



# United States Department of the Interior



FISH AND WILDLIFE SERVICE  
South Florida Ecological Services Office  
1339 20<sup>th</sup> Street  
Vero Beach, Florida 32960

March 23, 2011

Colonel Alfred A. Pantano, Jr.  
U.S. Army Corps of Engineers  
Palm Beach Gardens Regulatory Section  
4400 PGA Boulevard, Suite 500  
Palm Beach Gardens, Florida 33410

Service Federal Activity Code: 41420-2010-CPA-0023  
Service Consultation Code: 41420-2010-F-0453  
Date Received: October 15, 2009  
Project: Scripps Briger DRI  
County: Palm Beach

Dear Colonel Pantano:

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion to the U.S. Army Corps of Engineers (Corps) for the development of the Scripps Briger DRI project site and its effects on the federally threatened eastern indigo snake (*Drymarchon corais couperi*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). A complete administrative record of this consultation is on file in the Service's South Florida Ecological Services Office; Vero Beach, Florida.

This Biological Opinion is based on information provided in the October 15, 2009, request for formal consultation and supporting documents, as well as field investigations, telephone conversations, email correspondence, and other sources of information.

The Corps provided a determination of "may affect, but not likely to adversely affect" for the endangered wood stork (*Mycteria americana*). Although wood storks are regularly observed foraging in wetlands and ditches throughout south Florida, the Scripps project site does not contain significant suitable foraging or nesting habitat. The Service has identified a core foraging area (CFA) of 18.6 miles (mi) around known wood stork rookeries and the Scripps site is within the CFA of one wood stork rookery. Typical foraging sites for the wood stork include freshwater marshes, stock ponds, shallow and seasonally flooded roadside or agricultural ditches, narrow tidal creeks, shallow tidal pools, managed impoundments, and depressions in cypress (*Taxodium distichum*) heads, swamps, and sloughs.

The 681.69-acre (ac) Scripps project site contains 83.21 ac of short-hydroperiod wetlands and 2.76 ac of long-hydroperiod ditches (other surface waters). The wood stork foraging analysis determined the loss of biomass caused by developing the site would be 6.95 kilograms (kg) from impacts to 75.71 ac of class 1 wetlands and 3.14 kg from impacts to 2.76 ac of class 4 ditches. The wood stork compensation plan provided by the applicant includes the enhancement and preservation of 7.50 ac of freshwater marsh habitat onsite, the enhancement of 395 ac of

TAKE PRIDE<sup>®</sup>  
IN AMERICA 

wetlands at Pines Glades West Natural Area, and the purchase of 12.23 herbaceous credits at Loxahatchee Mitigation Bank. The wood stork biomass gained by enhancing the onsite wetland is 23.08 kg of long hydroperiod (class 4) biomass and the gain by enhancing 395 ac at Pine Glades West Natural Area is 86.98 kg of short hydroperiod (classes 2 and 3) biomass, for a net increase of 99.97 kg of biomass overall (Table 1). In addition, although they have not been analyzed using our wood stork methodology, the herbaceous credits purchased from Loxahatchee Mitigation Bank will add to the overall net gain. The project's proposed wetland compensation includes an abundance of long and short hydroperiod wetlands and far exceeds the wetland impacts caused by developing the project site; therefore, the Service concurs with the Corps' determination of "may affect, but not likely to affect" the wood stork.

### **Consultation History**

On October 15, 2009, the Service received the Corps' request for formal consultation regarding the eastern indigo snake and the wood stork.

On January 12, 2010, the Service, Corps, and applicant's consultant conducted a site visit to verify onsite conditions.

On February 8, 2010, the Service and the applicant's consultant conducted a second site visit to allow Project Orianna staff to test their trained eastern indigo snake detection dog.

On December 14, 2010, the Corps changed their determination for the wood stork from "may affect" to "may affect, but not likely to affect" based on the applicant's updated mitigation plan and wood stork forage analysis.

The Service has reviewed all information received pertinent to the indigo snake for the Scripps Briger DRI project site. As of December 14, 2010, the Service received all information necessary for initiation of formal consultation on the indigo snake for this project as required in the regulations governing interagency consultations (50 CFR § 402.14).

## **BIOLOGICAL OPINION**

### **DESCRIPTION OF THE PROPOSED ACTION**

The proposed Scripps Briger DRI project is for the conceptual development of a biotechnology facility and associated commercial and residential development. The intent of the project is to provide a mixed use development on a 681.69-acre site in Palm Beach County. The site consists of two parcels separated by Interstate 95 (I-95). The western parcel is bound on the north by the confluence of I-95 and the Florida Turnpike, on the west by the Florida Turnpike, on the east by I-95, and on the south by Hood Road. The eastern parcel is bound on the north by Donald Ross Road, on the west by I-95, on the south by Hood Road, and on the east by single-family residences and a school (Figure 1). The entire project site contains 83.21 ac of wetlands, the majority of which are exotic wetland hardwoods. There is a small 2.76 ac ditch on site that does not appear to connect off site. The remaining 595.72 ac of uplands on site are predominantly dense pine flatwoods with portions dominated by exotics (Table 2). The project as proposed will impact 2.76 ac of ditch, 75.71 ac of wetlands, and 535.05 ac of uplands. As part of the project, the applicant has proposed to preserve a 7.50-ac freshwater marsh located in the southern portion of eastern parcel as well as 60.67 ac of upland preserve dispersed throughout the site. The two larger

upland preserves (46.17 ac and 13.55 ac) are located in the western parcel. The project site is located in Sections 26 and 35, Township 41 South, Range 42 East, Palm Beach Gardens, in Palm Beach County, Florida

### **Action area**

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate project area involved in the action. However, in this case, the action area is limited to the project site due to the heavy urban development surrounding the project site. Thus, the action area is the 681.69-acre project site where the Service must consider potential effects to indigo snakes that may breed, feed, or shelter within the project area.

## **STATUS OF THE SPECIES/CRITICAL HABITAT**

### **Eastern indigo snake**

In addition to the assessment below, a 5-year review was completed in 2008 resulting in no change to the status of the species (Service 2008a). No critical habitat has been designated for this species. The 5-year review builds upon the detailed information in the Multi-Species Recovery Plan for this species and is located at <http://www.fws.gov/southeast/5yearReviews/5yearreviews/easternindigofinal.pdf>.

