United States Department of the Interior

FISH AND WILDLIFE SERVICE
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District Commander
U.S. Army Corps of Engineers
P.O. Box 4970
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Applicant:	Martin County Board of County Commissioners
Project:	Green River Parkway
County:	Martin

Dear Colonel Grosskruger:

This document transmits the Fish and Wildlife Service's (Service) biological opinion for the construction of the Green River Parkway in Martin County, Florida, on the threatened Florida scrub-jay (*Aphelocoma coerulescens*), 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.*). The project site is located in Sections 20, 21, 28, and 29, Township 37 South, Range 41 East, Martin County, Florida (Figure 1)

This biological opinion is based on information provided in the U.S. Army Corps of Engineer's (Corps) letter to the Service dated August 23, 2006; information provided by the applicant's consultants (Biological Research Associates, Incorporated, and R.L. Weight, Incorporated); email messages; telephone conversations; and other sources of information. A complete administrative record of this consultation is on file at the South Florida Ecological Services Office, Vero Beach, Florida.

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 IPCC Report (2007) describes changes in natural ecosystems with potential wide-spread effects

TAKE PRIDE IN AMERICA

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 (DOI) 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 by local effects (*e.g.*, elevation, topography, latitude, proximity to the ocean). 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. Climatic changes in south Florida could amplify current land management challenges involving habitat fragmentation, urbanization, invasive species, disease, parasites, and water management (Pearlstine 2008).

Air Temperature

Current models predict changes in mean global temperature in the range 2-4°C (4-8°F) by 2100, but how this manifests at the regional and local scale is uncertain. Note that a change of just a couple degrees can have profound effects, particularly at temperature extremes. For example, in Florida, winter frost, a 2-degree transition from 33°F to 31°F, greatly affects vegetation. While predicted changes in average annual temperature appear small, local and seasonal temperature variation may be greater. It is also important to consider that an increase in the temperature of the global atmosphere may manifest as an increase or a decrease in local means and extremes. We do not currently know either the direction or anticipated size of temperature change in Florida, but the following possibilities at the local level should be considered:

- Changes (likely small) in mean annual temperature.
- Greater extremes of temperature in summer (average highs) and winter (average lows).
- More prolonged and seasonally extended frosts.
- Shifts in the distribution of temperature regimes (isotherms, growing zones).
- Changes in the seasonal onset of temperature changes (*e.g.*, earlier spring).
- Changes in the duration of temperature regimes (*e.g.*, longer hot summers).
- Changes in both air and water (lake, river, ocean) temperature.

Most organisms have preferred ranges of temperature and lethal temperature limits they cannot survive. Many organisms require temperature signals or suitable temperature regimes to successfully complete life cycle activities such as nesting and winter dormancy. Some organisms are sensitive to temperature for incubation, sex determination (i.e., reptiles such as sea turtles and alligators) or seed germination. The oxygen content of water (affecting fish) and the

water content of vegetation (affecting fire combustion) are temperature-dependent. Some noxious or undesirable organisms may proliferate under different temperature regimes (*e.g.*, blue green algae in lakes, exotic species). Changes in temperature will likely affect fish and wildlife resources in many ways depending on the direction, amount, timing and duration of the changes.

Rainfall

Florida is already very sensitive to variation in rainfall. Well-drained soils, rapid runoff and high plant transpiration quickly redistribute water available to organisms. Despite a high average rainfall, much of Florida experiences seasonal drought that profoundly affects fish and wildlife resources. Florida's rain depends on both global and regional climate factors (jet stream, El Nino, frontal progression, storms and hurricanes) and local weather (thunder storms, sea breezes, lake effects and local circulation) that are likely affected by climate change. The following possibilities at the local level should be considered:

- Changes in average annual rainfall (higher or lower).
- Changed seasonal distribution of rainfall (when rain falls).
- Changed regional distribution of rainfall (where rain falls).
- Changed intensity (*e.g.*, more severe storm rain, or dispersed "misty" rain).

Rainfall changes are affected by temperature (changes in evaporation). Affects of rainfall change will likely be mediated through responses by vegetation and the changed availability of surface water (lakes, ponds, rivers, swamps, wet prairies) on which many organisms depend. In the longer term, changes in deposition (recharge) to surficial and deep aquifers may affect spring flow. Florida has an unusually high area of wetland habitats supporting wildlife. If climate change reduces rainfall, then desertification of much of Florida is possible and it may come to resemble "desert islands" such as much of the Bahamas that occur at the same latitude. Rainfall changes may have the most profound effects on Florida's fish and wildlife resources.

Storms

The predicted effect of climate change is to increase the frequency and intensity of severe storms, particularly tropical cyclones (hurricanes). Higher sea temperatures and high atmosphere conditions generate energy and conditions suitable for storms. There is some controversy on whether this effect is already discernible against the background of natural variation and cycles of hurricane occurrence. Hurricanes are generally considered detrimental to human interests and do cause wildlife mortality. However, their effect in natural systems is generally transient- plants and animals rapidly recover. Hurricanes do have significant secondary effects, remodeling coastal habitat structure (barrier islands, beaches, salt/freshwater intrusion to marshes and estuaries), replenishing water bodies and aquifers and renewing plant succession, which are not completely negative for wildlife. Hurricane effects will interact with rainfall and sea level changes, possibly exacerbating coastal flooding. Hurricanes also redistribute organisms- particularly plants by spreading seeds and other propagules. The following possibilities at the local level should be considered:

- Changed (likely increased) storm intensity and frequency.

- Changed and possibly more concentrated storm tracks leading to more frequent storm landfall.
- Interaction of surge and sea level for more severe coastal and adjacent inland effects.
- Distribution of invasive species.

Sea Level Rise

All current predictions suggest sea level will rise due to melting of continental and glacial ice and thermal expansion of the oceans. Florida, with its extensive coastline and low topography is vulnerable to sea level rise. The magnitude of the predicted rise is currently unknown and estimates vary from a few centimeters to meters. Modeled predictions using median consensus sea level rise estimates indicate that significant portions of Florida's coastline will be inundated and a major redistribution of coastal habitats is likely. However, to put this in context, Florida's coast currently experiences sea level fluctuations of 1-2 m (2-6 feet) twice daily as tides and is exposed to storm surges of 3-5 m in occasional hurricanes. Sea level changes will be superimposed on these normal, larger fluctuations. While these changes will be disastrous to human structures and activities, the effect on wildlife and its habitat may be less damaging. In essence, coastal habitats will migrate inland and Florida's flat coastal topography (a result of previous sea level changes) actually mitigates the effect. Current coastal forests, dunes and beaches will migrate inland and be displaced by marsh, current marsh will become sea grass, barrier islands will become sandbars and new barrier islands arise. The primary effect for wildlife will be redistribution, and possibly increase in some habitats at the expense of others. More profound changes in the coastal and marine environment may be driven by the temperature and rainfall effects that may promote the distribution of mangroves and coral reefs into the expanded coastal zone. The hazard to wildlife will arise from efforts to protect human structures from these changes by dikes, sea walls, dredging, beach nourishment and similar engineering responses. Changes in temperature regimes in the ocean may cause shifts in distribution of marine species, and profound but entirely unpredictable effects may be generated if climate changes causes large scale change in ocean circulation such as the Florida Current. The following possibilities at the local level should be considered:

- Transient but damaging effects on vulnerable coastal species (*e.g.*, beach nesting shorebirds, sea turtles).
- Redistribution of coastal habitats with disruptions of productivity.
- Sedimentation effects during the transition.
- Interactive synergy with other climate effects (*e.g.*, temperature, storm frequency) to generate unanticipated second order effects.
- Disruption of coastal migration patterns, particularly "passive" migrations of larvae driven by local water movement effects.
- Secondary effects of protection of human structures.
- Migration zones and corridors available to allow changes in distribution.

To summarize, effects of climate change on wildlife in Florida are likely to be widespread and profound, and occur over a variety of dimensions and variables. As these effects cannot be prevented or delayed under current circumstances, a practical response will be to identify key

areas and key species and habitats that are vulnerable to irreversible change and develop policy and planning to mitigate effects on these vulnerable entities.

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).

Consultation History

In a letter to the Service dated August 23, 2006, the Corps determined that proposed Green River Parkway project "may affect, but is not likely to adversely affect" the threatened eastern indigo snake, the endangered wood stork, and the threatened Florida scrub-jay. The Corps stated that the applicant had agreed to implement the Service's *Standard Protection Measures for the Eastern Indigo Snake* (Service 2004). The Corps requested the Service's concurrence for these determinations.

In a letter to the Corps dated September 11, 2006, the Service concurred with the Corps' determination for the eastern indigo snake. The Service also requested additional information for the project's impacts to the wood stork and the Florida scrub-jay.

In a letter to the Corps dated March 2, 2007, the applicant's consultant, Biological Research Associates, provided additional information to the Corps relating to the Service's September 11, 2006, request for additional information.

In a letter to the applicant dated April 24, 2007, the Corps requested information on alternatives for the Green River Parkway project that would minimize the project's impacts to wetlands. The Corps also requested more information on the wetland mitigation plan proposed for the project.

On May 7, 2008, the Service meet with the applicant's consultant (R. L. Weight, Incorporated) to discuss the applicant's revised plans for the Green River Parkway project, and the potential impacts to federally-listed species.

In a letter to the Corps dated May 22, 2008, the Service concurred with the Corps determination for the Florida scrub-jay and the wood stork.

In a email to the Service dated February 24, 2009, Audubon of Martin County provided the Service with new information on the project indicating that the Florida scrub-jay may be using habitat within the proposed project corridor. Audubon of Martin County provided documentation that scrub-jays were visiting bird feeders within residential lots immediately east of the project corridor during 2006. Consequently, scrub-jays were travelling through the project corridor to visit these bird feeders. Audubon of Martin County also noted that suitable habitat

for the scrub-jay occurs within the project corridor. The Service transmitted this information to the Corps.

On March 6, 2009, a Service biologist conducted a inspection of the project site. Suitable habitat for the Florida scrub-jay was observed within the project corridor.

In a letter to the Service dated March 10, 2009, the Corps changed its determination for the Florida scrub-jay from "may affect, not likely to adversely affect" to "may affect, likely to adversely affect." Based on the new information on the project, the Corps also requested that the Service initiate formal consultation under the Act.

In a meeting with Service on March 13, 2009, representatives of the applicant, the Corps, and the Service met to discuss the project.

