORT NO. 18

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RECOMMENDED MANAGEMENT PRACTICES FOR CRESTED CARACARAS—Morrison

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INTRODUCTION

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

BIOLOGICAL INFORMATION ABOUT THE SPECIES

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

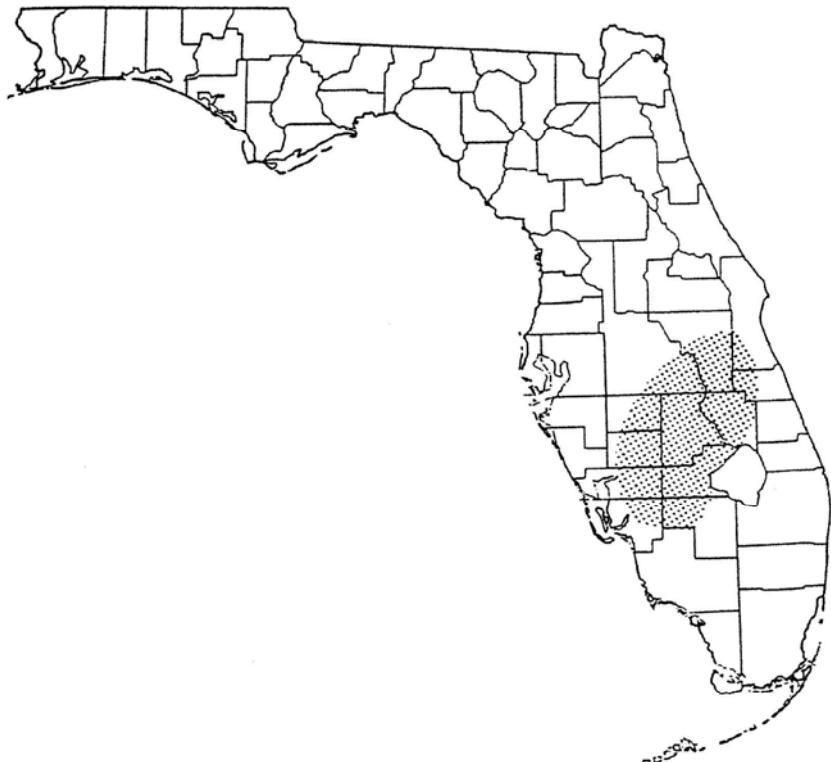


Fig. 1. Currently known breeding range of the crested caracara in Florida.

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

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

Home Range

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

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

Nesting

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

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

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

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

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

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

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

Feeding

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

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

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

Roosting

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

The Juvenile Period

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

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

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

Gathering Areas

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

Tolerance of Human Activity and Disturbance

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

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

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

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

RECOMMENDED MANAGEMENT PRACTICES FOR CRESTED CARACARA HABITAT IN FLORIDA

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

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

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

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

SURVEY PROTOCOL FOR FINDING CARACARA NESTS

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

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

Timing of Surveys

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

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

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

Duration of Surveys

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

Searching for Nests

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

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

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

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

Nest Monitoring

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

MONITORING PROTOCOL FOR KNOWN CARACARA TERRITORIES

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

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

Nest Finding and Monitoring Reproductive Success

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

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

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

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

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

Monitoring for Habitat Use

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

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

Other Monitoring Considerations

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

Reporting Banded Individuals

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

CURRENT STATUS OF THE CRESTED CARACARA IN FLORIDA

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

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

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Appendix C. Standard Protection Measures for the Eastern Indigo Snake.

1. An eastern indigo snake protection/education plan shall be developed by the applicant or requestor for all construction personnel to follow. The plan shall be provided to the Service for review and approval at least 30 days prior to any clearing activities. The educational materials for the plan may consist of a combination of posters, videos, pamphlets, and lectures (*e.g.*, an observer trained to identify eastern indigo snakes could use the protection/education plan to instruct construction personnel before any clearing activities occur). Informational signs should be posted throughout the construction site and along any proposed access road to contain the following information:
 - a. A description of the eastern indigo snake, its habits, and protection under Federal Law;
 - b. Instructions not to injure, harm, harass or kill this species;
 - c. Directions to cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site on its own before resuming clearing; and,
 - d. Telephone numbers of pertinent agencies to be contacted if a dead eastern indigo snake is encountered. The dead specimen should be thoroughly soaked in water and then frozen.
2. If not currently authorized through an incidental take statement in association with a biological opinion, 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.
3. An eastern indigo snake monitoring report must be submitted to the appropriate Florida Field Office within 60 days of the conclusion of clearing phases. The report should be submitted whether or not eastern indigo snakes are observed. The report should contain the following information:
 - a. Any sightings of eastern indigo snakes; and
 - b. Other obligations required by the FWC as stipulated in the permit.

Revised February 12, 2004

Appendix D.

Sample Poster for the Eastern Indigo Snake.



WATCH OUT FOR THE EASTERN INDIGO SNAKE

The Eastern indigo snake is the largest nonpoisonous snake in North America, growing up to 2.4 meters (8 feet) in length. The color of both adults and young is shiny bluish-black with some red or cream coloring on the chin or sides of the head. The indigo snake is usually found in high, dry, well-drained sandy soils, in the same habitat preferred by the gopher tortoise. Indigo snakes may also be found in hammocks, swamps, and flatwoods habitats in south Florida. Gopher tortoise burrows are used by many prey animals that are easily captured by the indigo snake in the burrow. Indigo snakes also use the burrows as dens for cover, and laying eggs. Other potential dens are stumps of trees, cavities in the soil, and under piles of debris.

The decline in the population of indigo snakes is attributed to habitat loss due to development and over-collecting for the pet trade. Fragmentation of habitat by roads results in many indigo snakes killed by vehicle traffic.

Every effort should be undertaken to avoid harming any snake observed during work on this construction site. Any indigo snakes encountered during construction activity should be allowed to crawl off before continuing activities. If it appears that the construction activities will cause harm to the snake, construction must be stopped until the proper action can be determined.

These rare snakes are protected by the Act of 1973 which makes it a violation to “harass, harm, pursue, hunt, shoot, wound, kill, capture, or collect endangered or threatened species.” Violations can result in fines of up to \$20,000 and/or up to 1 year in prison. Only permitted personnel are allowed to handle the snakes.

Contact the following agencies if indigo snakes are observed:

Fish and Wildlife Service at 772-562-3909

Florida Fish and Wildlife Conservation Commission at 888-404-3922

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