### **Species/critical habitat description**

The eastern indigo snake, which can reach lengths of up to 8.5 feet (2.6 meters) (Moler 1992), was historically known as the largest North American snake species until more recently when an 8.76 foot (267 cm) long bull snake (*Pituophis catenifer*) was discovered (Devitt et al 2007). Its color is uniformly lustrous-black, dorsally and ventrally, except for a red or cream-colored suffusion of the chin, throat, and sometimes the cheeks. Its scales are large and smooth (the central 3 to 5 scale rows are lightly keeled in adult males) in 17 scale rows at mid-body. Its anal plate is undivided. In the Florida Keys, adult indigo snakes seem to have less red on their faces or throats compared to most mainland specimens (Lazell 1989). Several researchers have informally suggested that Lower Keys indigo snakes may differ from mainland snakes in ways other than color. Critical habitat has not been designated for this species.

### **Life history**

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

Eastern indigo snakes are active and spend a great deal of time foraging and searching for mates. They are one of the few snake species that are active during the day and rest at night. The eastern indigo snake is a generalized predator and will eat any vertebrate small enough to be overpowered. They swallow their prey alive. Food items include fish, frogs, toads, snakes (venomous, as well as non-venomous), lizards, turtles, turtle eggs, small alligators, birds, and small mammals (Keegan 1944; Babis 1949; Kochman 1978; Steiner et al. 1983).

### **Population dynamics**

Eastern indigo snakes use a mosaic of habitats. A study in southern Georgia found that interspersed tortoise-inhabited sandhills and wetlands improve habitat quality for the eastern indigo snake (Landers and Speake 1980). Eastern indigo snakes shelter in gopher tortoise burrows, hollowed root channels, hollow logs, or the burrows of rodents, armadillos, or land crabs (Lawler 1977; Moler 1985a; 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 snake survival. Over most of its range in Florida, the eastern indigo snake frequents diverse habitats such as pine flatwoods, scrubby flatwoods, floodplain edges, sand ridges, dry glades, tropical hammocks, edges of freshwater marshes, muckland fields, coastal dunes, and xeric sandhill communities (Service 1999). Eastern indigo snakes also use agricultural lands and various types of wetlands, with higher population concentrations occurring in the sandhill and pineland regions of northern and central Florida. Observations over the last 50 years made by maintenance workers in citrus groves in east-central Florida indicate that eastern indigo snakes are occasionally observed on the ground in the tree rows and more frequently near the canals, roads, and wet ditches (Zeigler 2006). In the sugar cane fields at the A-1 Reservoir Project site in the EAA, eastern indigo snakes have been observed (including one mortality) during earthmoving and other construction-related activities.

Eastern 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 1985a). Adult males have larger home ranges than adult females and juveniles; their ranges average 554 ac, decreasing to 390 ac in the summer (Moler 1985b). In contrast, a gravid female may use from 3.5 to 106 ac (Smith 1987). In Florida, home ranges for females and males range from 5 to 371 ac and 4 to 805 ac, respectively (Smith 2003). At the Archbold Biological Station (ABS), average home range size for females was determined to be 47 ac and overlapping male home ranges to be 185 ac (Layne and Steiner 1996).

### **Status and distribution**

The eastern indigo snake was listed as threatened on January 31, 1978 (43 FR 4028), due to population declines caused by habitat loss, over-collecting for the domestic and international pet trade, and mortality caused by rattlesnake collectors who gas gopher tortoise burrows to collect snakes. The indigo snake ranges from the southeastern United States to northern Argentina (Conant and Collins 1998). This species has eight recognized subspecies, two of which occur in the United States: the eastern indigo and the Texas indigo (*D. c. erebennus*). In the United States, the eastern indigo snake historically occurred throughout Florida and in the coastal plain of Georgia and has been recorded in Alabama and Mississippi (Diemer and Speake 1983; Moler

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

Effective law enforcement has reduced pressure on the species from the pet trade. However, because of its relatively large home range, the eastern indigo snake is vulnerable to habitat loss, degradation, and fragmentation (Lawler 1977; Moler 1985a). The primary threat to the eastern indigo snake is habitat loss due to development and fragmentation. In the interface areas between urban and native habitats, residential housing is also a threat because it increases the likelihood of snakes being killed by property owners and domestic pets. Extensive tracts of undeveloped land are important for maintaining eastern indigo snakes. In citrus groves, eastern indigo snake mortality occurs from vehicular traffic and management techniques such as pesticide usage, lawn mowers, and heavy equipment usage (Zeigler 2006). Within the 2000 to 2005 timeframe, since the spread of citrus canker, Zeigler (2006) reported seeing at least 12 dead eastern indigo snakes that were killed by heavy equipment operators in the act of clearing infected trees.

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

To protect and manage this species for recovery, Breininger et al. (2004) concluded that the greatest eastern indigo snake conservation benefit would be accrued by conserving snake populations in the largest upland systems that connect to other large reserves while keeping edge to area ratios low. Management of these lands should be directed towards maintaining and enhancing the diversity of plant and animal assemblages within these properties. Where these goals are achieved, eastern indigo snakes will directly benefit because of improved habitat conditions. Land managers should be encouraged to utilize fire as a tool to maintain biodiversity in fire-dependent ecosystems.

#### **Analysis of the species/critical habitat likely to be affected**

The proposed action has the potential to adversely affect eastern indigo snake adults, juveniles, nests, and hatchlings within the proposed project area. Potential effects include injury, mortality, habitat loss or degradation, and disturbance resulting from construction of the proposed Scripps Briger DRI project.

Critical habitat has not been designated for the indigo snake; therefore, none would be affected.

#### **ENVIRONMENTAL BASELINE**

The environmental baseline is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem, within the action area. It includes the impact of state or private actions, which occur simultaneously with the consultation in progress.

## **Climate change**

According to the Intergovernmental Panel on Climate Change Report (IPCC) (2007), warming of the earth's climate is "unequivocal," as is now evident from observations of increases in average global air and ocean temperatures, widespread melting of snow and ice, and rising sea level. The 2007 IPCC report describes changes in natural ecosystems with potential wide-spread effects on many organisms, including marine mammals and migratory birds. The potential for rapid climate change poses a significant challenge for fish and wildlife conservation. Species' abundance and distribution are dynamic, relative to a variety of factors, including climate. As climate changes, the abundance and distribution of fish and wildlife will also change. Highly specialized or endemic species are likely to be most susceptible to the stresses of changing climate. Based on these findings and other similar studies, the Department of the Interior requires agencies under its direction to consider potential climate change effects as part of their long-range planning activities (Service 2007).