As of March 19, 2009, we have received all the information necessary for initiation of formal consultation on the Florida scrub-jay for this project as required in the regulations governing interagency consultations (50 CFR § 402.14). The Service is providing this biological opinion in conclusion of formal consultation.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The applicant proposes to build a new roadway in Martin County, Florida, known as the Green River Parkway. The new north-south roadway will be located from the intersection of Northwest Baker Road and Northeast 15th Street to Northeast Jensen Beach Boulevard. The proposed 1.5-mile long roadway would include 1 northbound travel lane and 1 southbound travel lane, a sidewalk immediately west of the road within the road right-of-way, and stormwater treatment ponds. A berm and barrier wall will be constructed east of the roadway adjacent to existing residential development (Figure 2). The roadway will have a posted speed limit of 35 miles per hour. The purpose of the project is to provide additional capacity and improve traffic flow in the project area. The 19.13 project corridor contains 0.55 acre of existing mobile homes, 8.9 acres of pine flatwood, 1.87 acre of sand pine (*Pinus clausa*), 2.91 acre of xeric oak, 0.72 acre of brazilian pepper (*Schinus terebinthifolius*), 0.16 acre of melalueca (*Melalueca quinquenervia*), 2.17 acre of freshwater marsh, 0.3 acre of disturbed land, and 1.55 acres of existing roads and highways. The project will impact 1.59 acres of wetlands. As compensation for impacts to wetlands, the applicant has proposed to provide 1.17 credits at the flow-through marsh created in association within Martin County's Western Palm City Corridor project. The project site is located in Sections 20, 21, 28, and 29, Township 37 South, Range 41 East, Martin County, Florida (Figure 1).

The Service finds that the proposed project will result in the loss of habitat occupied by the scrub-jay in the project corridor, and harassment to the scrub-jay due to the close proximity of the construction and operation of the proposed two-lane roadway to an occupied scrub-jay territory. Surveys for scrub-jays, based on the Service's guidance, were conducted by the

applicant's consultant in the project corridor from March 10, 2008, through March 14, 2008. Scrub-jays were not observed within the project corridor during the survey. However, two scrub-jays were observed immediately west (within 100 feet) of the project corridor. Information provided by Audubon of Martin County indicates that scrub-jays have historically crossed the project site to visit residences immediately east of the project. Audubon of Martin County provided photographs of scrub-jays using bird feeders in this area during 2006. It is also probable that some residents have been hand-feeding scrub-jays. In addition, at least five scrub-jays were documented by a Service biologist to occur in suitable scrub habitat approximately 1,000 feet west of the project corridor during a site visit conducted on March 6, 2009. Based on this information, the Service believes the project will result in the loss of 13.68 acres of suitable scrub-jay habitat within the project corridor.

To minimize the adverse effects of the action to the scrub-jay, the applicant has proposed to enhance and conserve 80.72 acres of uplands and wetlands known as the Gables parcel located adjacent to the project corridor (Figure 2.) The Gables parcel contains 43.59 acres of habitat suitable for the scrub-jay. The applicant has agreed to manage the Gables parcel in perpetuity to benefit the Florida scrub-jay. A Service-approved management plan for the site will be submitted to the Service and the Corps within 6 months of the date of issuance of this Biological Opinion. The applicant has also agreed to place a conservation easement on the Gables parcel within 6 months of the date of issuance of this Biological Opinion. The conservation easement will state that land uses on the site will be confined to those suitable for conservation purposes, and changes in lands uses on the site cannot occur without written permission of the Service. Funds to ensure the long-term management of the Gables parcel will be provided through a fuel tax previously instituted by Martin County. Finally, the applicant has agreed to survey suitable habitat on the Gables parcel site to determine the status of the scrub-jay, within 6 months of the date of issuance of this Biological Opinion, and once every 5 years thereafter.

Action Area – Florida Scrub-jay

In determining the action area for the Florida scrub-jay for this biological opinion, the Service evaluated the extent that scrub-jays may be affected by the loss of habitat due to this project and the resulting benefits anticipated from the habitat compensation proposed by the applicant. The action area for this project is defined as the area that includes the coastal portion of St. Lucie County, from approximately the Fort Pierce Inlet southward to the Martin County Line, and the coastal portion of Martin County north of the St. Lucie River (Figure 3). The action area is one of a network of scrub-jay habitat compensation service areas in Florida defined by the Service to promote scrub-jay conservation. Suitable scrub-jay habitat within these areas can be acquired, managed, and protected by persons proposing section 7 related actions to minimize their adverse impacts to the Florida scrub-jay. Habitat compensation service areas were established based on results of a spatially-explicit population model developed for the Florida scrub-jay (Stith 1999), published metapopulation data, Geographic Information System coverage of public lands and scrub habitat, and our knowledge of localized scrub-jay populations. Each scrub-jay habitat compensation service area: (1) contains one or more parcels of public or protected private lands that collectively have one or more scrub-jay populations anticipated to persist long-term; (2) has

at least 1 population with a minimum of 10 pairs of scrub-jays; and (3) minimizes the potential for demographic fragmentation.

STATUS OF THE SPECIES/CRITICAL HABITAT

This section summarizes Florida scrub-jay biology and ecology as well as information regarding the status and trends of the Florida scrub-jay throughout its entire range. The Service uses this information to assess whether a Federal action is likely to jeopardize the continued existence of the species. The Environmental Baseline section summarizes information on status and trends of the Florida scrub-jay specifically within the action area. This summary provides the foundation for the Service=s assessment of the effects of the proposed action, as presented in the Effects of the Action section. A thorough treatment of the biology and ecology of the Florida scrub-jay can be found in the *South Florida Multi-Species Recovery Plan* (Service 1999).

Species/critical habitat description

Scrub-jays are about 10 to 12 inches long and weigh about 3 ounces. They are similar in size and shape to blue jays (*Cyanocitta cristata*), but differ significantly in coloration (Woolfenden and Fitzpatrick 1996a). Unlike the blue jay, the scrub-jay lacks a crest. It also lacks the conspicuous white-tipped wing and tail feathers, black barring, and bridle of the blue jay. The scrub-jay's head, nape, wings, and tail are pale blue, and its body is pale gray on its back and belly. Its throat and upper breast are lightly striped and bordered by a pale blue-gray "bib" (Woolfenden and Fitzpatrick 1996a). Scrub-jay sexes are not distinguishable by plumage (Woolfenden and Fitzpatrick 1984), and males, on the average are only slightly larger than females (Woolfenden 1978). The sexes may be identified by a distinct "hiccup" call made only by females (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1986). Scrub-jays that are less than about 5 months of age are easily distinguishable from adults; their plumage is smoky gray on the head and back, and they lack the blue crown and nape of adults. Molting occurs between early June and late November and peaks between mid-July and late September (Bancroft and Woolfenden 1982). During late summer and early fall, when the first basic molt is nearly done, fledgling scrub-jays may be indistinguishable from adults in the field (Woolfenden and Fitzpatrick 1984). The wide variety of vocalizations of scrub-jays is described in Woolfenden and Fitzpatrick (1996b).

Scrub-jays are in the order Passeriformes and the family Corvidae. They have been called a "superspecies complex" and described in four groups that differ in geographic distribution within the United States and Mexico: *A. californica*, from southwestern Washington through Baja California; *A. insularis*, on Santa Cruz in the Channel Islands, California; *A. woodhousii*, from southeastern Oregon and the Rocky Mountains and Great Plains to Oaxaca, Mexico; and *A. coerulescens* in peninsular Florida (American Ornithologists' Union [AOU] 1983). Other jays of the same genus include the Mexican jay or gray-breasted jay (*A. ultramarina*) and the unicolored jay (*A. unicolor*) of Central America and southwest North America (Woolfenden and Fitzpatrick 1996b).

The Florida scrub-jay, which was originally named *Corvus coerulescens* by Bosc in 1795, was transferred to the genus *Aphelocoma* in 1851 by Cabanis. In 1858, Baird made *coerulescens* the

type species for the genus, and it has been considered a subspecies (*A. c. coerulescens*) for the past several decades (AOU 1957). It recently regained recognition as a full species (Florida scrub-jay, *A. coerulescens*) from the AOU (AOU 1995) because of genetic, morphological, and behavioral differences from other members of this group: the western scrub-jay (*A. californica)* and the island scrub-jay *(A. insularis)*. The group name is retained for species in this complex; however, it is now hyphenated to "scrub-jay" (AOU 1995). From here on in the document, Florida scrub-jays will be referred to as scrub-jays.

This species account references the full species name, *A. coerulescens*, as listed in the Federal Register (Service 1987).

No critical habitat has been designated for this species; therefore, none will be affected.

Life history/Population dynamics

The scrub-jay has specific habitat needs. It is endemic to peninsular Florida's ancient dune ecosystems or scrubs, which occur on well-drained to excessively well-drained sandy soils (Laessle 1958; Laessle 1968; Myers 1990). This relict oak-dominated scrub, or xeric oak scrub, is essential habitat to the scrub-jay. This community type is adapted to nutrient-poor soils, periodic drought, and frequent fires (Abrahamson 1984). Xeric oak scrub on the Lake Wales Ridge is predominantly made up of four species of stunted, low-growing oaks: sand live oak (*Quercus geminata*), Chapman oak (*Q. chapmanii*), myrtle oak (*Q. myrtifolia*), and scrub oak (*Q. inopina*) (Myers 1990). In optimal habitat for scrub-jays on the Lake Wales Ridge, these oaks are 3 to 10 feet high, interspersed with 10 to 50 percent unvegetated, sandy openings, and a sand pine (*Pinus clausa*) canopy of less than 20 percent (Woolfenden and Fitzpatrick 1991). Trees and dense herbaceous vegetation is rare. Other vegetation noted along with the oaks includes saw palmetto (*Serenoa repens)* and scrub palmetto *(Sabal etonia*), as well as woody shrubs such as Florida rosemary (*Ceratiola ericoides*) and rusty lyonia (*Lyonia ferruginea*).

Scrub-jays occupy areas with less scrub oak cover and fewer openings on the Merritt Island/Cape Canaveral Complex and in southwest Florida than typical of xeric oak scrub habitat on the Lake Wales Ridge (Schmalzer and Hinkle 1992b; Breininger et al. 1995; Thaxton and Hingtgen 1996). The predominant communities here are oak scrub and scrubby flatwoods. Scrubby flatwoods differ from scrub by having a sparse canopy of slash pine (*Pinus elliotii*); sand pines are rare. Shrub species mentioned above are common, except for scrub oak and scrub palmetto, which are restricted to the Lake Wales Ridge. Runner oak (*Q. minima*), turkey oak (*Q. laevis*), bluejack oak (*Q. incana*), and longleaf pine (*Pinus palustris*) also have been reported. Kennedy Space Center, in Brevard County, supports one of the largest contiguous populations of scrub-jays. Studies conducted there give good descriptions of this habitat type (Schmalzer and Hinkle 1992b).

