United States Department of the Interior

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

Federal Activity Number 41420-2005-FA-0060

Initials	Date
CLC	5/17/07
SS	5/21/07

May 18, 2007

Memorandum to File

Subject: Biological Opinion for Issuance of a Section 10(a)(1)(B) incidental take permits to Royal Tequesta LLC for Incidental Take of the Florida scrub-jay

Paul Souza
Field Supervisor

This document is the Fish and Wildlife Service (Service) biological opinion based on our review of the issuance of a section 10(a)(1)(B) incidental take permit (Permit) to Royal Tequesta L.L.C. (Applicant) for the construction of commercial and residential buildings in the Village of Tequesta, Palm Beach County, Florida, and its effects on the threatened Florida scrub-jay (*Aphelocoma coerulescens*) (scrub-jay) per section 7 of the Endangered Species Act of 1973, as amended (Act) (16 United States Code [U.S.C.] 1531 *et seq.*).

This biological opinion is based on information provided in the Applicant's Habitat Conservation Plan (HCP), the Service's South Florida multi-species recovery plan (Service 1999), letters, email correspondence, and site visits. The biological opinion does not address requirements of other environmental statutes, such as the National Environmental Policy Act. A complete record of this consultation is maintained and available for review at the Service's South Florida Ecological Services Office (SFESO), Vero Beach, Florida.

Consultation History

On August 2, 2004, the Service received the Permit application form and HCP for the property from Environmental Services, Incorporated (Consultant), the Applicant's agent.

On October 14, 2004 the Consultant contacted the Service to inquire if the project had been assigned to a biologist.

TAKE PRIDE IN AMERICA

On November 9, 2004 the Service contacted the Consultant to let them know a biologist had been assigned to their project and to set up a date for a site visit. A follow-up e-mail was sent to inform the Consultant that the Service had not yet received the Permit fee.

On November 10, 2004, the Service provided the Consultant with comments on the HCP.

On December 2, 2004, the Service, the Consultant, and the applicant's real estate agent conducted a site visit.

On December 3, 2004, the Service sent the Consultant a summary of points discussed at the site visit and requested a revised HCP.

On December 23, 2004, the SFESO requested a cultural resource review from the Regional Office (RO) via email.

On February 14, 2005, the SFESO received cultural resource review clearance from the RO dated February 9, 2005.

On November 11, 2005, the SFEFO received the revised HCP from the Consultant.

On September 15, 2006, the Permit application and application processing fee were sent to the RO for certification.

On March 16, 2007, the proposed project was announced in the Federal Register.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

The Applicant seeks a Permit from the Service under section 10(a)(1)(B) of the Act. The Permit will authorize take of 2.24 acres of habitat occupied by scrub-jays associated with commercial and residential construction in Palm Beach County, Florida. The project is located on the southwest corner of the intersection of U.S. Highway One and County Line Road, Section 30, Township 40 South, Range 43 East in the Village of Tequesta, Palm Beach County, Florida (Figure 1). The site encompasses 6 acres of land, of which 2.24 acres is occupied by scrub-jays.

The Applicant's HCP provides a description of the proposed action, including measures the Applicant proposes to avoid, minimize, and mitigate adverse effects to scrub-jays, and is summarized below.

As part of the proposed project, the Applicant has committed to avoid, minimize, and mitigate impacts to scrub-jays. Measures proposed to be undertaken include: (1) placing 1.34 acres of occupied scrub-jay habitat in a conservation easement which will be enhanced and managed for scrub-jays by the Applicant's Consultant, (2) avoiding land clearing activities during the scrub-jay nesting season (March 1 to June 30), and (3) contributing $384,017.78 to a Service approved scrub-jay conservation fund.

The action area is defined as all areas to be affected directly or indirectly by the proposed action and not merely the immediate area involved in the action. It includes the area in which scrub-jays on the property could reasonably be expected to feed, breed, or shelter and interact with each other. Scrub-jays within the project site are part of a larger complex of demographically connected scrub-jays that inhabit coastal areas of east-central Martin County, south, to northeastern coastal Palm Beach County and are known as the M15 metapopulation (Stith 1999). Accordingly, the action area for this biological opinion is considered the area encompassing M15.