Climate change at the global level drives changes in weather at the regional level, although weather is also strongly affected by season and local effects (*e.g.*, elevation, topography, latitude, proximity to the ocean, etc). Temperatures are predicted to rise from 2°C to 5°C for North America by the end of this century (IPCC 2007). Other processes to be affected by this projected warming include rainfall (amount, seasonal timing and distribution), storms (frequency and intensity), and sea level rise. However, the exact magnitude, direction, and distribution of these changes at the regional level are not well understood or easy to predict. Seasonal change and local geography make prediction of the effects of climate change at any location variable. Current models offer a wide range of predicted changes.

Climatic changes in south Florida could amplify current land management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management (Pearlstine 2008). Global warming will be a particular challenge for endangered, threatened, and other "at risk" species. It is difficult to estimate, with any degree of precision, which species will be affected by climate change or exactly how they will be affected. The Service will use Strategic Habitat Conservation planning, an adaptive science-driven process that begins with explicit trust resource population objectives, as the framework for adjusting our management strategies in response to climate change (Service 2006).

## **Status of the species within the action area**

The size of the action area represents a small portion of the combined acreage of all habitats usable by indigo snakes in south Florida. Furthermore, the Scripps Briger DRI site is fragmented from other areas potentially inhabited by eastern indigo snakes. The most likely route for immigration and emigration would be via the residential areas to the east and south; however, the natural areas are very sparse within these developments. It is unlikely snakes would survive attempting to cross I-95, the Florida Turnpike, or Donald Ross Road. Due to these physical barriers in the landscape, it is the Services' opinion that indigo snakes are very unlikely to disperse to or from the project site.

Although we have little information on the distribution and abundance of indigo snakes within the action area, they have been documented using habitats similar to those impacted by the proposed

action within 10 mi of the action area. As previously mentioned, the surrounding area is highly developed; therefore, any indigo snakes in the action area are likely to utilize the Scripps Briger site and are not likely to have home ranges that include areas outside of the site. While indigo snakes have not been observed on the site, an eastern diamondback rattlesnake (*Crotalus horridus*) was observed by staff from ESI Consultants during a site visit. Eastern indigo snakes are known to eat rattlesnakes as well as occupy the same habitat. Additionally, an experimental survey was conducted on February 17, 2010, using a trained indigo snake detection dog and handler team. The snake detecting dog has been trained to pick up the scent of eastern indigo snakes and signal only for indigo snakes. While on site, the dog signaled the possible presence of a snake in a gopher tortoise burrow; however, the burrow was not scoped to confirm presence.

### **Factors affecting the species environment within the action area**

Based on available aerial photographs (<http://web.uflib.ufl.edu/digital/collections/FLAP/>), the historic land use in the action area was predominantly pine with pockets of freshwater marsh until sometime after 1968. The Florida Turnpike was completed in this area in 1957, forming the western boundary of the site, and I-95 was completed through the Palm Beach Gardens area in 1987, bisecting the Scripps Briger site. The construction of these two major thoroughfares facilitated the rapid development that occurred in this area from the 1970s through present time. Pine flatwoods, scrubby flatwoods, and high pine are preferred native habitat types for indigo snakes (Service 1999). Based on historic land use, this area contained high-quality habitat for indigo snakes; however, only moderately suitable habitat remains on the project site due to the surrounding development as well as presence of nuisance and exotic plant species on site. Although the habitat present is not of the highest quality, we are considering the entire site to be usable. The Service recognizes it is unlikely snakes and other potential prey can cross I-95 and the Florida Turnpike successfully, therefore it is likely the potential on site populations exist independent of each other.

It is difficult to estimate the density of eastern indigo snakes at the project site due to a general lack of data for the action area. Therefore, we used the data from other studies of eastern indigo snakes in Florida to estimate eastern indigo snake density on the project site. There is uncertainty around these estimates because they were not based on similar types of habitat but the study sites were located on similar latitudes in Florida. As this is the best data available, we believe the comparisons are valid and represent a conservative approach.

A 26-year study conducted by Layne and Steiner (1996) at ABS estimated a population density of 2.6 indigo snakes (1.9 males, 0.7 females) per 100 hectares (ha) (247 ac). They also estimated a lower density based on 5 snakes (3 males and 2 females) that occupied 314 ha at 1.6 indigo snakes per 100 ha (0.96 males to 0.64 females). ABS is approximately 60 mi northwest of the project area and contains more native snake habitat (*i.e.*, the study area was comprised of 60 percent xeric pine and oak uplands, and 40 percent pine flatwoods, bayheads, swale, and seasonal ponds). Eastern indigo snakes have been observed at ABS in all natural and man-altered habitats with no obvious habitat preferences (Layne and Steiner 1996). Layne and Steiner (1996) also estimated densities and eastern indigo snake territory size for sugar cane habitats, a suboptimal habitat that is used by eastern indigo snakes. The average territory size for an eastern indigo snake in sugar cane was approximately 185 ac.

There may be additional uncertainty regarding the sex ratio reported by Layne and Steiner (1996) at ABS. From a sample of 181 adult and juvenile eastern indigo snakes, Layne and Steiner (1996) found that 58 percent of the individuals were males and 42 percent were females. The juvenile eastern indigo snakes (< 800 millimeters; n = 36) were present at a 1:1 sex ratio, therefore, it was the larger snakes that skewed the sex ratio towards males. This led Layne and Steiner (1996) to postulate that the estimated adult sex ratio may be artificially skewed because males have larger home ranges and move more than females in winter. Therefore, male snakes may have a higher probability of being captured or killed by vehicular traffic (and thus added to their sample). It may be an adult sex ratio of 1:1 is more appropriate for eastern indigo snakes. This ratio is more typical of colubrid snakes according to Parker and Plummer (2001). A 1:1 sex ratio was also reported by Moulis (1976) for 11 captive hatchling indigo snakes. We have adopted a 1:1 sex ratio for this Biological Opinion.

The habitat on the project site is less than optimal due to the condition of the site and its geographic isolation. As it is the only available study in suboptimal habitat, we have used Layne and Steiner's (1996) estimates of densities in sugar cane as a surrogate for the Scripps Briger project. Therefore, we believe there may be up to 3 territories on site. As snakes are unlikely to have a territory that spans both sides of a major highway, these potential territories are divided into one territory on the west side of I-95 (about a 195-acre parcel), and two territories on the eastern parcel (about a 486-acre parcel). Assuming that the eastern indigo snakes present at the Scripps Briger site are present in a 1:1 sex ratio, the 3 territories would equate to 6 eastern indigo snakes.