Optimal scrub-jay habitat occurs as patches with the following attributes: (1) 10 to 50 percent of the oak scrub made up of bare sand or sparse herbaceous vegetation; (2) greater than 50 percent of the shrub layer made up of scrub oaks; (3) a mosaic of oak scrubs that occur in optimal height

(4 to 6 feet) and shorter; (4) less than 15 percent canopy cover; and (5) greater than 984 feet from a forest (Breininger et al. 1998). Much potential scrub-jay habitat occurs as patches of oak scrub within a matrix of little-used habitat of saw palmetto and herbaceous swale marshes (Breininger et al. 1991; Breininger et al.1995). These native matrix habitats supply prey for scrub-jays and habitat for other species of conservation concern. The flammability of native matrix habitats is important for spreading fires into oak scrub (Breininger et al. 1995, Breininger et al. 2002). Degradation or replacement of native matrix habitats with habitat fragments and industrial areas attract predators of scrub-jays, such as fish crows (*Corvus ossifragus*), that are rare in most regularly burned native matrix habitats (Breininger and Schmalzer 1990; Woolfenden and Fitzpatrick 1991). Matrix habitats often develop into woodlands and forests when there is a disruption of fire regimes. These woodlands and forests are not suitable for scrub-jays, decrease the habitat suitability of nearby scrub, attract predators, and further disrupt fire patterns.

Scrub-jays have a social structure that involves cooperative breeding, a trait that the other North American species of scrub-jays do not show (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1990). Scrub-jays live in families ranging from two birds (a single mated pair) to extended families of eight adults (Woolfenden and Fitzpatrick 1984) and one to four juveniles. Fledgling scrub-jays stay with the breeding pair in their natal territory as “helpers,” forming a closely-knit, cooperative family group. Prebreeding numbers are generally reduced to either a pair with no helpers or families of three or four individuals (a pair plus one or two helpers) (Woolfenden and Fitzpatrick 1996a).

Scrub-jays have a well-developed intrafamilial dominance hierarchy with breeder males most dominant, followed by helper males, breeder females, and, finally, female helpers (Woolfenden and Fitzpatrick 1977; Woolfenden and Fitzpatrick 1984). Helpers take part in sentinel duties (Woolfenden and Fitzpatrick 1984; McGowan and Woolfenden 1989), territorial defense (Woolfenden and Fitzpatrick 1984), predator-mobbing, and the feeding of both nestlings (Stallcup and Woolfenden 1978) and fledglings (Woolfenden and Fitzpatrick 1984; McGowan and Woolfenden 1990). The well-developed sentinel system involves having one individual occupying an exposed perch watching for predators or territory intruders. When a predator is seen, the sentinel scrub-jay gives a distinctive warning call (McGowan and Woolfenden 1989; McGowan and Woolfenden 1990), and all family members seek cover in dense shrub vegetation (Fitzpatrick et al. 1991). Scrub-jay pairs occupy year-round, multipurpose territories (Woolfenden and Fitzpatrick 1978; Woolfenden and Fitzpatrick 1984; Fitzpatrick et al. 1991). Territory size averages 22 to 25 acres (Woolfenden and Fitzpatrick 1990; Fitzpatrick et al. 1991), with a minimum size of about 12 acres (Woolfenden and Fitzpatrick 1984; Fitzpatrick et al. 1991). The availability of territories is a limiting factor for scrub-jay populations (Woolfenden and Fitzpatrick 1984). Because of this limitation, nonbreeding adult males may stay at the natal territory as helpers for up to 6 years, waiting for either a mate or territory to become available (Woolfenden and Fitzpatrick 1984). Scrub-jays may become breeders in several ways: (1) by replacing a lost breeder on a non-natal territory (Woolfenden and Fitzpatrick 1984); (2) through “territorial budding,” where a helper male becomes a breeder in a segment of its natal territory (Woolfenden and Fitzpatrick 1978); (3) by inheriting a natal territory following the death of a breeder; (4) by establishing a new

territory between existing territories (Woolfenden and Fitzpatrick 1984); or (5) through "adoption" of an unrelated helper by a neighboring family followed by resident mate replacement (Woolfenden and Fitzpatrick 1984). Territories also can be created by restoring habitat through effective habitat management efforts in areas that are overgrown (Thaxton and Hingtgen 1994).

To become a breeder, a scrub-jay must find a territory and a mate. Evidence presented by Woolfenden and Fitzpatrick (1984) suggests that scrub-jays are monogamous. The pair retains ownership and sole breeding privileges in its particular territory year after year. Courtship to form the pair is lengthy and ritualized and involves posturing and vocalizations made by the male to the female (Woolfenden and Fitzpatrick 1996b). Copulation between the pair is generally out of sight of other scrub-jays (Woolfenden and Fitzpatrick 1984). These authors also reported never observing copulation between unpaired scrub-jays or courtship behavior between a female and a scrub-jay other than her mate. Age at first breeding in the scrub-jay varies from 1 to 7 years, although most individuals become breeders between 2 and 4 years of age (Fitzpatrick and Woolfenden 1988). Persistent breeding populations of scrub-jays exist only where there are scrub oaks in sufficient quantity and form to provide an ample winter acorn supply, cover from predators, and nest sites during the spring (Woolfenden and Fitzpatrick 1996b).

Scrub-jay nests are typically constructed in shrubby oaks, at a height of 1.6 to 8.2 feet (Woolfenden 1974). Sand live oak and scrub oak are the preferred shrubs on the Lake Wales Ridge (Woolfenden and Fitzpatrick 1996b), and myrtle oak is favored on the Atlantic Coastal Ridge (Toland 1991) and southern Gulf coast. In suburban areas, scrub-jays nest in the same evergreen oak species as well as in introduced or exotic trees; however, they build their nests in a significantly higher position in these oaks than when in natural scrub habitat (Bowman et al. 1996). Scrub-jay nests are an open cup, about 7 to 8 inches outside diameter and 3 to 4 inches inside diameter. The outer basket is bulky and built of course twigs from oaks and other vegetation, and the inside is lined with tightly wound palmetto or cabbage palm (*Sabal palmetto*) fibers. There is no foreign material as may be present in a blue jay nest (Woolfenden and Fitzpatrick 1996b).

Nesting is synchronous, normally occurring from 1 March through 30 June (Woolfenden and Fitzpatrick 1984). On the Atlantic Coastal Ridge and southern Gulf coast, nesting may be protracted through the end of July. In suburban habitats, nesting is consistently started earlier (March) than in natural scrub habitat (Fleischer 1996), although the reason for this is unknown.

Clutch size ranges from one to five eggs, but is typically three or four eggs (Woolfenden and Fitzpatrick 1990). Clutch size is generally larger in suburban habitats, and the birds try to rear more broods per year (Fleischer 1996). Double brooding by as much as 20 percent has been documented on the Atlantic Coastal Ridge and in suburban habitat within the southern Gulf coast, compared to about 2 percent on the Lake Wales Ridge. Scrub-jay eggs measure 1.1 inches x 0.8 inches (length x breadth) (Woolfenden and Fitzpatrick 1996b), and coloration "varies from pea green to pale glaucous green… blotched and spotted with irregularly shaped markings of cinnamon rufous and vinaceous cinnamon, these being generally heaviest about the larger end" (Bendire 1895). Eggs are incubated for 17 to 19 days (Woolfenden 1974), and fledging occurs

15 to 21 days after hatching (Woolfenden 1978). Only the breeding female incubates and broods eggs and nestlings (Woolfenden and Fitzpatrick 1984). Average production of young is two fledglings per pair, per year (Woolfenden and Fitzpatrick 1990; Fitzpatrick et al. 1991), and the presence of helpers improves fledging success (Woolfenden and Fitzpatrick 1990; Mumme 1992). Annual productivity must average at least two young fledged per pair for a population of scrub-jays to support long-term stability (Fitzpatrick et al. 1991).

Fledglings depend upon adults for food for about ten weeks, during which time they are fed by both breeders and helpers (Woolfenden 1975; McGowan and Woolfenden 1990). Survival of scrub-jay fledglings to yearling age class averages about 35 percent in optimal scrub, while annual survival of both adult males and females averages around 80 percent (Woolfenden and Fitzpatrick 1996b). Data from Archbold Biological Station, however, suggest survival and reproductive success of scrub-jays in suboptimal habitat is lower (Woolfenden and Fitzpatrick 1991). These data help explain why local populations inhabiting unburned, late successional habitats become extirpated. Similarly, data from Indian River County show mean annual productivity declines significantly in suburban areas where Toland (1991) reported productivity averaged 2.2 young fledged per pair in contiguous optimal scrub, 1.8 young fledged per pair in fragmented moderately-developed scrub, and 1.2 young per pair fledged in very fragmented suboptimal scrub. The longest observed lifespan of a scrub-jay is 15.5 years at Archbold Biological Station in Highlands County (Woolfenden and Fitzpatrick 1996b).

Scrub-jays are nonmigratory and permanently territorial. Juveniles stay in their natal territory for up to 6 years before dispersing to become breeders (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1986). Once scrub-jays pair and become breeders, generally within two territories of their natal area, they stay on their breeding territory until death. In suitable habitat, fewer than 5 percent of scrub-jays disperse more than 5 miles (Stith et al. 1996). All documented long-distance dispersals have been in unsuitable habitat such as woodland, pasture, or suburban plantations. Scrub-jay dispersal behavior is affected by the intervening land uses. Protected scrub habitats will most effectively sustain scrub-jay populations if they are located within surrounding habitat types that can be used and traversed by scrub-jays. Brushy pastures, scrubby corridors along railway and road rights-of-way, and open burned flatwoods offer links for colonization among scrub-jay populations. Stith et al. (1996) believe a dispersal distance of 5 miles is close to the biological maximum for scrub-jays.

Scrub-jays forage mostly on or near the ground, often along the edges of natural or man-made openings. They visually search for food by hopping or running along the ground beneath the scrub or by jumping from shrub to shrub. Insects, particularly orthopterans (*e.g.*, locusts, crickets, grasshoppers, beetles) and lepidopteran (*e.g.*, butterfly and moth) larvae, form most of the animal diet throughout most of the year (Woolfenden and Fitzpatrick 1984). Small vertebrates are eaten when encountered, including frogs and toads (*Hyla femoralis*, *H. squirella*, rarely *Bufo quercicus*, and unidentified tadpoles, lizards (*Anolis carolinensis*, *Chemidophorus sexlineatus*, *Sceloporus woodi*, *Eumeces inexpectatus*, *Neoseps reynoldsi*, *Ophisaurus compressus*, *O. ventralis*), small snakes (*Thamnophus sauritus*, *Opheodrys aestivus*, *Diadophis punctatus*), small rodents (cotton rat [*Sigmodon hispidus*], *Peromyscus polionotus*, black rat [*Rattus rattus*] young), downy chicks of the

bobwhite (*Colinus virginianus*), and fledgling common yellowthroat (*Geothlypis trichas*). In suburban areas, scrub-jays will accept supplemental foods once the scrub-jays have learned about them (Woolfenden and Fitzpatrick 1984).