STATUS OF THE SPECIES/CRITICAL HABITAT

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: *Aphelocoma 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, *Aphelocoma 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 six 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 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 (Thaxton 1998). 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 (Thaxton 1998). 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 (Thaxton 1998). 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 10 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 that 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 that a dispersal distance of five 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 10 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 (Miller 2004), and there is at least

one breeding pair of scrub-jays remaining in Clay County (Miller 2004). A scrub-jay has been documented in St. Johns County as recently as 2003 (Miller 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 that 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 habitat 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 that 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 that 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), Breininger (1999), and Miller (2004); 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 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 that 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 that 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 that 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 one-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 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 ESA 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, that 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 that at least 2,100 breeding pairs of scrub-jays were living in overgrown habitat. Toland (1999) reported that 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 that 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 that 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 that 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, strong winds tend to make these nests susceptible to destruction (Woolfenden and Fitzpatrick 1996b; Bowman 1998). Hurricanes also 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 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 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 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

Status of the species within the action area

Efforts to conserve and manage xeric upland habitats within the action area (M15 metapopulation) have expanded in the last 10 years as a result of local and State land acquisition programs. Scrub-jays are generally well represented on public lands containing xeric vegetation within the action area. However, none of the parcels alone contain large enough populations of scrub-jays to ensure the long-term persistence and recovery of this scrub-jay metapopulation.

Within the action area, scrub-jays occupy small, remnant patches of xeric uplands (Stith 1999). The largest contiguous tract of suitable scrub-jay habitat exists within and immediately adjacent

to Jonathan Dickenson State Park (JDSP) in southeastern Martin County (Fernald 1989). The largest known remaining assemblage of scrub-jays within the action area also occurs in JDSP located about 0.5 mile north of the project area. In 2004 and 2005, the Martin County Audubon Society (MCAS) banded all known scrub-jay families in Martin County with the exception of one family in northern Martin County that belonged to the M14 metapopulation (Braun 2005). Of the 44 individual scrub-jays banded throughout the county, 24 were located in JDSP. MCAS does not list any banded scrub-jays from Seabranch State Reserve, however, Stith (1999) indicates the Reserve is occupied. In northern Palm Beach County, Iverson (1994) documented the presence of 100 individual birds representing 37 families. However, this figure probably does not represent current numbers of scrub-jays as land development pressures and the adverse effects of the surrounding urban landscape have likely resulted in a decrease in the numbers of scrub-jays in northern Palm Beach County.

Despite the large loss of habitat and relatively small amount of xeric uplands under public protection (compared to historic numbers), the affected scrub-jay metapopulation may still be viable. Stith (1999) developed a spatially-explicit, individually based population model to simulate population dynamics on a landscape scale considering availability of habitat as of 1994. Model results indicate that the eastern Martin County and northeastern Palm Beach County metapopulation was less vulnerable than most other metapopulations (18th least vulnerable out of the 21 identified metapopulations statewide); it has low extinction and quasi-extinction risks. These favorable results were due principally to relatively large scrub-jay populations within JDSP, Seabranch State Reserve, and Juno Hills Natural Area. Although certain model assumptions and limitations constrain these results, it can generally be concluded that with the continued protection and enhanced management of habitat within these core public lands, the demographic health of this metapopulation will exceed most other metapopulations throughout the State. This finding, however, is dependent on continued implementation of effective management by the public agencies who oversee these lands.

Biologists from Gee and Jenson observed a scrub-jay family using part of the Village of Tequesta water treatment plant property and the project site during their March 2003 scrub-jay survey of the water treatment plant. A Service biologist observed a scrub-jay on the eastern end of the project site during a November 7, 2003, site visit. The Consultant's May 2004 scrub-jay survey determined that one family of three scrub-jays occupies the western portion of the project site. The Consultants also conducted a nest survey in May 2004. While no active scrub-jay nests were located, four nests which were thought to be scrub-jay nests from previous nesting seasons were located. Another scrub-jay family was located to the north of Atlantis at Tequesta project site in the Casa del Sol development site and property to the west of it during a survey conducted by the Consultant for the Casa del Sol development in June and July 2003.

Factors affecting species environment within the action area

Xeric uplands within the action area have declined in distribution and ecological quality over the past 100 years. Urban and agricultural development in this area has resulted in substantial losses of habitat. Fernald (1989) estimated that as of 1984 about 97 percent of xeric uplands in Palm

Beach County had been lost. Although the action area does not encompass all of Palm Beach County, we believe Fernald's estimate probably is representative of habitat loss experienced within the portion of north Palm Beach County that falls within the action area. Fernald (1989) also estimated that about 63 percent of xeric uplands in Martin County had been lost to urban and agricultural development by 1984. Since these estimates, additional losses of habitat have occurred, due primarily to increasing urban growth and habitat degradation due to fire suppression.

As mentioned above, urban and agricultural uses over the past 100 years have destroyed or fragmented much of the xeric upland habitat both within the action area and rangewide. During this period, there have been thousands of individual residential, commercial, and agricultural projects of varying size that individually or in combination with other land uses have adversely affected xeric uplands within the action area (Fernald 1989). Although some of the historical threats to the scrub-jay have been abated to a limited extent due to regulatory oversight and the protective provisions of the Act, habitat destruction and degradation still occur throughout the action area. For example, local and county policies generally exclude small residential lot owners (platted residential areas) and agricultural lands from local environmental review ordinances. As a result, xeric uplands, although identified as a sensitive habitat by most municipalities and counties in their comprehensive planning documents, are destroyed on a lot-by-lot basis or on a larger scale within agricultural lands, without environmental review.