We do not expect the horse pasture area to solely comprise an eastern indigo snake territory due to lack of vegetative cover; however, there are adequate resources within the barn and debris piles to support eastern indigo snakes and their prey. The remaining forested portions of the site provide ample cover for both eastern indigo snakes and their prey. Knowing that the males are territorial, we do not expect that existing territories would overlap to a large degree, however, female territories could overlap male territories.

## **EFFECTS OF THE ACTION**

This section includes an analysis of the direct and indirect effects of the proposed action on the eastern indigo snake and its interrelated and interdependent activities.

### **Factors to be considered**

Factors considered in the analyses for effects of the action include the distribution of the geographic areas where disturbance will occur relative to the potential value of that area to eastern indigo snakes, the type of disturbance, the proximity of the action to natural areas outside of the project site but within the action area that may support indigo snakes, the timing of project activities relative to sensitive periods in the snake's life cycle, the duration of potential effects on indigo snakes and their habitat, and the operation and maintenance of the project.

The Scripps Briger project site is primarily pine flatwoods with exotic vegetation scattered throughout the forested areas. The Corps exerted jurisdiction over several pocket wetlands that are interspersed throughout the site. The vegetation on site is extremely thick in absence of fire and there is sufficient cover on site for eastern indigo prey. Several other species of snakes were



reportedly observed on site by staff from ESI Consultants, including an eastern diamondback rattlesnake. The consultants also reported several gopher tortoise burrows on site, in which indigo snakes are known to reside. However, the dependence on these burrows is thought to be less in South Florida. With the absence of other large tracts of undeveloped parcels in this part of Palm Beach County, it is likely the Scripps site could act as a sink for all wildlife needing larger natural areas, including the indigo snake. The Service believes the presence of other snakes, gopher tortoise burrows, and suitable habitat provides a good indication of the potential for eastern indigo snakes to occur on site.

The applicant agreed to conduct an unofficial cursory survey for eastern indigo snakes using a new detection method. Although the Service has not officially adopted this survey methodology, we are collecting data to determine if this is a reliable survey method. A dog has been trained to detect the scent of indigo snakes and alert the handler when this scent is detected. According to the handler, indication by the dog includes various signs they are trained to observe. The dog expresses a suite of behaviors including sitting and/or remaining stationary, vigorous tail-wagging, and crouching (Stevenson et al. 2010). On this particular survey, the dog showed interest in several areas on the eastern portion of the site. However, we were not permitted to bring the dog into the pasture and barn area per the lessee's request. On the western parcel, the dog circled and sniffed repeatedly at a tortoise burrow. The handler told us this was a positive indicator that the dog thought there was scent of an indigo snake within the burrow. However, we were unable to confirm the presence of an indigo snake with the burrow camera. The positive indications from the detector dog support the Service's belief that the entire site could be used by indigo snakes.

The action would result in loss of cover, habitat, and associated prey, and disturbance may occur in the form of pedestrian, vehicular, or excessive noise over the phase of the proposed project. Construction noise could disturb eastern indigo snakes where it exceeds ambient noise. Visual disturbance from personnel could also affect eastern indigo snakes. Although personnel will be advised to avoid eastern indigo snakes, the operation of equipment in heavily vegetated areas where snakes may not be visible may result in direct injury or mortality. The land clearing and construction of the infrastructure involves use of heavy equipment that may also injure or kill eastern indigo snakes.

There is very little undeveloped land in the vicinity of the proposed project; therefore, the potential for emigration from the Scripps Briger site is limited. Several residential developments surround the site, but narrow corridors or patch landscape are all that exist to sustain prey and provide cover for the indigo snakes in these areas. The Florida Turnpike and I-95 make dispersal from the site difficult due to constant vehicular traffic. There will be approximately 90 ac of uplands and wetlands preserved on site which may provide potential habitat; however, these parcels are fragmented and scattered throughout the site.

Construction and maintenance activities are most likely to occur during daylight hours, the same time that eastern indigo snakes are active. This would increase risk of injury or mortality of eastern indigo snakes during construction activities. The timing of construction is not known and it is likely that construction will occur year-round in at least some areas of the site. Construction will occur in a single pulse of activity and the projected length of construction is unknown at this time. Therefore, eastern indigo snakes using the Scripps site are likely to be disturbed or harassed for the duration of construction.

## **Analyses for effects of the action**

The indigo snake is difficult to detect and quantify for the following reasons: (1) it has a wide-ranging distribution; (2) it has a patchy distribution within suitable habitat; (3) it has limited detectability due to use of burrows or holes for shelter; (4) there is likely unoccupied suitable habitat; (5) juveniles have limited detectability due to their affinity for thick vegetation; and (6) it may use cryptic sheltering areas that may be temporarily established during construction (e.g., brush piles, equipment stockpiles, and dirt mounds). This makes the quantifiable determination of effects of a project difficult.

The direct effects that this project may have on indigo snakes within the action area are discussed below. The total area directly affected is estimated to be 681.69 ac, the entire project area.

### **Direct effects**

Direct effects are those effects that result from the proposed action (including the effects of interrelated and interdependent actions) and affect the species or its habitat.

Injury and mortality: It is difficult to determine the number of eastern indigo snakes (adults, juveniles, hatchlings, or eggs) that could be injured or killed by the project. Due to the nature of the proposed construction, the Service estimates that some of the eastern indigo snakes present at the time of the action could be adversely affected by the project. The initial clearing of vegetation could crush or injure individual snakes and their nests and destroy or degrade occupied and potential den sites. However, the applicant has agreed to implement the *Standard Protection Measures for the Eastern Indigo Snake* (Service 2004) as part of the proposed action; therefore, it is likely that not all indigo snakes encountered during preparation activities will be injured or killed.

Timing of construction will not be determined until a later date; therefore, we must assume that construction operations could also result in destruction of eggs or young.

Harassment: Noise associated with the proposed activities could disturb snakes where it exceeds ambient noise. Additionally, visual disturbance from personnel during site preparation and clearing activities could also affect snakes.

The *Standard Protection Measures for the Eastern Indigo Snake* require the applicant to develop a protection/education plan for all construction personnel to follow. Onsite personnel should be familiar with the physical description of the snake and what to do if a snake is observed during any phase of construction activities. The snake must be allowed to leave the site on its own accord and must not be harassed in any way.

Disturbance during construction: The increased human presence on the site during clearing and construction along with the operation of equipment and vehicles may disturb eastern indigo snakes to the point they leave the project area. This may result in missed foraging and mating opportunities and these individuals may be more vulnerable to predation, intraspecific aggression, and mortality from vehicle strikes.