Acorns are the principal plant food (Woolfenden and Fitzpatrick 1984; Fitzpatrick et al. 1991). From August to November each year, scrub-jays may harvest and cache 6,500 to 8,000 oak (*Quercus* spp.) acorns throughout their territory. Acorns are typically buried beneath the surface of bare sand patches in the scrub during fall, and retrieved and consumed year-round, though most are consumed in fall and winter (DeGange et al. 1989). On the Atlantic Coastal Ridge, acorns are often cached in pine trees, either in forks of branches, in distal pine boughs, under bark, or on epiphytic plants, between 1 to 30 feet in height. Other small nuts, fruits, and seeds also are eaten (Woolfenden and Fitzpatrick 1984).

Many scrub-jays occur in habitat conditions where their long-term persistence is doubtful, although their persistence in these areas can occur for many years (Swain et al. 1995; Stith et al. 1996; Root 1998; Breininger et al. 2001). A primary cause for scrub-jay decline is poor demographic success associated with reductions in fire frequency (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1991; Schaub et al. 1992; Stith et al. 1996; Breininger et al. 1999). The reduction in fire frequency is associated with increases in shrub height, decreases in open space, increases in tree densities, and the replacement of scrub and marshes by forests (Duncan and Breininger 1998; Schmalzer and Boyle 1998; Duncan et al. 1999). These habitat trajectories result in declines in habitat use and demographic success (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1991). As a result, mean family size declines, and eventually the number of breeding pairs can decline by 50 percent every 5 to 10 years (Woolfenden and Fitzpatrick 1991; Breininger et al. 1999; Breininger et al. 2001).

Status and distribution

The scrub-jay was federally listed as threatened in 1987 primarily because of habitat fragmentation, degradation, and loss (Service 1987).

Historically, oak scrub occurred as numerous isolated patches in peninsular Florida. These patches were concentrated along both the Atlantic and Gulf coasts and on the central ridges of the peninsula (Davis 1967). Probably until as recently as the 1950s, scrub-jay populations occurred in the scrub habitats of 39 of the 40 counties south of, and including Levy, Gilchrist, Alachua, Clay, and Duval Counties. Historically, most of these counties would have contained hundreds or even thousands of breeding pairs (Fitzpatrick et al. 1994). Only the southernmost county, Monroe, lacked scrub-jays (Woolfenden and Fitzpatrick 1996a). Although scrub-jay numbers probably began to decline when European settlement began in Florida (Cox 1987), the decline was first noted in the literature by Byrd (1928). After 40 years of personal observation of the Etonia scrub (now known as Ocala National Forest), Webber (1935) observed many changes to the previously-undisturbed scrub habitat found there, noting that “The advent of man has created a new environmental complex.”

A state-wide scrub-jay census was last conducted in 1992 and 1993, at which time there were an estimated 4,000 pairs of scrub-jays left in Florida (Fitzpatrick et al. 1994). At that time, the scrub-jay was considered extirpated in ten counties (Alachua, Broward, Clay, Duval, Gilchrist, Hernando, Hendry, Pinellas, and St. Johns), and were considered functionally extinct in an additional five counties (Flagler, Hardee, Levy, Orange, and Putnam), where ten or fewer pairs remained. Recent information indicates there are at least 12 to 14 breeding pairs of scrub-jays located within Levy County, higher than previously thought, and there is at least one breeding pair of scrub-jays remaining in Clay County. A scrub-jay has been documented in St. Johns County as recently as 2003. Populations are close to becoming extirpated in Gulf coast counties (from Levy south to Collier) (Woolfenden and Fitzpatrick 1996a). In 1992-1993, population numbers in 21 of the counties were below 30 or fewer breeding pairs (Fitzpatrick et al. 1994). Based on the amount of destroyed scrub habitat, scrub-jay population loss along the Lake Wales Ridge is 80 percent or more since pre-European settlement (Fitzpatrick et al. 1991). Since the early 1980s, Fitzpatrick et al. (1994) estimated in the northern third of the species' range, the scrub-jay has declined somewhere between 25 and 50 percent. The species may have declined by as much as 25 to 50 percent in the last decade alone (Stith et al. 1996).

On protected lands, scrub-jays have continued to decline due to inadequate habitat management (Stith 1999). However, over the last several years, steps to reverse this decline have occurred, and management of scrub habitat is continuing in many areas of Florida (Hastie and Eckl 1999; Stith 1999; The Nature Conservancy 2001; Turner et al. 2006).

Stith (1999) utilized a spatially explicit individual-based population model developed specifically for the scrub-jay to complete a metapopulation viability analysis of the species. The species' range was divided into 21 metapopulations demographically isolated from each other. Metapopulations are defined as collections of relatively discrete demographic populations distributed over the landscape; these populations are connected within the metapopulations through dispersal or migration (Hanski and Gilpin 1991). A series of simulations were run for each of the 21 metapopulations based on different scenarios of reserve design ranging from the minimal configuration consisting of only currently protected patches of scrub (no acquisition option) to the maximum configuration, where all remaining significant scrub patches were acquired for protection (complete acquisition option) (Stith 1999). The assumption was made that all areas that were protected were also restored and properly managed.

Results from Stith's (1999) simulation model included estimates of extinction, quasi-extinction (the probability of a scrub-jay metapopulation falling below 10 pairs), and percent population decline. These were then used to rank the different statewide metapopulations by vulnerability. The model predicted five metapopulations (Northeast Lake, Martin, Merritt Island, Ocala National Forest, and Lake Wales Ridge) have low risk of quasi-extinction. Two of the five (Martin and Northeast Lake), however, experienced significant population declines under the "no acquisition" option; the probability for survival of both of these metapopulations could be improved with more acquisitions.

Eleven of the remaining 21 metapopulations were shown to be highly vulnerable to quasi-extinction if no more habitats were acquired (Central Brevard, North Brevard, Central Charlotte, Northwest Charlotte, Citrus, Lee, Levy, Manatee, Pasco, St. Lucie, and West Volusia). The model predicted the risk of quasi-extinction would be greatly reduced for 7 of the 11 metapopulations (Central Brevard, North Brevard, Central Charlotte, Northwest Charlotte, Levy, St. Lucie, and West Volusia) by acquiring all or most of the remaining scrub habitat. The model predicted the remaining four metapopulations (Citrus, Lee, Manatee, and Pasco) would moderately benefit if more acquisitions were made.

Stith (1999) classified two metapopulations (South Brevard and Sarasota) as moderately vulnerable with a moderate potential for improvement; they both had one or more fairly stable populations of scrub-jays under protection, but the model predicted population declines. The rest of the metapopulations could collapse without further acquisitions, making the protected populations there vulnerable to epidemics or other catastrophes.

Three of the metapopulations evaluated by Stith (1999) (Flagler, Central Lake, and South Palm Beach) were classified as highly vulnerable to quasi-extinction and had low potential for improvement, since little or no habitat is available to acquire or restore.

Current threats

Research and monitoring of scrub-jays has revealed more information about threats to this species since the time the scrub-jay recovery plan was approved in 1990 (Service 1990). The following discussion is intended to give an up-to-date analysis:

The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range: Scrub habitats have continued to decline throughout peninsular Florida since listing occurred, and habitat destruction continues to be one of the main threats to the scrub-jay. Cox (1987) noted local extirpations and major decreases in numbers of scrub-jays and attributed them to the clearing of scrub for housing and citrus groves. Eighty percent or more of the scrub habitats have been destroyed along the Lake Wales Ridge since pre-European settlement (Turner et al. 2006). Fernald (1989), Fitzpatrick et al. (1991), and Woolfenden and Fitzpatrick (1996a) noted that habitat losses due to agriculture, silviculture, and commercial and residential development have continued to play a role in the decline in numbers of scrub-jays throughout the state. State-wide, estimates of scrub habitat loss range from 70 to 90 percent (Woolfenden and Fitzpatrick 1996a). Various populations of scrub-jays within the species' range have been monitored closely, and more precise estimates of habitat loss in these locations are available (Snodgrass et al. 1993; Thaxton and Hingtgen 1996).

Toland (1999) estimated about 70 to 78 percent of pre-European settlement scrub habitats had been converted to other uses in Brevard County. This is due mainly to development activity and citrus conversion, which were the most important factors that contributed to the scrub-jay decline between 1940 and 1990. A total of only 10,656 acres of scrub and scrubby flatwoods remain in Brevard County (excluding federal ownership), of which only 1,600 acres (15 percent) is in

public ownership for the purposes of conservation. Less than 1,977 acres of an estimated pre-European settlement of 14,826 acres of scrubby flatwoods habitat remain in Sarasota County, mostly occurring in patches averaging less than 2.5 acres in size (Thaxton and Hingtgen 1996). Only 10,673 acres of viable coastal scrub and scrubby flatwoods remained in the Treasure Coast region of Florida (Indian River, Saint Lucie, Martin, and Palm Beach counties) according to Fernald (1989). He estimated 95 percent of scrub had already been destroyed for development purposes in Palm Beach County.

Habitat destruction not only reduces the amount of area scrub-jays can occupy, but also increases fragmentation of habitat. As more scrub habitat is altered, the habitat is cut into smaller and smaller pieces, separated from other patches by larger distances; such fragmentation increases the probability of inbreeding and genetic isolation, which is likely to increase extinction probability (Fitzpatrick et al. 1991; Woolfenden and Fitzpatrick 1991; Stith et al. 1996; Thaxton and Hingtgen 1996). Dispersal distances of scrub-jays in fragmented habitat are further than in optimal unfragmented habitats, and demographic success is poor (Thaxton and Hingtgen 1996; Breininger 1999).