Although most available information suggests xeric uplands and scrub-jays have declined dramatically within the action area in recent times, a number of actions have also taken place that have resulted in conservation benefits to the scrub-jay and their habitat. Of most importance are land acquisition and management efforts by private, local, State, and Federal agencies to conserve xeric uplands. Combined, land acquisitions (Table 1) and other conservation measures within the action area have resulted in the protection of about 4,100 acres of xeric uplands (Palm Beach County 2002b; South Florida Water Management District 1998). A summary of Permits issued and associated mitigation within the action area appears in Table 2.

EFFECTS OF THE ACTION

Factors to be considered

The project site occurs within habitat suitable for the scrub-jay. Scrub-jays may be found within and adjacent to the proposed construction footprint year-round. The timing of land clearing for this project will be outside the nesting season to reduce the risk of take. The time required to complete construction of the project is not known, but it is likely all land clearing associated with the development will be completed in a few months. The project will result in permanent loss and alteration of the native upland vegetation currently available to the scrub-jay within the project site.

Analyses for effects of the action

Beneficial Effects - The Applicant will place 1.34 acres of occupied scrub-jay habitat in a conservation easement which will be enhanced and managed for scrub-jays.

Funding ($384,017.78) provided by the Applicant will go to an approved scrub-jay mitigation fund and will be used to acquire and manage tracts of scrub habitat for scrub-jays.

Direct Effects - Because of their mobility, fledgling and adult scrub-jays are unlikely to be killed during land clearing. Since land clearing in preparation for construction is planned to be initiated outside of the nesting season (March 1 to June 30), impacts to nesting scrub-jays, their eggs, and/or dependent chicks, should be avoided.

The proposed commercial construction will result in a loss of 2.24 acres of habitat occupied by scrub-jays. Habitat destruction will result in the loss of foraging, breeding, and sheltering habitat for one family of scrub-jays, currently estimated at three individuals. Scrub-jays may respond to the loss and restoration of habitat within the project site in one or more of the following ways: (1) they may continue to use the much smaller remaining scrub as a food resource, (2) they may abandon the project site and continue to use the remainder of their territory, (3) they may abandon their territory for more suitable habitat, if available; or (4) they may abandon their territory and perish during dispersal.

Indirect Effects - Development puts residences and commercial buildings in close proximity to scrub-jay nests. Increasing urbanization also leads to more vehicular traffic and higher numbers of free-roaming house cats, which are hazards to bird populations. The domestic cat is the most widespread terrestrial carnivore on earth, and the fact that cats negatively affect a vast array of wildlife species, especially birds and small mammals, is well documented (Churcher and Lawton 1989).

The indirect effects of alterations of the landscape matrix are difficult to quantify. Low to moderate levels of urban development within occupied scrub-jay habitat may result in an increase in productivity, but any increase may be off-set by increased mortality at other life stages (Bowman 1998). Encroaching urbanization within occupied scrub-jay habitat will likely result in the decline and extirpation of scrub-jays (Thaxton and Hingtgen 1996). Construction of the proposed project site, resulting from issuance of this Permit, will probably lead to many of the same adverse affects documented by recent research. The presence of small tracts of scrub within developed areas may allow persistence of some families. The Service expects urban encroachment will alter behavioral patterns and expose scrub-jays to increased mortality.

Interrelated and Interdependent Effects - By increasing the amount of xeric uplands under public ownership and management, most xeric-upland dependent species will benefit due to greater protection of habitat. As a result, the scrub-jay will benefit immediately from habitat acquisition and management. Although the Applicant's mitigation funding is relatively small when compared to the existing coverage of public lands, each additional acre protected adds biological and ecological benefits for scrub-jays and other xeric-dependent species.

Species' response to a proposed action

Surveys indicate that three scrub-jay families have territories in the vicinity of the project site. A small level of development can result in reduced fitness of scrub-jays remaining in an area (Bowman and Averill 1993). With proper habitat restoration and adequate resources, scrub-jays

can increase in numbers (Thaxton and Hingtgen 1996). The persistence and demographic success of scrub-jays depends on the size of the habitat preserved and availability of new recruits from surrounding territories. The loss of habitat from the proposed construction may reduce the fitness of the scrub-jay group occupying the project area and reduce the metapopulation. The 1.34-acre conservation easement will provide a foraging and sheltering area for scrub-jays and may minimize potential adverse effects of the proposed action.

CUMULATIVE EFFECTS

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

The action area is expected to experience urban growth and patches of xeric uplands that are not currently under public ownership will be lost or further degraded. The extent and timing of these losses cannot be determined because of variation in land prices and changes in urban growth patterns over time.