## **Indirect effects**

Indirect effects are those that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. The indirect effects that the proposed action may have on eastern indigo snakes within the action area are discussed below.

Injury and Mortality: Once construction is completed, additional vehicular traffic will access the site. The Service recognizes the possibility that a small number of indigo snakes may occupy the project area post construction. These snakes will be at risk for vehicular injuries or death. In addition, these snakes may experience harassment from living in close proximity to development as this increases the likelihood of snakes being killed or injured by property owners and domestic pets.

Loss of Prey: We expect that a prey base for the eastern indigo snake is available on the Scripps project site. This prey base would likely be diminished in the post-construction environment due to the land use conversion.

## **Interrelated and interdependent actions**

An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for its justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation. No interrelated or interdependent actions are expected to result from the project.

## **Species' response to the proposed action**

Construction, operation, and maintenance of the project may result in actions that could kill or injure individual eastern indigo snakes, destroy nests, and destroy or degrade habitat and foraging areas. Clearing, burning, earthmoving, construction, operation, and maintenance activities may also disturb eastern indigo snakes by causing them to try to leave the area, and possibly miss foraging and mating opportunities. Individual eastern indigo snakes attempting to flee the area are likely to be unsuccessful due to surrounding major roadways, and any who manage to successfully disperse may be more vulnerable to predation and intraspecific aggression. The Service anticipates the number of eastern indigo snakes at the Scripps site will be less after construction than that of the baseline condition. This is due primarily to the habitat loss. We anticipate up to 6 eastern indigo snakes may currently inhabit the site.

The Service anticipates approximately 681.69 ac of potential eastern indigo snake habitat within the construction site would be affected by the proposed action. The number of individuals present at the time of the action is not known; however, the Service estimates as many as 3 male and 3 female indigo snakes may be present within the construction area of the project.

Furthermore, we anticipate up to 3 nests may be present during any given nesting season (April to July) prior to construction. These population estimates are based partly on population density estimates in native and altered habitats at ABS (Layne and Steiner 1996) and in the sugar cane fields at the EAA A-1 Reservoir Project site. After construction, we anticipate the number of eastern indigo snakes and nests present will decrease due to loss or conversion of habitat and ongoing disturbance.

Although unlikely, the possibility exists that a small number of eastern indigo snakes may continue to use the Scripps site following construction if vegetative cover and prey items are present. However, these snakes will be subject to effects due to ongoing activities on site as discussed above in the indirect effects section.

## **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.

Conversion of surrounding lands that currently support indigo snakes to residential uses that would support less eastern indigo snakes would be the most likely cumulative effect on the species, but only if no wetlands were impacted (*i.e.*, no Federal permit was required). The primary threat today to the eastern indigo snake is habitat loss and fragmentation due to development (Lawler 1977; Moler 1985a). Besides loss of habitat, residential developments also increase risk to eastern indigo snakes in the interface areas between urban and native habitats because it increases the likelihood of snakes being killed by property owners and domestic pets. Increased traffic associated with development may also lead to increased eastern indigo snake mortality. Given that the surrounding area is already heavily developed, there is little potential for future development. However, jurisdictional wetlands are prominent in this area which would require a Federal permit for development and subsequent review pursuant to the Act. Therefore, the Service does not anticipate any appreciable cumulative effects to the eastern indigo snake.

## **CONCLUSION**

The project will remove 681.69 ac of moderately suitable habitat which is already fragmented from other potential snake habitat by major roads and development. This is less than 0.5 percent of the habitat for eastern indigo snakes available on public and agricultural lands in Palm Beach County alone. After reviewing the current status of the eastern indigo snake, the environmental baseline for the action area, the effects of the proposed action and anticipated cumulative effects, it is the Service's biological opinion that the Scripps project, as proposed, is not likely to jeopardize the continued existence of the eastern indigo snake. No critical habitat has been designated for these species; therefore, none will be affected. We anticipate that eastern indigo snakes (3 males, 3 females, 3 nests) will over time be extirpated from the site as there will be limited cover available to hide and support sufficient forage. The habitat that will remain on site in the form of mitigation areas is neither contiguous nor large enough to support snakes indefinitely. The potential loss of eastern indigo snakes present at the Scripps site will not significantly reduce the numbers, distribution, and reproduction of indigo snakes in south Florida.

## **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 behavioral 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, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking, that is incidental to and not intended as part of the agency action, is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary and must be undertaken by the Corps so that they become binding conditions of any grant or permit issued to the District, as appropriate, for the exemption in 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 (1) fails to assume and implement the terms and conditions or (2) fails to require the District to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the grant, agreement, or permit document, the protection coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Corps or the District, must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(i)(3)].

#### **AMOUNT OR EXTENT OF TAKE ANTICIPATED**

The Service anticipates the action will cause the permanent loss or degradation of 681.69 ac of indigo snake habitat on the project site. Permanent loss of habitat will occur through clearing and development of the site.

Based on the reported densities of eastern indigo snakes at ABS and observations of eastern indigo snakes at the EAA A-1 Reservoir Project site, the Service assumes up to 6 indigo snakes and up to 3 eastern indigo snake nests may be present on the site under pre-construction conditions. Of these snakes and nests, we anticipate the following may be incidentally taken as a result of the action.

Up to two eastern indigo snakes may be harmed (injury or mortality) incidental to project construction. The productivity associated with up to three eastern indigo snake nests may also be lost through direct mortality incidental to project construction.

After site clearing and development, we anticipate that the project site will not continue to support eastern indigo snakes. The green spaces of the proposed Scripps biotech development are not contiguous with other undeveloped land and are too small to support a snake indefinitely. If a snake were to return to the site post development, the increase in traffic could lead to future mortality or injury. Human involvement and maintenance of the Scripps biotech facility would likely deter snakes from returning. Therefore, we anticipate that all eastern indigo snakes at the Scripps project site could be incidentally taken through harassment for the life of the project.

## **EFFECT OF THE TAKE**

In the accompanying Biological Opinion, the Service determined this level of anticipated take is not likely to jeopardize the continued existence of the eastern indigo snake.

## **REASONABLE AND PRUDENT MEASURES**

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the effects of incidental take of the eastern indigo snake.

The Corps has stated it will require the applicant to follow the *Standard Protection Measures for the Indigo Snake* (Service 2004). Within this protection/education plan the applicant will develop an eastern indigo snake educational brochure to be available to contractors. Additionally, the plan will identify what to do and who to contact in the event an indigo snake is encountered. This plan must be submitted and approved by the Service 30 days prior to land clearing activities. We have considered these measures in this Biological Opinion and believe they are critical in minimizing take associated with the proposed action. No additional reasonable and prudent measures are necessary or appropriate to further minimize the incidental take of indigo snakes.