Disease or Predation: Most scrub-jay mortality probably is from predation (Woolfenden and Fitzpatrick 1996b). The second most frequent cause may be disease, or predation on disease-weakened scrub-jays (Woolfenden and Fitzpatrick 1996b). Known predators of scrub-jays are listed by Woolfenden and Fitzpatrick (1990), Fitzpatrick et al. (1991), Schaub et al. (1992), Woolfenden and Fitzpatrick (1996a), Woolfenden and Fitzpatrick (1996b), and Breininger (1999); the list includes eastern coachwhip (*Masticophis flagellum*, known to eat adults, nestlings, and fledglings), eastern indigo snake (*Drymarchon corais couperi*, known to eat adults and fledglings), black racer (*Coluber constrictor*, known to eat eggs), pine snake (*Pituophus melanoleuous*), and corn snake (*E. guttata*). Mammalian predators include bobcats (*Lynx rufus*), raccoons (*Procyon lotor*), sometimes cotton rats (known to eat eggs), black rats, and free-roaming cats (*Felis catus*, known to eat adults). Franzreb and Puschock (2004) also have documented spotted skunks (*Spilogale putorius*) and grey fox (*Urocyon cinereoargenteus*) as mammalian predators of scrub-jay nests. Fitzpatrick et al. (1991) postulate that populations of free-roaming cats are able to eliminate small populations of scrub-jays. Avian nest predators include the great horned owl (*Bubo virginianus*), eastern screech-owl (*Otus asio*), red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), fish crow, boat-tailed grackle (*Quiscalus major*), common grackle (*Q. quiscula*), American crow (*Corvus brachyrhynchos*), blue jay, and swallow-tailed kites (*Elanoides forficatus*).

Fitzpatrick et al. (1991) reported that overgrown scrub habitats are often occupied by the blue jay, which may be one factor limiting scrub-jay populations in such areas. Raptors which seem to be important predators of adult scrub-jays are merlin (*Falco columbarius*), sharp-shinned hawk (*Accipiter striatus*), Cooper's hawk (*A. cooperii*), and northern harrier. During migration and winter, these four raptor species are present in areas which contain scrub habitat, and scrub-jays may experience frequent confrontations (as many as one pursuit a day) with them (Woolfenden and Fitzpatrick 1990).

In coastal scrub, Woolfenden and Fitzpatrick (1996b) report scrub-jays are vulnerable to predation by raptors in October, March, and April, when high densities of migrating accipiters and falcons are present. Woolfenden and Fitzpatrick (1996b) and Toland (1999) suggest in overgrown scrub habitats, hunting efficiency for scrub-jay predators is increased. Bowman and Averill (1993) noted scrub-jays occupying fragments of scrub found in or near housing developments were more prone to predation by house cats and competition from blue jays and mockingbirds. Woolfenden and Fitzpatrick (1996a, 1996b) stated proximity to housing developments (and increased exposure to domestic cats) needs to be taken into consideration when designing scrub preserves. Young scrub-jays are especially vulnerable to ground predators (*e.g.*, snakes and mammals) before they are fully capable of sustained flight.

The scrub-jay hosts two protozoan blood parasites (*Plasmodium cathemerium* and *Haemoproteus danilewskyi*), but incidence is low (Woolfenden and Fitzpatrick 1996b). Several scrub-jays sick from these two agents in March 1992 survived to become breeders. The scrub-jay carries at least three types of mosquito-borne encephalitis: St. Louis, eastern equine, and "Highlands jay" (Woolfenden and Fitzpatrick 1996b). Of particular concern is the arrival of West Nile virus (the agent of another type of encephalitis) in Florida during 2001 (Stark and Kazanis 2001); since corvids have been particularly susceptible to the disease in states north of Florida, it is expected scrub-jays will be affected (Breininger et al. 2003).

Woolfenden and Fitzpatrick (1996b) noted three episodes of elevated mortality (especially among juveniles) in 26 years at Archbold Biological Station. Each of these incidents occurred in conjunction with elevated water levels following unusually heavy rains in the fall, although high mortality does not occur in all such years. During the most severe of these presumed epidemics (August 1979 through March 1980), all but one of the juvenile cohort and almost half of the breeding adults died (Woolfenden and Fitzpatrick 1984; Woolfenden and Fitzpatrick 1990). The 1979 through 1980 incident coincided with a known outbreak of eastern equine encephalitis among domestic birds in central Florida (Woolfenden and Fitzpatrick 1996b). From the fall of 1997 through the spring of 1998, the continuing population decline of scrub-jays along the Atlantic coast and in central Florida may have been augmented by an epidemic of unknown origin (Breininger 1999).

At Cape Canaveral Air Force Station, Stevens and Hardesty (1999) noted a decline in juvenile survival from 60 to 70 percent in the preceding years to only 22 percent in 1997 and 1998. It stayed low (only 25 percent) in 1998 and 1999 before again climbing into the mid-60 percent range. Also, adult survival dropped from 70 to 80 percent survival in the preceding years to 50 to 60 percent in 1997 and 1998. Overall, their annual surveys documented the largest 1-year drop (pairs decreased by 17 percent and birds by 20 percent) in this population at the same time as the presumed statewide epidemic.

In winter-summer of 1973, 15 species of intestinal parasitic fauna (including 8 nematodes, 5 trematodes, 1 cestode, and 1 acanthocephalan) were found in 45 scrub-jays collected in south-central Florida; the parasite load was attributed to a varied arthropod diet (Kinsella 1974). These

naturally-occurring parasites are not believed to have a negative impact on scrub-jay population levels.

Larvae of the burrowing fly, *Philornis porteri*, occur irregularly on scrub-jay nestlings. The species pupates in the base of the nest; larvae locate in nasal openings, mouth flanges, bases of flight feathers, and toes; apparently no serious effect on the scrub-jay host occurs (Woolfenden and Fitzpatrick 1996b). Additionally, one undescribed chewing louse (*Myrsidea* sp.) (Woolfenden and Fitzpatrick 1996b), one wing-feather mite (*Pterodectes* sp.), two chiggers (*Eutrombicula lipovskyana* and *E. alfreddugesi*), and a flea (sticktight flea [*Echidnophaga gallinacea*]) (Woolfenden and Fitzpatrick 1996b) occur on some individuals, usually at low densities. Nymphs and larvae of four ticks (*Amblyomma americanum*, *A. tuberculatum*, *Haemaphysalis leporispalustris*, and *Ixodes scapularis*) are known to occur on scrub-jays, as well as the larvae of the tick *A. maculatum* (Woolfenden and Fitzpatrick 1996b). These naturally-occurring parasites were not believed to have a negative impact on scrub-jay population levels; however, a recent study of the impact of the sticktight flea on scrub-jays indicates that low fitness and death can be caused by this parasite (Boughton et al. 2006). The host vector for this flea was a domestic dog (*Canis familiaris*) suggesting that introduction of human pets into scrub-jay areas may increase parasite loads and reduce fitness.

The Inadequacy of Existing Regulatory Mechanisms: Woolfenden and Fitzpatrick (1996a) state the importance of enforcing existing Federal laws regarding the management of Federal lands as natural ecosystems for the long-term survival of the scrub-jay. The Service consults regularly on activities on Federal lands which may affect scrub-jays and also works with private landowners through the section 10(a)(1)(B) incidental take permitting process of the Act when take is likely to occur and no Federal nexus is present. Florida's State Comprehensive Plan and Growth Management Act of 1985 is administered mostly by regional and local governments. Regional Planning Councils administer the law through Development of Regional Impact Reviews; at the local level, although comprehensive plans contain policy statements and natural resource protection objectives, they are only effective if counties and municipalities enact and enforce ordinances. As a general rule, counties have not enacted and enforced ordinances that are effective in protecting scrub-jays (Fernald 1989).

The Wildlife Code of the State of Florida (Chapter 68A, Florida Administrative Code) prohibits taking of individuals of threatened species, or parts thereof, or their nests or eggs, except as authorized. The statute does not prohibit clearing of habitat occupied by protected species, which limits the ability of the FWC to protect the scrub-jay and its habitat.

Other Natural or Man-made Factors Affecting its Continued Existence: Human interference with natural fire regimes has continued to play a major part in the decline of the scrub-jay and today may exceed habitat loss as the single most important limiting factor (Woolfenden and Fitzpatrick 1991; Woolfenden and Fitzpatrick 1996a; Fitzpatrick et al. 1994). Lightning strikes cause virtually all naturally-occurring fires in south Florida scrub habitat (Abrahamson 1984; Hofstetter 1984; Woolfenden and Fitzpatrick 1990). Fire has been noted to be important in maintenance of scrub habitat for decades (Nash 1895; Harper 1927; Webber

1935; Davis 1943; Laessle 1968; Abrahamson et al. 1984). Human efforts to prevent and/or control natural fires have allowed the scrub to become too dense and tall to support populations of scrub-jays, resulting in the decline of local populations of scrub-jays throughout the State (Fernald 1989; Percival et al. 1995; Stith et al. 1996; Thaxton and Hingtgen 1996; Woolfenden and Fitzpatrick 1990; Woolfenden and Fitzpatrick 1996a; Toland 1999). Woolfenden and Fitzpatrick (1996a) cautioned, however, fire applied too often to scrub habitat also can result in local extirpations. Data from Archbold Biological Station show that fire-return intervals varying between 8 and
15 years are optimal for long-term maintenance of productive scrub-jay populations in central Florida (Woolfenden and Fitzpatrick 1996b). These intervals also correspond with those yielding healthy populations of listed scrub plants (Menges and Kohfeldt 1995; Menges and Hawkes 1998). Optimal fire-return intervals may, however, be shorter in coastal habitats (Schmalzer and Hinkle 1992a; Schmalzer and Hinkle 1992b).

Stith et al. (1996) estimated at least 2,100 breeding pairs of scrub-jays were living in overgrown habitat. Toland (1999) reported most of Brevard County's remaining scrub (estimated to be only 15 percent of the original acreage) is overgrown due to fire suppression. He further suggests that the overgrowth of scrub habitats reduces the number and size of sand openings which are crucial not only to scrub-jays, but also many other scrub plants and animals. Reduction in the number of potential scrub-jay nesting sites, acorn cache sites, and foraging sites presents a problem for scrub-jays. Fernald (1989) reported overgrowth of scrub results not only in the decline of species diversity and abundance but also a reduction in the percentage of open sandy patches (Fernald 1989; Woolfenden and Fitzpatrick 1996b). Fitzpatrick et al. (1994) believed fire suppression was just as responsible as habitat loss in the decline of the scrub-jay, especially in the northern third of its range. Likewise, the continued population decline of scrub-jays within Brevard County between 1991 and 1999 has been attributed mainly to the overgrowth of remaining habitat patches (Breininger et al. 2001). Breininger et al. (1999) concluded optimal habitat management is essential in fragmented ecosystems maintained by periodic fire, especially to lessen risks of decline and extinction resulting from epidemics and hurricanes.

Fitzpatrick et al. (1991), Fitzpatrick et al. (1994), and Woolfenden and Fitzpatrick (1996a) expressed concern for the management practices taking place on federal lands at Ocala National Forest, Merritt Island National Wildlife Refuge at the Kennedy Space Center, and Cape Canaveral Air Force Station, all supporting large contiguous populations of scrub-jays. They predicted fire suppression and/or too frequent fires (on the latter two) and silvicultural activities involving the cultivation of sand pine on Ocala National Forest would be responsible for declines of scrub-jays in these large contiguous areas of scrub. These areas should be those where populations are most secure because of federal agencies' responsibilities under section 7(a)(1) of the Act. Monitoring of scrub-jay populations, demography, and nesting success is ongoing on all of these properties to assess the effectiveness of management practices in meeting scrub-jay recovery objectives.