Recent commitments by the State of Florida to continue land acquisition and management well into the 21st century will provide many opportunities to protect additional xeric oak scrub in southeastern Florida. Florida's land acquisition program (Florida Forever) will acquire additional xeric oak scrub; however, the amount of lands reasonably certain to be acquired cannot be determined.

CONCLUSION

After reviewing the 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 issuance of the Permit, as proposed, is not likely to jeopardize the continued existence of the scrub-jay. No critical habitat has been designated for this species; therefore, none will be affected.

The proposed action and resulting combination of residential and commercial construction will destroy 2.24 acre of occupied scrub-jay habitat in Palm Beach County. The destruction of scrub-jay habitat is expected to result in adverse effects to the scrub-jay. However, effects of these losses will likely be minimized and mitigated through habitat acquisition, establishment of the on-site conservation easement, and timing of construction activities. This mitigation strategy reduces the risk of future loss of habitat and increases the amount of habitat under perpetual management. Cumulatively, we anticipate benefits to the security and viability of the affected metapopulations as a result of implementation of the mitigation and minimization measures in the Permit.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibits 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 Applicant's HCP and its associated documents identify expected impacts to affected species likely to result from the proposed taking and the measures that are necessary and proper to minimize those impacts. All conservation measures described in the proposed HCP, together with the terms and conditions described in the section 10(a)(1)(B) permit or permits issued with respect to the Applicant's HCP, are hereby incorporated by reference as reasonable and prudent measures and terms and conditions within this Incidental Take Statement under 50 Code of Federal Regulations [CFR] 402.14(I). Such terms and conditions are nondiscretionary and must be undertaken for the exemptions under section 10(a)(1)(B) and section 7(o)(2) of the Act to apply. If the Applicant fails to adhere to these terms and conditions, the protective coverage of the section 10(a)(1)(B) permit and section 7(o)(2) may lapse. The amount or extent of incidental take expected under the Applicant's HCP, associated reporting requirements, and provisions for disposition of dead or injured animals are as described in the HCP and its accompanying section 10(a)(1)(B) permit[s].

AMOUNT OR EXTENT OF TAKE ANTICIPATED

Based on the Applicant's HCP and available biological information, the Service anticipates 2.24 acres of occupied scrub-jay habitat will be incidentally taken as a result of the proposed action.

Depending on availability of unoccupied habitat in the vicinity of the project site, these birds may: (1) alter their territory to include adjacent, suitable habitat to compensate for the loss, (2) persist in their reduced territory, (3) abandon the territory, and disperse to other available suitable habitat, or, (4) abandon the territory and perish during dispersal.

In the first three events, scrub-jays will be impacted by the loss of habitat and the reduction in the amount and/or quality of habitat that remains. These factors will likely adversely affect feeding, breeding, or sheltering behavioral patterns for this family. In the forth event, scrub-jays will die.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that the level of anticipated take is not likely to result in jeopardy to the scrub-jay or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The description of the proposed action, and the Applicant's HCP, prescribe methods to minimize on-site habitat disturbances and deal with unforeseen future circumstances. These actions represent actions to minimize and mitigate adverse impacts to the scrub-jay to the maximum extent practicable. Based on the conservation actions in the HCP and the biology of the scrub-jay, the Service does not have any reasonable and prudent measures to add to the proposed action.

TERMS AND CONDITIONS

Since there are no "Reasonable and Prudent Measures," there are no "Terms and Conditions" for their implementation.

In order to be exempt from the prohibitions of the Act, the Service must issue an incidental take permit with the conservation measures as identified in the HCP and any standard special conditions necessary. The proposed project and conditions of the section 10(a)(1)(B) permit are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes no more than 2.24 acres of scrub habitat will be destroyed resulting in adverse effects for up to three scrub-jays. If, during the course of this action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the project design and special conditions of the incidental take permit. The Service must immediately provide an explanation of the causes of the taking and review the need for possible modification of the project.

Upon locating a dead, injured, or sick individual of an endangered or threatened species, initial notification must be made to the Service's Law Enforcement Office (20501 Independence Boulevard; Groveland, Florida 34736; 352-429-1037). Additional notification must be made to the Service's South Florida Ecological Services Office (1339 20th Street; Vero Beach, Florida 32960-3559; 772-562-3909). Care should be taken in handling sick or injured individuals and in the preservation of specimens in the best possible state for later analysis of cause of death or injury.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to carry 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 a listed species or critical habitat, to help implement recovery plans, or to develop information. We do not have any conservation recommendations to add at this time.

REINITIATION NOTICE

This concludes formal consultation on the proposed issuance of a Permit by the Service. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary

Federal agency involvement or control over the action has been retained (or is authorized by law) and if:

1. The amount or extent of incidental take is exceeded;

2. New information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this BO;

3. The agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this BO; or

4. A new species is listed or critical habitat designated that may be affected by the action.

In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending reinitiation.