## **TERMS AND CONDITIONS**

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 reporting and monitoring requirements. These terms and conditions are non-discretionary.

Reporting and disposition of dead or injured animals (salvage):

1. Upon locating a dead, injured, or sick federally listed species, initial notification must be made to referenced project biologist and the nearest Service Law Enforcement Office (U.S. Fish and Wildlife Service; 1339 20<sup>th</sup> Street, Vero Beach, Florida; 772-562-3909). Secondary notification should be made to the FWC, South Region; 8535 Northlake Boulevard, West Palm Beach, Florida; 33412-3303; 561-625-5122; 1-888-404-3922.
2. Care shall be taken in handling sick or injured specimens to ensure effective treatment and care or in the handling of dead specimens to preserve biological material in the best possible state for later analysis as to the cause of death. Dead specimens should be placed on ice and frozen as soon as possible. In conjunction with the care of sick or injured specimens or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.
3. In addition to reporting requirements for dead or injured snakes in conditions 1 and 2, a report shall be submitted post construction which includes all indigo snake sightings, injuries, and mortalities during the proposed action to the Service biologist. This report shall contain the location (latitude and longitude), dates, times, prevailing environmental conditions, and the circumstances surrounding all sightings and the disposition of all animals found. A site map with observation locations shall also be included in this report. If no snakes are encountered throughout construction, a report shall be submitted indicating that fact.

## 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.

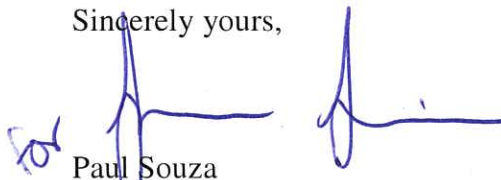
As a conservation measure, the Service asked the applicant to allow for a site visit by Project Orianna with their eastern indigo snake detection dog to do a test survey. The applicant voluntarily agreed to fund this portion of the study to aid in future methods to locate indigo snakes. The Service acknowledges the limited data and survey protocols for indigo snake detection and supported the effort by Scripps to aid in fulfilling this need. We believe the applicant has satisfied this proposed conservation measure.

## REINITIATION NOTICE

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

Thank you for your cooperation in the effort to conserve fish and wildlife resources. If you have any questions regarding this project, please contact Kristi Yanchis at 772-562-3909, extension 313.

Sincerely yours,



Paul Souza  
Field Supervisor  
South Florida Ecological Services Office

cc: electronic only

FWC, Tallahassee, Florida (MaryAnn Poole, Traci Wallace, FWC-CPS)  
Service, Jackson, Mississippi (Linda LaClaire)  
Service, Vero Beach, Florida (Marilyn Knight)  
Corps, West Palm Beach, Florida (Eric Reusch)  
District, West Palm Beach, Florida (Barbara Conmy)  
Palm Beach County ERM, West Palm Beach, Florida (Rob Robbins, Benji Studt)  
ESI, Jupiter, Florida (Mary Lindgren - mlindgren@esinc.cc)

## LITERATURE CITED

- Babis, W.A. 1949. Notes on the food of the indigo snake. *Copeia* 1949 (2):147.
- Breininger, D.R., M.L. Legare, and R.B. Smith. 2004. Edge effects and population viability of eastern indigo snakes in Florida. Pgs. 299-311 *in*: H.R. Akcakaya, M. Burgman, O. Kindvall, P. Sjorgren-Gulve, J. Hatfield, and M. McCarthy, editors. *Species Conservation and Management: Case Studies*. Oxford University Press, New York, New York.
- Carson, H.L. 1945. Delayed fertilization in a captive indigo snake with note of feeding and shedding. *Copeia* 1945(4): 222-224.
- Conant, R. and J.T. Collins. 1998. *A field guide to reptiles and amphibians of eastern and central North America*. Third Edition, Expanded. Houghton Mifflin Company; New York, New York.
- Cox, J.A. and R.S. Kautz. 2000. Habitat conservation needs of rare and imperiled wildlife in Florida. Florida Fish and Wildlife Conservation Commission; Tallahassee, Florida.
- Devitt et al. 2007 *Pituophis catenifer* (Bullsnake). Maximum Length. *Herpetological Review* 38:209-210.
- Diemer, J.E. and D.W. Speake. 1983. The distribution of the eastern indigo snake, *Drymarchon corais couperi*, in Georgia. *Journal of Herpetology* 17(3): 256-264.
- Intergovernmental Panel on Climate Change Fourth Assessment Report. 2007. *Climate Change 2007: Synthesis Report. Summary for Policy Makers*. Draft.
- Keegan, H.L. 1944. Indigo snakes feeding upon poisonous snakes. *Copeia* 1944 (1):59.
- Kochman, H.I. 1978. Eastern indigo snake, *Drymarchon corais couperi*. Pages 68-69 in R.W. McDiarmid, ed. *Rare and endangered biota of Florida*. University Presses of Florida; Gainesville, Florida.
- Landers, J.L. and D.W. Speake. 1980. Management needs of sandhill reptiles in southern Georgia. *Proceedings of the annual conference of the Southeastern Association of Fish and Wildlife Agencies* 34: 515-529.
- Lawler, H.E. 1977. The status of *Drymarchon corais couperi* (Holbrook), the eastern indigo snake, in the southeastern USA. *Herpetological Review* 8(3): 76-79.
- Layne, J.N. and T.M. Steiner. 1996. Eastern indigo snake (*Drymarchon corais couperi*): summary of research conducted on Archbold Biological Station. Report prepared under Order 43910-6-0134 to the U.S. Fish and Wildlife Service; Jackson, Mississippi.