Housing and commercial developments within scrub habitats are accompanied by the development of roads. Since scrub-jays often forage along roadsides and other openings in the

scrub, they are often killed by passing cars. Research by Mumme et al. (2000) along a two-lane paved road indicated clusters of scrub-jay territories found next to the roadside represented population sinks (breeder mortality exceeds production of breeding-age recruits), which could be supported only by immigration. Since this species may be attracted to roadsides because of their open habitat characteristics, vehicular mortality presents a significant and growing management problem throughout the remaining range of the scrub-jay (Dreschel et al. 1990; Mumme et al. 2000), and proximity to high-speed paved roads needs to be considered when designing scrub preserves (Woolfenden and Fitzpatrick 1996a).

Another potential problem in suburban areas supporting scrub-jays is supplemental feeding by humans (Bowman and Averill 1993; Woolfenden and Fitzpatrick 1996a; Bowman 1998). The presence of additional food may allow scrub-jays to persist in fragmented habitats, but recruitment in these populations is lower than in native habitats. However, even though human-feeding may postpone local extirpations, long-term survival cannot be ensured in the absence of protecting native oak scrub habitat necessary for nesting. Scrub-jays in suburban settings often nest high in tall shrubbery. During March high winds, tend to make these nests susceptible to destruction (Woolfenden and Fitzpatrick 1996b; Bowman 1998).

Hurricanes pose a potential risk for scrub-jays, although the exact impact of such catastrophic events is unknown. Breininger et al. (1999) modeled the effects of epidemics and hurricanes on scrub-jay populations in varying levels of habitat quality. Small populations of scrub-jays are more vulnerable to extirpation where epidemics and hurricanes are common. Storm surge from Category Three to Five hurricanes could inundate entire small populations of scrub-jays, and existing habitat fragmentation could prevent repopulation of affected areas. However, this model also predicted that long-term habitat degradation had greater influence on extinction risk than hurricanes or epidemics. Preliminary results of the impact of Hurricane Charley on the Charlotte County scrub-jay populations indicates that at least one member of all 20 family groups surveyed after the storm passed had survived (Miller 2006).

Fernald (1989) reported many of the relatively few remaining patches of scrub within the Treasure Coast region of Florida had been degraded by trails created by off-road vehicles, illegal dumping of construction debris, abandoned cars and appliances, or household waste. The invasion of these areas by exotic species, including Brazilian pepper (*Schinus terebinthifolius*), white cypress-pine (*Callitris glaucophylla*), and Australian pine (*Casuarina equisetifolia*) also was a problem. Other human-induced impacts identified by Fernald (1989) include the introduction of domestic dogs and free-roaming cats, black rats, greenhouse frogs (*Eleutherodactylus planirostris*), giant toads (*Bufo marinus*), Cuban tree frogs (*Osteopilus septentrionalis*), brown anoles (*Anolis sagrei*), and other exotic animal species. These exotic species may compete with scrub-jays for space and food.

Analysis of the species/critical habitat likely to be affected

The Florida scrub-jay's status since its listing in 1987 has not improved. The status and trends we discussed above clearly shows what two items are essential for recovery of this species:

(1) additional purchase of xeric oak scrub for preservation in key areas, and (2) restoration and management of publicly-owned xeric oak scrub already under preservation. Without both, it is unlikely recovery can be achieved.

ENVIRONMENTAL BASELINE

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

Status of the Species Within the Action Area

Scrub-jays have been documented in the action area primarily within scrub upland habitats (see Figures 2-15a – 2-15b in Stith 1999). Scrub-jays are known to occur on private and public lands. However, none of public land parcels contain a sufficient number of scrub-jays to ensure the long-term persistence and recovery of scrub-jays in the action area. The last known survey of the action area for the scrub-jay was conducted by Stith (1999) in 1992/1993 in association with his statewide scrub-jay survey. Stith (1999) documented approximately 28 active territories within the action area at that time. However, the action area has not been surveyed for scrub-jays in recent years. Based on habitat destruction due to population growth and associated development in the region, the scrub-jay population in the action area has almost certainly declined since Stith's 1992/1993 survey.

Florida scrub-jays have been documented to occur immediately adjacent to the project corridor. Scrub-jay surveys were conducted by the applicant's consultant from March 10, 2008, through March 14, 2008. Scrub-jays were not observed within the project corridor during the survey. However, two scrub-jays were observed immediately west of the project corridor (within 100 feet). Information provided by Audubon of Martin County indicate that scrub-jays have historically crossed the project site to visit residences located immediately east of the project. Audubon of Martin County provided photographs of scrub-jays using bird feeders in this area during 2006. It is also probable that some residents have been hand-feeding scrub-jays. Therefore, the Service believes that scrub-jays likely use habitat within the project corridor. In addition, at least five scrub-jays were documented to occur in suitable scrub habitat approximately 1,000 feet west of the project corridor during a site visit conducted on March 6, 2009. Discussions with the applicant's consultant suggest that two scrub-jay families may occur within suitable habitat adjacent to the project corridor. The project will also result in the loss of 13.68 acres of scrub-jay habitat within the project corridor.

Factors Affecting the Species' Environment Within the Action Area

The loss of xeric scrub habitat due to agricultural, commercial and residential development is the primary factor that has resulted in the decline of the scrub-jay in the action area as well as throughout its range. A large proportion of scrub-jay habitat in the action area has been converted to citrus groves, improved pasture, housing developments, golf courses, and other land uses. Although, scrub-jays are rarely directly killed by land clearing activities associated with development, they are less likely to persist in developed areas due to reduced food resources, and increased mortality from predators and motor vehicle traffic (Christman 2000).

Fire suppression has also resulted in significant adverse effects to the Florida scrub-jay in the action area. Excessive growth of vegetation in scrub habitats due to lack of periodic fires is known to significantly reduce the quality of these habitats to scrub-jays (Breininger et al. 1996; Fitzpatrick et al. 1991; Woolfenden and Fitzpatrick 1996b). Scrub-jays are adapted to early successional habitat conditions. Lack of fire results in the loss of open areas scrub-jays use to cache acorns and forage for prey. Moreover, overgrown conditions favor predators and competitors of scrub-jays (Miller and Stith 2002).

Acquisition of scrub-jay habitat is benefiting the scrub-jay in the action area. The total acreage of scrub habitat currently protected in the action area is not available. However, scrub habitat that provides habitat for the scrub-jay has been conserved in the Savannas State Park in St. Lucie County.

EFFECTS OF THE ACTION

This section deals with analyzing the direct and indirect effects of the project on the scrub-jay and its habitat.

Factors to be Considered

A portion of the project site occurs within habitat suitable for the scrub-jay, and the project site is located in the southeast portion of the geographic range of the scrub-jay. Critical habitat has not been designated for this species. The timing of construction for this project, relative to sensitive periods of the scrub-jay's lifecycle, is unknown. Scrub-jays may be found adjacent to the proposed construction footprint year-round. The project will be constructed in a single, disruptive event and result in permanent loss and alteration of the native upland vegetation within the project site. The time required to complete construction of the project is not known, but it is likely that all land clearing associated with the development will be completed in a few months. The disturbance associated with the project will be permanent and result in a loss of habitat currently available to the scrub-jay.

Beneficial Effects - The beneficial effects of the project to the scrub-jay include the enhancement, preservation, and long-term maintenance of 43.59 acres of suitable scrub-jay habitat at the 80.72-acre Gables parcel (Figure 2). The applicant has already acquired the Gables parcel and will place a conservation easement on the property. The conservation easement will state that land uses on the site will be confined to those suitable for conservation purposes, and

changes in land use cannot occur without written permission of the Service. A copy of the conservation easement will be provided to the Service and the Corps within 6 months of the date of issuance of this Biological Opinion. The applicant has also agreed to survey the Gables parcel, within 6 months of the date of issuance of this Biological Opinion, and once every 5 years thereafter, to monitor the status of the scrub-jay. In addition, a Service-approved management plan for the site will be submitted to the Service and the Corps within 6 months of the date of issuance of this Biological Opinion.

Direct Effects - Direct effects are those effects that are caused by the proposed action, at the time of construction, and are reasonably certain to occur. The direct effects that this project will have on the scrub-jay within the action area are discussed below.

The construction of the Green River Parkway may result in the harassment of scrub-jays, and the loss of 13.68 acres of habitat occupied by the scrub-jay, as a result of clearing of the project site and construction of the project. The probability of direct incidental take is dependent upon the number of scrub-jays in the area, their dispersal abilities, and the amount and distribution of available, suitable habitat. The probability of direct mortality of scrub-jays as a result of construction activities is low with proper safeguards to protect nesting birds.

The proposed action will directly result in the permanent loss of approximately 13.68 acres of uplands that provide potential foraging and breeding habitat for the scrub-jays that currently occur adjacent to the project corridor. Data provided by Audubon of Martin County suggest that scrub-jay travel through and may use scrub habitat within the project corridor. The construction of the roadway will also result in harassment to scrub-jays that within the known scrub-jay territory located approximately 100 feet west of the project corridor. Scrub-jays may respond to the harassment resulting from the project construction by persisting within the affected territory, shifting their territory to other xeric uplands in the project area, or abandoning the project site and failing to establish a new territory.

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. Interrelated or interdependent actions are not expected to result from the project.

Indirect Effects - Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside the area directly affected by the action. Indirect effects may include other Federal actions that have not undergone section 7 consultation, but will result from the action under consideration.

The proposed action will result in the construction of a new road. Consequently, if scrub-jays remain in the project area, the potential for scrub-jay mortality due to vehicle collisions will increase. Dreschel et al. (1990), Fitzpatrick et al. (1991), and Mumme et al. (2000) provide the best scientific and commercial data on the likelihood of incidental take as the result of scrub-jays being killed by the vehicles. The only documented road-kill mortality in Florida scrub-jays are

from jays living in a territory immediately adjacent to a road, not from dispersing some unknown distance across a road to a new territory.

The new road access provided by the project will indirectly allow for an increase in human population growth and associated commercial and residential development in undeveloped lands surrounding the project corridor. The Service believes that this growth and development would not occur without the transportation infrastructure provided by the project. Human population growth and development induced by the project could adversely affect the scrub-jay by increasing the potential for further loss and modification of existing scrub-jay habitat in lands adjacent to the project corridor. Such development would result in further reduction in the geographic range of the scrub-jay, and further fragmentation of the geographic range of the species. Fragmentation increases the probability of genetic isolation, which is likely to increase extinction probability (Fitzpatrick et al. 1991; Woolfenden and Fitzpatrick 1991; Snodgrass et al. 1993; Stith et al. 1996; Thaxton and Hingten 1996).