If you have any questions, please contact Constance Cassler at 772-562-3909, extension 243.

LITERATURE CITED

Abrahamson, W.G. 1984. Post-fire recovery of Florida Lake Wales Ridge vegetation. American Journal Botany 71:9-21.

Abrahamson, W.G., A.F. Johnson, J.N. Layne, and P.A. Peroni. 1984. Vegetation of the Archbold Biological Station, Florida: an example of the southern Lake Wales Ridge. Florida Scientist 47:209-250.

American Ornithologists' Union [AOU]. 1957. Check-list of North American Birds. Fifth edition. Allen Press; Lawrence, Kansas.

American Ornithologists' Union [AOU]. 1983. Checklist of North American Birds. Sixth edition. Allen Press; Lawrence, Kansas.

American Ornithologists' Union [AOU]. 1995. Fortieth supplement to the North American Ornithologists' Union Checklist of North American Birds. The Auk 112(3):819-830.

Bancroft, G.T., and G.E. Woolfenden. 1982. The molt of scrub jays and blue jays in Florida. Ornithological Monograph Number 29. American Ornithologists' Union; Washington, D.C.

Bendire, C.E. 1895. Life histories of North American birds. U.S. National Museum Special Bulletin No. 3. U.S. Government Printing Office; Washington, D.C.

Boughton, R.K., J.W. Atwell, and S.J. Schoech. 2006. An introduced generalist parasite, the sticktight flea (*Echidnophaga gallinacean*), and its pathology in the threatened Florida scrub-jay (*Aphelocoma coerulescens*). Journal of Parasitology 92(5):941–948.

Bowman, R. 1998. Population dynamics, demography, and contributions to metapopulation dynamics by suburban populations of the Florida scrub-jay, *Aphelocoma coerulescens*. Final report on Project No. NG94-032. Florida Fish and Wildlife Conservation Commission; Tallahassee, Florida.

Bowman, R. and L. Averill. 1993. Demography of a suburban population of Florida scrub jays. Annual Progress Report. U.S. Fish and Wildlife Service; Jacksonville, Florida.

Bowman, R., G.E. Woolfenden, A.L. Fleischer, Jr., and L.M. Walton. 1996. Nest site selection by Florida scrub-jays in natural and modified habitats [abstract]. Page 2 *in* Archbold Biological Station 1996 Symposium; Lake Placid, Florida.

Braun, D.G. 2005. Martin County Audubon Society. Email to Trish Adams dated July 7, 2005.

Breininger, D.R. 1999. Florida scrub-jay demography and dispersal in a fragmented landscape. The Auk 116(2):520-527.

Breininger, D.R. and P.A. Schmalzer. 1990. Effects of fire and disturbance on plants and birds in a Florida oak/palmetto scrub community. American Midland Naturalist 123(1):64-74.

Breininger, D.R., M.J. Provancha, and R.B. Smith. 1991. Mapping Florida scrub jay habitat for purposes of land-use management. Photogrammetric Engineering and Remote Sensing 57(11):1467-1474.

Breininger, D.R., V.L. Larson, B.W. Duncan, R.B. Smith, D.M. Oddy, and M.F. Goodchild. 1995. Landscape patterns of Florida scrub jay habitat use and demographic success. Conservation Biology 9(6):1442-1453.

Breininger, D.R., V.L. Larson, B.W. Duncan, and R.B. Smith. 1998. Linking habitat suitability to demographic success in Florida scrub-jays. Wildlife Society Bulletin 26(1):118-128.

Breininger, D.R., M.A. Burgman, and B.M. Stith. 1999. Influence of habitat quality, catastrophes, and population size on extinction risk of the Florida scrub-jay. Wildlife Society Bulletin 27(3):810-822.

Breininger, D.R., B. Toland, D. Oddy, M. Legare, J. Elseroad, and G. Carter. 2001. Biological criteria for the recovery of Florida scrub-jay populations on public lands in Brevard and Indian River County. Annual Progress Report to U.S. Fish and Wildlife Service; Jacksonville, Florida.

Breininger, D.R., B.W. Duncan, and N.J. Dominy. 2002. Relationships between fire frequency and vegetation type in pine flatwoods of east-central Florida, USA. Natural Areas Journal 22(3):186-193.

Breininger, D.R, B. Toland, D. Oddy, M. Legare, J. Elseroad, and G. Carter. 2003. Biological criteria for the recovery of Florida scrub-jay populations on public lands in Brevard County and Indian River County. Final Report to U.S. Fish and Wildlife Service; Jacksonville, Florida.

Byrd, H. 1928. Notes from correspondents: Florida jay. Florida Naturalist 1(4):87.

Churcher, P.B. and J.H. Lawton. 1989. Beware of well-fed felines. Natural History 7:40-46.