- Lazell, Jr. J.D. 1989. *Wildlife of the Florida Keys: a natural history*. Island Press; Washington, D.C.
- Moler, P.E. 1985a. Distribution of the eastern indigo snake, *Drymarchon corais couperi*, in Florida. *Herpetological Review* 16(2): 37-38.
- Moler, P.E. 1985b. Home range and seasonal activity of the eastern indigo snake, *Drymarchon corais couperi*, in northern Florida. Final Performance Report, Study E-1-06, III-A-5. Florida Game and Freshwater Fish Commission; Tallahassee, Florida.
- Moler, P.E. 1992. Rare and endangered biota of Florida. Volume III. Amphibians and reptiles. University presses of Florida; Gainesville, Florida.
- Moler, P.E. 1998. Personal communication. Biologist. Comments dated January 9, 2006, to the U.S. Fish and Wildlife Service on the technical/agency draft Multi-Species Recovery Plan for South Florida. Florida Fish and Wildlife Conservation Commission; Tallahassee, Florida.
- Parker, W.S. and M.V. Plummer. 2001. Population ecology in snakes: Ecology and Evolutionary Biology (Seigel, R.A., J.T. Collins, and S.S. Novak, editors). The Blackburn Press; Caldwell, New Jersey. pp. 253-301.
- Pearlstine, L.G. 2008. Ecological consequences of climate change for the Florida Everglades: An initial summary. Technical memorandum, South Florida Natural Resources Center, Everglades National Park; Homestead, Florida.
- Shaw, C.E. 1959. Longevity of snakes in the United States as of January 1, 1959. *Copeia* 1959(4): 336-337.
- Smith, C.R. 1987. Ecology of juvenile and gravid eastern indigo snakes in north Florida. M.S. thesis, Auburn University; Auburn, Alabama.
- Smith, R. 2003. Personal communication. Biologist. Presentation to the U.S. Fish and Wildlife Service on February 24, 2003. Dynamac Corporation; Kennedy Space Center, Florida.
- Speake, D.W., D. McGlincy, and C. Smith. 1987. Captive breeding and experimental reintroduction of the eastern indigo snake. Pages 84-90 in *Proceedings of the 3rd Southeastern Nongame and Endangered Wildlife Symposium*; Athens, Georgia.
- Steiner, T.M., O.L. Bass, Jr., and J.A. Kushlan. 1983. Status of the eastern indigo snake in Southern Florida National Parks and vicinity. South Florida Research Center Report SFRC-83-01, Everglades National Park; Homestead, Florida.
- Stevenson, D.J., K. Ravenscroft, R. Zappalorti, M. Ravenscroft, S. Weigley, and C. Jenkins. 2010. Using a Wildlife Detector Dog for Locating Eastern Indigo Snakes. *Herpetological Review* 41(4): 437-442.

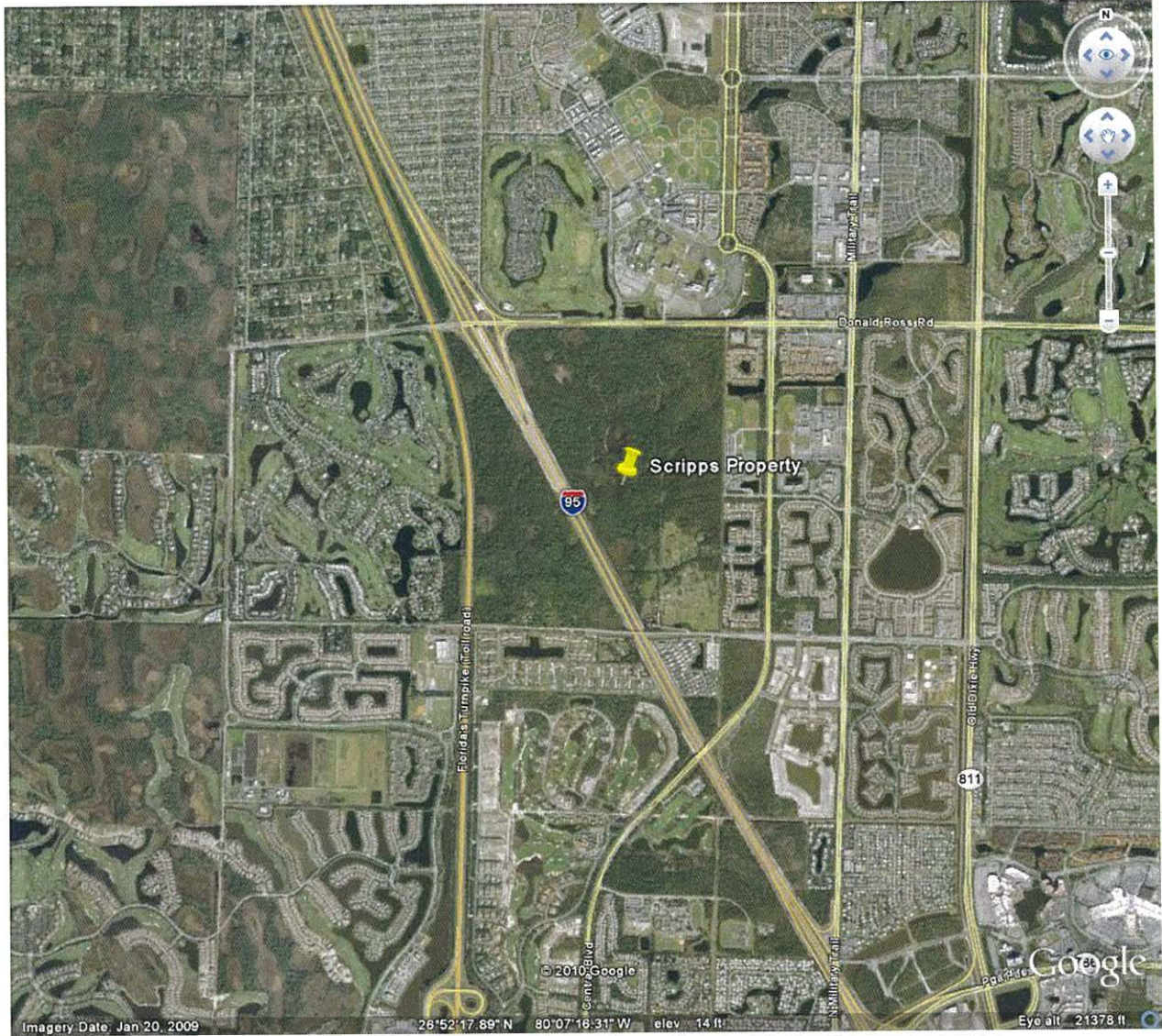
- U.S. Fish and Wildlife Service. 1999. South Florida Multi-Species Recovery Plan. Southeast Region; Atlanta, Georgia.
- U.S. Fish and Wildlife Service. 2004. Standard protection measures for the eastern indigo snake. South Florida Ecological Services Office; Vero Beach, Florida.
- U.S. Fish and Wildlife Service. 2006. Strategic Habitat Conservation. Final Report of the National Ecological Assessment Team to the U.S. Fish and Wildlife Service and U.S. Geologic Survey.
- U.S. Fish and Wildlife Service. 2007. Draft communications plan on the U.S. Fish and Wildlife Service's Role in Climate Change.
- U.S. Fish and Wildlife Service. 2008. Eastern Indigo Snake, 5-Year Review. Fish and Wildlife Service, Atlanta, Georgia.
- Zeigler, M. 2006. Personal communication. Citrus grove operations manager. Meeting with the U.S. Fish and Wildlife Service on August 1, 2006. Agricultural Resource Management; Vero Beach, Florida.