We believe that the new development induced by this action may not result in significant adverse affects to scrub-jays because:

1. A portion of suitable habitat in the project area has been placed under conservation easement through the South Florida Water Management District. Martin County has also acquired the 80.72-acre Gables parcel located adjacent to the project corridor, and the site will be placed under conservation easement, and managed for the benefit of the scrub-jay in perpetuity.

2. Future actions in the immediate project area would likely require a permit from the Corps before they could proceed and require consultation by the Service under section 7 of the Act. Accordingly, the Service would be able to work with the Corps to avoid or minimize the adverse impacts of these actions to the scrub-jay. The Service acknowledges that future development projects induced by the proposed action may not require a permit from the Corps or have any section 7 nexus. However, persons undertaking such projects are not absolved from the prohibition of take of listed species under the Act. Section 10 of the Act provides a means for permitting the incidental take of listed species associated with non-Federal actions. In order to obtain an incidental take permit, the applicant must prepare an HCP, acceptable to the Service, describing how impacts to the species will be minimized and mitigated, to the maximum extent practicable. In order to be acceptable to the Service, an HCP for a non-Federal action affecting the scrub-jay would generally include adequate habitat mitigation.

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 unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

Anticipated future county actions in the action area that will adversely affect scrub-jay habitat include the issuance of county building permits. Permits to construct single-family homes and commercial buildings within the action area are required by Martin County. Many of the construction projects impacting scrub-jay habitat in the action area will require both a county building permit and a Corps permit, and will require consultation under section 7 of the Act.

A small proportion of construction projects requiring county building permits will not impact wetlands and will not require a permit from the Corps. In general, these projects will not have a Federal nexus requiring consultation with the Service under the Act. However, applicants obtaining county building permits are not absolved from the prohibition of take of listed species under the Act as referenced above. We note that Martin County has begun preliminary discussions with the Service about developing a county wide HCP for impacts to scrub-jays for development projects that may not have a Federal nexus. The Service will continue to work with Martin County, as well as developers and landowners, to ensure that we are informed of all projects that may affect the scrub-jay and do not have a Federal nexus under section 7 of the Act, so that we can adequately avoid and minimize their effects to the scrub-jay. Minimization of impacts would include preservation and enhancement of existing occupied scrub-jay habitat, and restoration of unoccupied habitat to provide suitable habitat for scrub-jay use and allow for range expansion. The Service will also continue to encourage the counties in the action area to prepare an HCP for scrub-jays, or inform the Service of projects that may affect the scrub-jay and do not have a Federal nexus under section 7 of the Act. The Service has considered cumulative effects within the action area for the Florida scrub-jay, and based on the above discussion, we have not identified any additional cumulative effects beyond those already discussed in the Environmental Baseline.

CONCLUSION

After reviewing the current status of the scrub-jay, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the project as proposed, is not likely to jeopardize the continued existence of the Florida scrub-jay. Critical habitat for the scrub-jay has not been designated, and will not be affected. Construction of the project will result in the permanent loss of 13.68 acres of potential scrub-jay habitat, and harassment to at least two scrub-jays known to occur immediately west of the project corridor. However, the loss of this habitat and the harassment resulting from the project construction and operation of the roadway is not expected to appreciably affect the overall survival and recovery of the scrub-jay.

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 to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly

impairing essential behavioral patterns, 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 such taking is in compliance with the terms and conditions of this incidental take statement.

The terms and conditions described below are nondiscretionary and must be undertaken by the Corps so they become binding conditions of any grant or permit issued to the Martin County Board of County Commissioners 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 Martin County Board of County Commissioners to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protection coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps and/or the Martin County Board of County Commissioners 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 has reviewed the biological information for this species, information presented by the applicant's consultant, and other available information relevant to this action. The Service finds that incidental take in the form of harm and harassment is anticipated for two Florida scrub-jays due to: (1) the conversion of 13.68 acres of scrub-jay habitat to a new two-lane paved roadway, and 2) the ongoing use of the roadway by motorized vehicles following construction of the project. The Service has determined that this level of anticipated take is not likely to result in jeopardy to the species. If during the course of this action, this level of take is exceeded; such take would represent new information requiring review of the reasonable and prudent measures provided. The Federal agency must immediately provide modification of the reasonable and prudent measures.

REASONABLE AND PRUDENT MEASURES

When providing an incidental take statement, the Service is required to give reasonable and prudent measures it considers necessary or appropriate to minimize the take along with terms and conditions that must be complied with, to implement the reasonable and prudent measures. Furthermore, the Service must also specify procedures to be used to handle or dispose of any individuals taken. The Service finds the following reasonable and prudent measures are necessary and appropriate to reduce take and to minimize the direct and indirect effects of the proposed project on the scrub-jay:

1. Minimize the adverse effects of harm and harassment to the scrub-jay by implementing an appropriate scrub-jay habitat compensation and management plan.

2. Minimize the adverse effects of the action to the scrub-jay through appropriate timing of construction events.

3. Notify the Service of any unauthorized take of scrub-jays.

TERMS AND CONDITIONS

To implement the above reasonable and prudent measures, the Service has outlined the following terms and conditions. In accordance with the Interagency Cooperation Regulation (50 CFR 402), these terms and conditions must be complied with to implement the reasonable and prudent measures:

1. Within 6 months of the date of this Biological Opinion, the applicant will provide to the Corps and the Service a copy of the conservation easement placed on the 80.72-acre Gables parcel located in Section 20, Township 37 South, Range 41 East in Martin County, Florida. The conservation easement will state that land uses on the site will be confined to those suitable for conservation purposes, and changes in land use cannot occur without written permission of the Service.

2. Within 6 months of the date of this Biological Opinion, the applicant will provide to the Corps and the Service a copy of the management plan for the Gables parcel approved by the Service. The management plan will detail how the applicant will manage the site in perpetuity to benefit the Florida scrub-jay. The management plan will include: a discussion of how the applicant intends to enhance native vegetation (*i.e.*, through burning or mechanical trimming) and remove exotic vegetation on the site both initially and in perpetuity to maintain optimal habitat for the scrub-jay and other wildlife; how the applicant will fund the management of the site in perpetuity; how the applicant will prevent vandalism, access by vehicles, and illegal dumping on the site; and how the applicant will prevent remove liter from accumulating on the portion of the site immediately adjacent to the Green River Parkway.

3. Within 6 months of the date of this Biological Opinion, the applicant will provide to the Corps and the Service a detailed report of the scrub-jay survey conducted on the Gables parcel. The survey will be completed prior to the commencement of the initial vegetation treatment described in Condition # 4 below. In addition, the applicant or applicant's agent will provide a report to the Service and the Corps for each of the scrub-jay surveys completed on the Gables parcel every 5 years thereafter in perpetuity. Each subsequent scrub-jay survey report will be provided within 60 days of the completion of survey.

4. Within 1 year of the date of this Biological Opinion, the applicant will conduct an initial treatment of the vegetation on the Gables parcel to enhance habitat for the scrub-jay and other wildlife species, and remove exotic vegetation from the Gables parcel (as specified in the management plan above). The applicant will notify the Service and the Corps in writing within 60 days of the completion of the initial treatment of the site.

5. As a condition of the permit for the project, the Corps will not allow the applicant to initiate construction of the proposed action within occupied scrub-jay habitat on the project site during the scrub-jay nesting season (March 1 to June 30). During project construction, the applicant or a qualified biologist will survey suitable habitat within the project corridor (daily) for signs of scrub-jay nesting until such a time where all native vegetation in the project corridor is cleared. Should scrub-jays initiate nesting within the project corridor, the applicant or their designated agents will establish and mark a 125-foot perimeter around the nest tree. This marked area will be avoided during construction activities for the duration of the scrub-jay nesting season or until fledging has occurred, or the nest has failed.

6. Upon locating a dead scrub-jay specimen, initial notification must be made to the nearest Service Law Enforcement Office (Mr. Vance M. Eaddy; Fish and Wildlife Service; 9549 Koger Blvd., Suite 111; St. Petersburg, Florida 33702; 727-570-5398). Secondary notification should be made to the FWC; South Region, 3900 Drane Field Road; Lakeland, Florida, 33811-1299; 1-800-282-8002. Care must be taken in handling any dead specimens of proposed or listed species found in the project area to preserve the specimen or its remains in the best possible state. In conjunction with the preservation of any dead specimens, the finder has the responsibility to ensure evidence intrinsic to determining the cause of death of the specimen is not unnecessarily disturbed. The finding of dead specimens does not imply enforcement proceedings pursuant to the Act. The reporting of dead specimens is required to enable the Service to determine if take is reached or exceeded and to ensure the terms and conditions are appropriate and effective.

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. The Service is not proposing any conservation recommendations at this time.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the Green River Parkway project. As provided in 50 CFR Section 402.16, reinitiation of formal consultation is required when discretionary Federal agency involvement or control over the action has been retained and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may

new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Thank you for your cooperation and effort in protecting fish and wildlife resources. If you have any questions regarding this project, please contact John Wrublik at 772-562-3909 at extension 282.