Cox, J.A. 1987. Status and distribution of the Florida scrub jay. Florida Ornithological Society Special Publication No. 3. Gainesville, Florida.

Davis, J.H., Jr. 1943. The natural features of southern Florida: especially the vegetation and the Everglades. Florida Department of Conservation, Florida Geological Survey Bulletin 25:1-311.

Davis, J.H., Jr. 1967. General map of natural vegetation of Florida. Agricultural Experiment Station, Institute of Food and Agricultural Sciences. University of Florida; Gainesville, Florida.

DeGange, A.R., J.W. Fitzpatrick, J.N. Layne, and G.E. Woolfenden. 1989. Acorn harvesting by Florida scrub jays. Ecology 70(2):348-356.

Dreschel, T.W., R.B. Smith, and D.R. Breininger. 1990. Florida scrub jay mortality on roadsides. Florida Field Naturalist 18:82-83.

Duncan, B.W. and D.R. Breininger. 1998. Quantifying habitat change: modeling historic and current Florida scrub-jay habitat suitability. Proceedings of GIS/LIS 1998 Annual Conference; Ft. Worth, Texas.

Duncan, B.W., S. Boyle, D.R. Breininger, and P.A. Schmalzer. 1999. Coupling past management practice and historic landscape change on John F. Kennedy Space Center, Florida. Landscape Ecology 14:291-309.

Fernald, R.T. 1989. Coastal xeric scrub communities of the Treasure Coast region, Florida: a summary of their distribution and ecology, with guidelines for their preservation. Nongame Wildlife Technical Report No. 6. Florida Game and Fresh Water Fish Commission; Tallahassee, Florida.

Fitzpatrick, J.W. and G. E. Woolfenden. 1988. Components of lifetime reproductive success in the Florida scrub jay. Pages 305-320 *in* T.H. Clutton-Brock, editor. Reproductive Success. University of Chicago Press; Chicago, Illinois.

Fitzpatrick, J.W., G.E. Woolfenden, and M.T. Kopeny. 1991. Ecology and development-related habitat requirements of the Florida scrub jay (*Aphelocoma coerulescens coerulescens*). Florida Nongame Wildlife Program, Technical Report No. 8. Florida Game and Fresh Water Fish Commission; Tallahassee, Florida.

Fitzpatrick, J.W., B. Pranty, and B. Stith. 1994. Florida scrub jay statewide map 1992-93. Archbold Biological Station; Lake Placid, Florida.

Fleischer, A.L., Jr. 1996. Pre-breeding time budgets of female Florida scrub-jays in natural and suburban habitats [abstract]. Page 5 *in* Archbold Biological Station 1996 Symposium; Lake Placid, Florida.

Franzreb, K.E. and J. Puschock. 2004. Year 3 (FY 2003): Status, population dynamics, and habitat use of the Florida scrub-jay on the Ocala National Forest, Florida. Draft annual report 2003. U.S. Forest Service; Asheville, North Carolina.

Hanski, I., and M. Gilpin. 1991. Metapopulation dynamics: brief history and conceptual domain. Biological Journal of the Linnaean Society 42:3-16.

Harper, R.M. 1927. Natural Resources of Southern Florida. Florida Department Conservation, Florida Geological Survey Annual Report. 18:27-206.

Hastie, K. and E. Eckl. 1999. North Florida team rallies around scrub jay. Page 28 *in* M. Durham, editor. Fish and Wildlife News July/August 1999. U.S. Fish and Wildlife Service; Washington, D.C.

Hofstetter, R.H. 1984. The effect of fire on the pineland and sawgrass communities of southern Florida. Pages 465-476 *in* P.J. Gleason, editor. Environments of South Florida: present and past II. Miami Geological Society; Coral Gables, Florida.

Iverson, G. and J.E. Gardner. 1994. Florida scrub-jay population, Palm Beach County, 1994. Unpublished data. On file, Fish and Wildlife Service, Vero Beach, Florida.

Kinsella, J.M. 1974. Helminth fauna of the Florida scrub jay: host and ecological relationship. Proceedings of the Helminthological Society of Washington 41(2):127-130.

Laessle, A.M. 1958. The origin and successional relationship of sandhill vegetation and sand-pine scrub. Ecological Monograph 28:361-387.

Laessle, A.M. 1968. Relationships of sand pine scrub to former shore lines. Quarterly Journal of the Florida Academy of Science 30:269-286.

McGowan, K.J. and G.E. Woolfenden. 1989. A sentinel system in the Florida scrub jay. Animal Behavior 37:1000-1006.

McGowan, K.J. and G.E. Woolfenden. 1990. Contributions to fledgling feeding in the Florida scrub jay. Journal of Animal Ecology 59:691-707.