**Table 1.** Wood stork forage biomass analysis summary

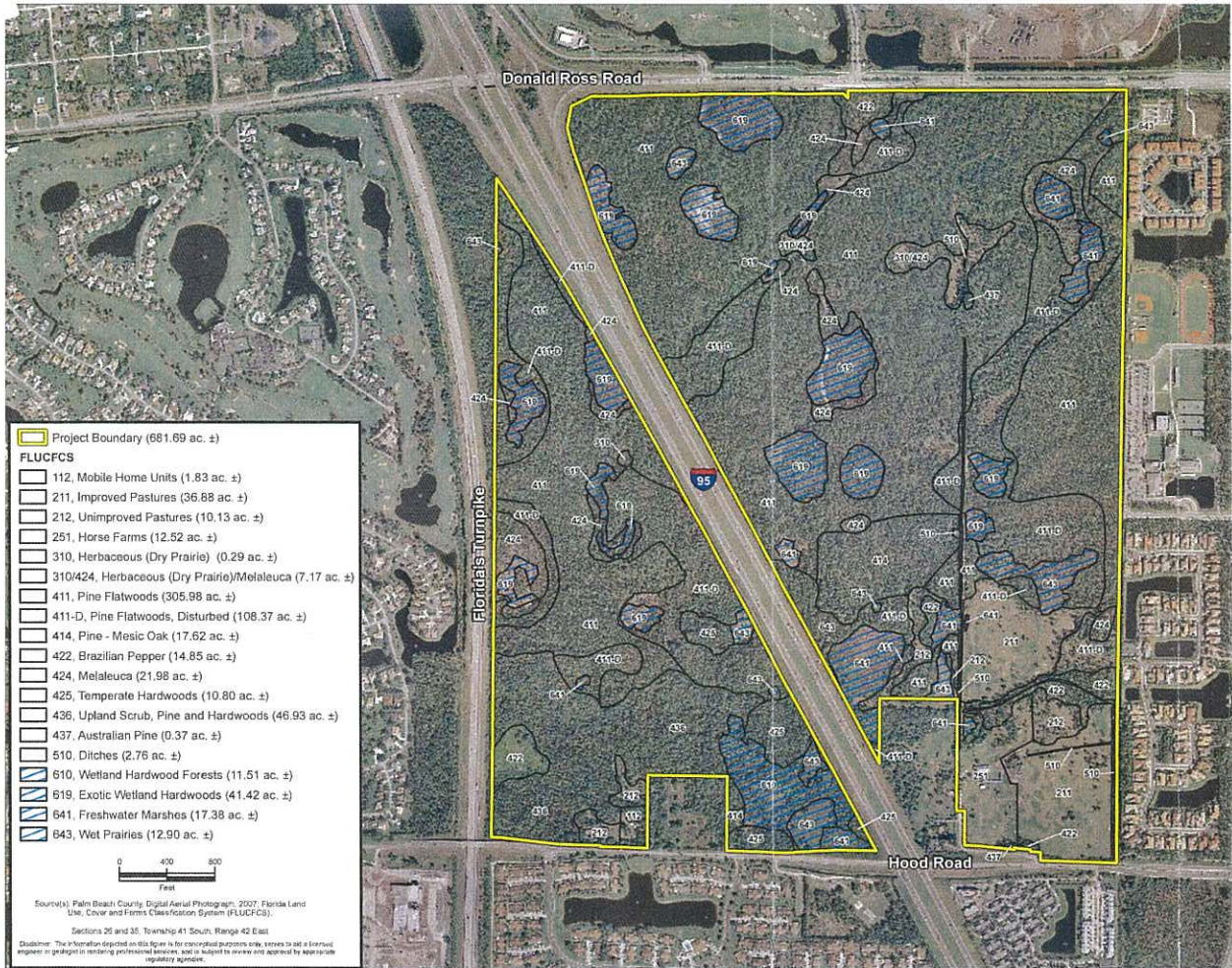
Hydroperiod	Existing Footprint		Preserve Areas				Net Change Per Hydroperiod Class	
			Pre Enhancement		Post Enhancement			
	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams
Class 1: 0 to 60 Days	75.71	6.95					-75.71	-6.95
Class 2: 60 to 120 Days			242.50	197.75	242.50	197.75	0.00	0.00
Class 3: 120 to 180 Days			160.00	177.78	152.50	264.76	-7.50	86.98
Class 4: 180 to 240 Days	2.76	3.14			7.50	23.08	4.74	19.94
Class 5: 240 to 300 Days							0.00	0.00
Class 6: 300 to 330 Days							0.00	0.00
Class 7: 330 to 365 Days							0.00	0.00
<b>TOTAL</b>	<b>78.47</b>	<b>10.09</b>	<b>402.50</b>	<b>375.53</b>	<b>402.50</b>	<b>485.59</b>	<b>-78.47</b>	<b>99.97</b>

**Table 2.** Land cover types within the Scripps project site based on the Florida Land Use, Cover, and Forms Classification System (2004 data). Figure 2 displays these data.

Land Cover Code	DESCRIPTION	Acres
112	Mobile Home Units	1.83
211	Improved Pasture	36.88
212	Unimproved Pasture	10.13
251	Horse Farms	12.52
310	Herbaceous (Dry Prairie)	0.29
310/424	Herbaceous (Dry Prairie)/Melaleuca	7.17
411	Pine Flatwoods	305.98
411-D	Pine Flatwoods Disturbed	108.37
414	Pine-Mesic Oak	17.62
422	Brazilian Pepper	14.85
424	Melaleuca	21.98
425	Temperate Hardwoods	10.80
436	Upland Scrub, Pine and Hardwoods	46.93
437	Australian Pine	0.37
510	Ditches	2.76
610	Wetland Hardwood Forests	11.51
619	Exotic Wetland Hardwoods	41.42
641	Freshwater Marshes	17.38
643	Wet Prairies	12.90



**Figure 1.** The Scripps project location.



**Figure 2.** The Scripps project site with Florida Land Use Cover and Forms Classification System (FLUCCS) codes depicted.