Sincerely yours,

for Paul Souza
Field Supervisor
South Florida Ecological Services Office

cc: electronic copy only
Corps, Palm Beach Gardens, Florida (Garett Lips)
EPA, West Palm Beach, Florida (Richard Harvey)
FWC, Tallahassee, Florida (Mary Ann Poole)
Service, Atlanta, Georgia (Dave Flemming)
Service, Jacksonville, Florida (Michael Jennings)

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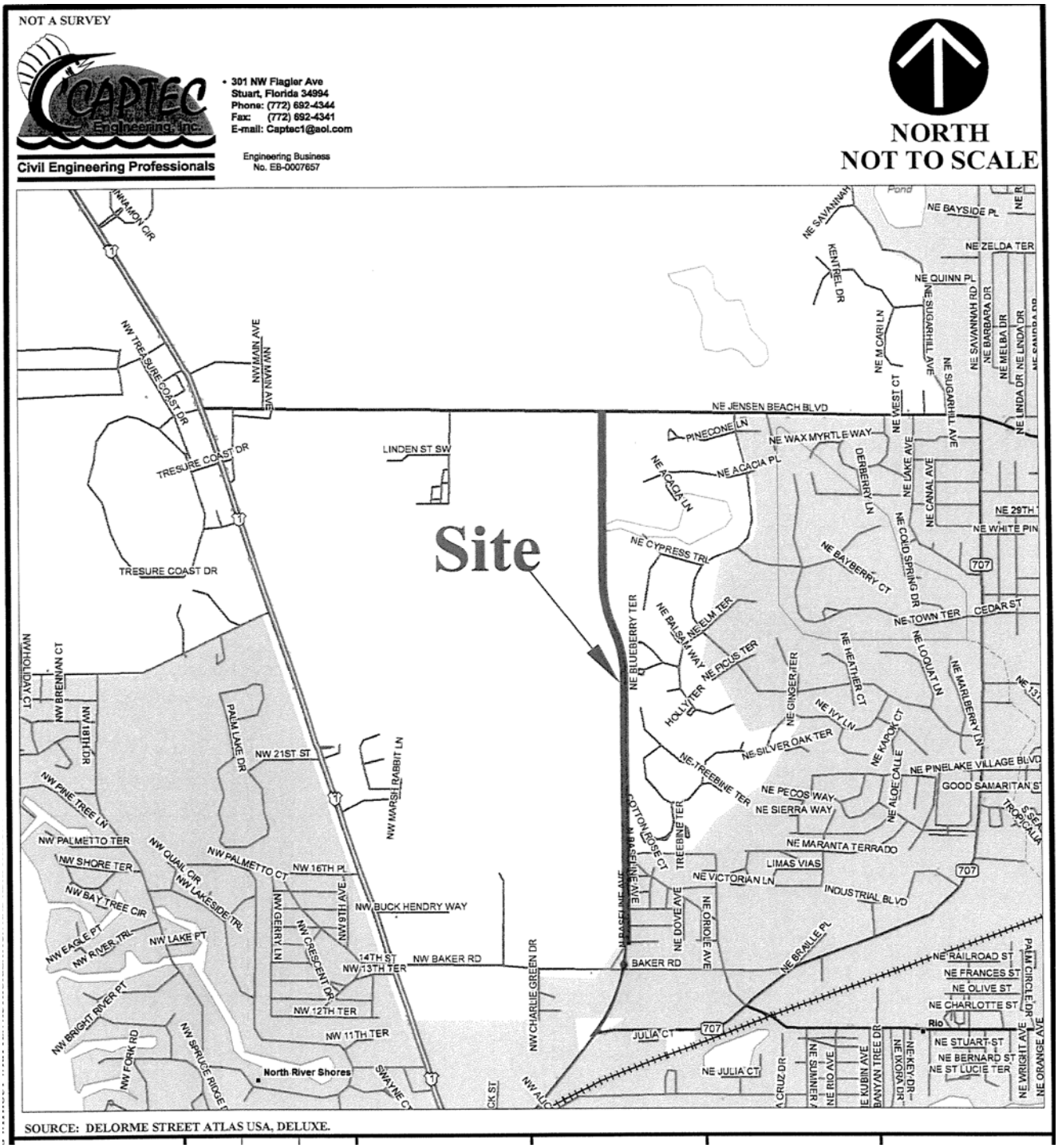

Figure 1. Location map of the Green River Parkway project site in Martin County, Florida.

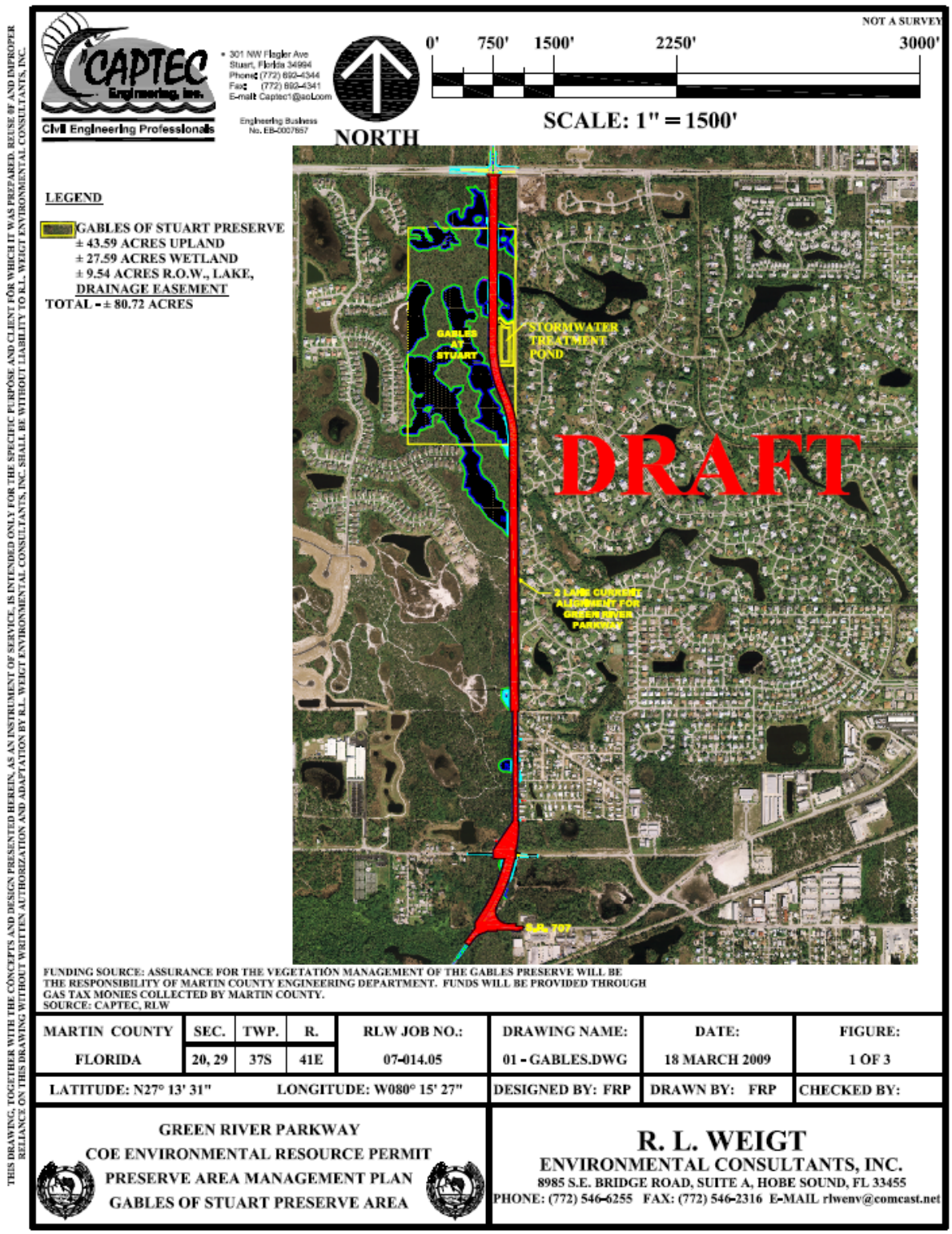

Figure 2. Map of Green River Parkway project site in Martin County, Florida.

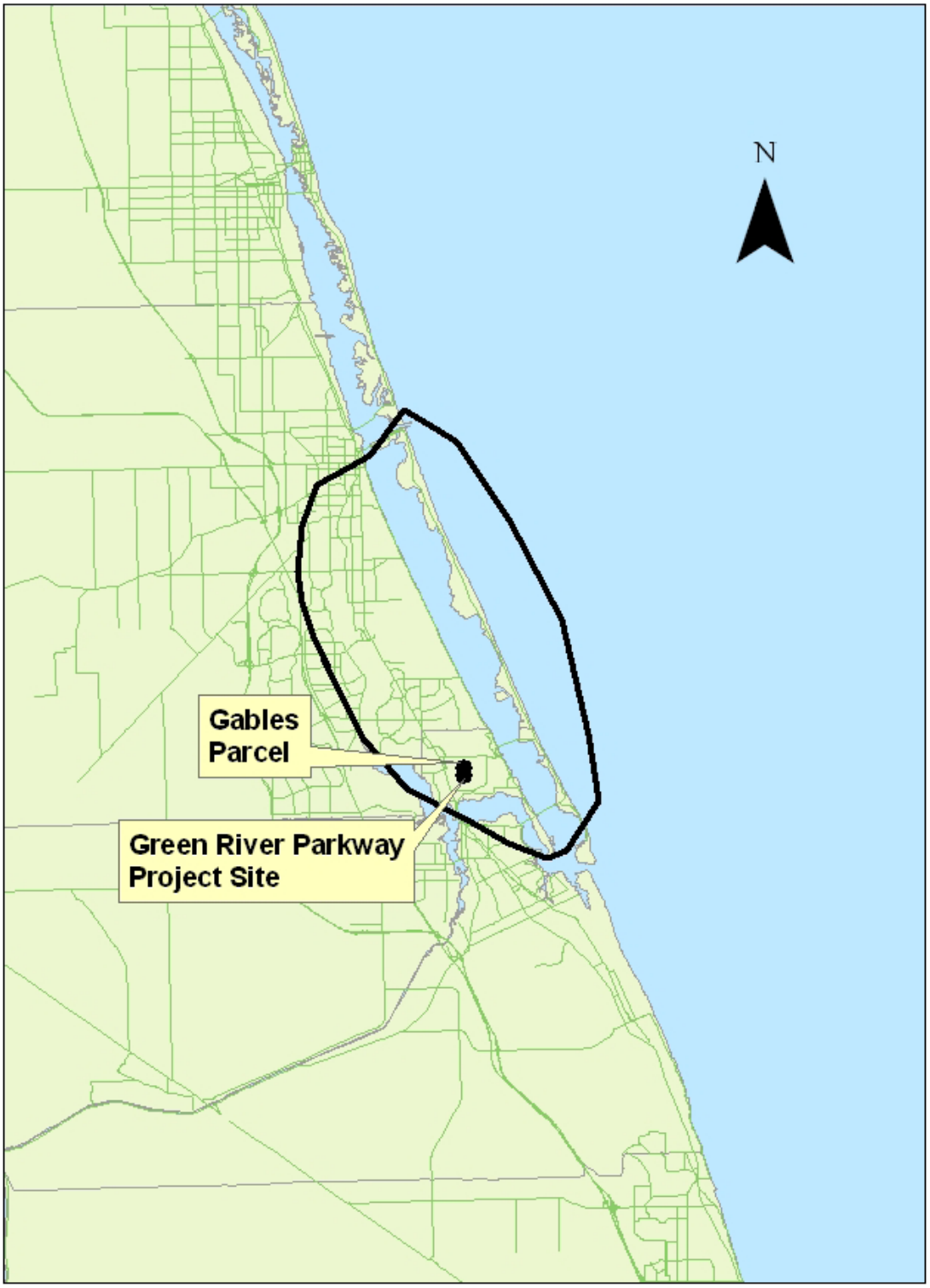

Figure 3. Location map of action area for the Florida scrub-jay including the Green River Parkway project site and the Gables Parcel Compensation site.