Menges, E.S. and C.V. Hawkes. 1998. Interactive effects of fire and microhabitat on plants of Florida scrub. Ecological Applications 8(4):935-946.

Menges, E.S. and N. Kohfeldt. 1995. Life history strategies of Florida scrub plants in relation to fire. Bulletin of the Torrey Botanical Club 122(4):282-297.

Miller, J.B. 2003. Personal communication. Biologist. E-mail to the U.S. Fish and Wildlife Service dated May 13, 2003. Florida Park Service; St. Augustine, Florida.

Miller, K.E. 2004. Personal communication. Biologist. E-mail to U.S. Fish and Wildlife Service dated December 14, 2004. Florida Fish and Wildlife Conservation Commission; Gainesville, Florida.

Miller, K.E. 2006. Assessing impacts of Hurricane Charley on Florida scrub-jays in Charlotte County. Progress Report to U.S. Fish and Wildlife Service; Vero Beach, Florida.

Mumme, R.L. 1992. Do helpers increase reproductive success? An experimental analysis in the Florida scrub-jay. Behavioral Ecology and Sociobiology 31:319-328.

Mumme, R.L. and S.J. Schoech, G.E. Woolfenden, and J.W. Fitzpatrick. 2000. Life and death in the fast lane: demographic consequences of road mortality in the Florida scrub jay. Conservation Biology 14:501-512.

Myers, R.L. 1990. Scrub and high pine. Pages 150-193 *in* R.L. Myers and J.J. Ewel, editors. Ecosystems of Florida. University of Central Florida Press; Orlando, Florida.

Nash, G.V. 1895. Notes on some Florida plants. Bulletin of the Torrey Botanical Club 22:141-161.

Palm Beach County, Environmental Resource Management. Undated. Natural Area List. http://www.co.palm-beach.fl.us/erm/divisions/stewardship/acquisition/nalist.htm

Percival, H.F., D.B. McDonald, and M.J. Mazurek. 1995. Status and distribution of the Florida scrub jay (*Aphelocoma coerulescens*) on Cape Canaveral, Florida. Technical Report Number 51. Florida Fish and Wildlife Research Unit; Gainesville, Florida.

Root, K.V. 1998. Evaluating the effects of habitat quality, connectivity, and catastrophes on a threatened species. Ecological Applications 8(3):854-865.

Schaub, R., R.L. Mumme, and G.E. Woolfenden. 1992. Predation on the eggs and nestlings of Florida scrub jays. The Auk 109(3):585-593.

Schmalzer, P.A. and S.R. Boyle. 1998. Restoring long-unburned oak-saw palmetto scrub requires mechanical cutting and prescribed burning. Restoration and Management Notes 16(1):96-97.

Schmalzer, P.A. and C.R. Hinkle. 1992a. Recovery of oak-saw palmetto scrub after fire. Castanea 57(3):158-173.

Schmalzer, P.A., and C.R. Hinkle. 1992b. Species composition and structure of oak-saw palmetto scrub vegetation. Castanea 57(4):220-251.

Snodgrass, J.W., T. Townsend, and P. Brabitz. 1993. The status of scrub and scrub jays in Brevard County, Florida. Florida Field Naturalist 21(3):69-74.

South Florida Water Management District. 1998. Save Our Rivers 1998 land acquisition and management plan. West Palm Beach, Florida.

Stallcup, J.A. and G.E. Woolfenden. 1978. Family status and contribution to breeding by Florida scrub jays. Animal Behavior 26:1144-1156.

Stark, L.M. and D. Kazanis. 2001. Arbovirus surveillance: annual summary report, 2001. Florida Department of Health [Internet]. Tampa, Florida [cited December 13, 2006]. Available from: http://www.myfloridaeh.com/community/arboviral/pdfs/2001/2001_arboannual.pdf

Stevens, T. and J. Hardesty. 1999. Status and distribution of the Florida scrub-jay (*Aphelocoma coerulescens*) at Cape Canaveral Air Station, Florida, Annual Report: 1998-1999. Report to U.S. Air Force; Patrick Air Force Base, Florida.

Stith, B.M. 1999. Metapopulation viability analysis of the Florida scrub-jay (*Aphelocoma coerulescens*): a statewide assessment. Final report to U.S. Fish and Wildlife Service; Jacksonville, Florida.

Stith, B.M, J.W. Fitzpatrick, G.E. Woolfenden, and B. Pranty. 1996. Classification and conservation of metapopulations: a case study of the Florida scrub jay. Pages 187-215 *in* D.R. McCullough, editor. Metapopulations and wildlife conservation. Island Press; Washington, D.C.

Swain, H.M., R. Bowman, D. Breininger, P. Schmalzer, K. Root, S. Boyle, S. Bergen, and S. MacCaffree. 1995. Out of the pyrogenic frying pan and into the political fire: developing reserve designs for the Florida scrub jay [abstract]. Page 79 *in* Society of Conservation Biology annual meeting; Fort Collins, Colorado.

Thaxton, J.E. 1998. Personal communication. Uplands, incorporated.

Thaxton, J.E. and T.M. Hingtgen. 1994. Responses of Florida scrub jays to management of previously abandoned habitat. District 4 Annual Research Report. Florida Park Service; Tallahassee, FL.

Thaxton, J.E. and T.M. Hingtgen. 1996. Effects of suburbanization and habitat fragmentation on Florida scrub-jay dispersal. Florida Field Naturalist 24(2):25-37.

The Nature Conservancy. 2001. Saving the Florida scrub-jay: recommendations for preserving Florida's scrub habitat. The Nature Conservancy and Audubon of Florida; Altamonte Springs, Florida.

Toland, B.R. 1991. Nest site characteristics of a Florida scrub jay population in Indian River County [abstract]. Page 12 *in* Florida scrub-jay Workshop, May 23, 1991; Ormond Beach, Florida.

Toland, B.R. 1999. Current status and conservation recommendations for the scrub-jay in Brevard County. Report to the Brevard County Board of County Commissioners. Brevard County Natural Resources Management Office; Viera, Florida.

Turner, W.R., D.S. Wilcove, and H.M. Swain. 2006. State of the scrub: conservation progress, management responsibilities, and land acquisition priorities for imperiled species of Florida's Lake Wales Ridge. Archbold Biological Station; [Internet] Lake Placid, Florida. [Cited December 13, 2006]. Available from: http://www.archbold-station.org/abs/publicationsPDF/Turner_etal-2006-StateotScrub.pdf

U.S. Fish and Wildlife Service. 1987. Endangered and Threatened Wildlife and Plants; Threatened Status for the Florida Scrub Jay. Federal Register 52:20715-20719.

U.S. Fish and Wildlife Service. 1990. Recovery plan for the Florida scrub-jay; [Internet]. Atlanta, Georgia [Cited December 13, 2006]. Available from: http://ecos.fws.gov/docs/recovery_plans/1990/900509.pdf

U.S. Fish and Wildlife Service. 1999. South Florida multi-species recovery plan [Internet]. Atlanta, Georgia [cited December 14, 2006]. Available from: http://verobeach.fws.gov/Programs/Recovery/vbms5.html

Webber, H.J. 1935. The Florida scrub, a fire fighting association. American Journal of Botany 22:344-361.

Woolfenden, G.E. 1974. Nesting and survival in a population of Florida scrub jays. The Living Bird 12:25-49.

Woolfenden, G.E. 1975. Florida scrub jay helpers at the nest. The Auk 92:1-15.

Woolfenden, G.E. 1978. Growth and survival of young Florida scrub jays. Wilson Bulletin 90:1-18.

Woolfenden, G.E. and J.W. Fitzpatrick. 1977. Dominance in the Florida scrub jay. The Condor 79:1-12.

Woolfenden, G.E. and J.W. Fitzpatrick. 1978. The inheritance of territory in group-breeding birds. BioScience 28:104-108.

Woolfenden, G.E. and J.W. Fitzpatrick. 1984. The Florida scrub jay: Demography of a Cooperative-Breeding Bird. Princeton University Press; Princeton, New Jersey.

Woolfenden, G.E. and J.W. Fitzpatrick. 1986. Sexual asymmetries in the life history of the Florida scrub jay. Pages 87-107 *in* D. Rubenstein and R.W. Wrangham, editors. Ecological aspects of social evolution: birds and mammals. Princeton University Press; Princeton, New Jersey.

Woolfenden, G.E. and J.W. Fitzpatrick. 1990. Florida scrub jays: A synopsis after 18 years of study. Pages 241-266 *in* P.B. Stacey and W.B. Koenig, editors. Cooperative breeding in birds. Cambridge University Press; Cambridge, United Kingdom.

Woolfenden, G.E. and J.W. Fitzpatrick. 1991. Florida scrub jay ecology and conservation. Pages 542-565 *in* C.M. Perrine, J.D. Lebreton, and G.J.M. Hirons, editors. Bird population studies: relevance to conservation and management. Oxford University Press; Oxford, United Kingdom.

Woolfenden, G.E. and J.W. Fitzpatrick. 1996a. Florida scrub jay. Pages 267-280 *in* J.A. Rodgers, Jr., H.W. Kale II, and H.T. Smith, editors. Rare and Endangered Biota of Florida, Volume V. Birds. University Press of Florida; Gainesville, Florida.

Woolfenden, G.E. and J.W. Fitzpatrick. 1996b. Florida scrub jay. Pages 1-27 *in* A. Poole and F. Gill, editors. The birds of North America, Number 228. The Academy of Natural Sciences; Philadelphia, Pennsylvania, and the American Ornithologists' Union; Washington, D.C.

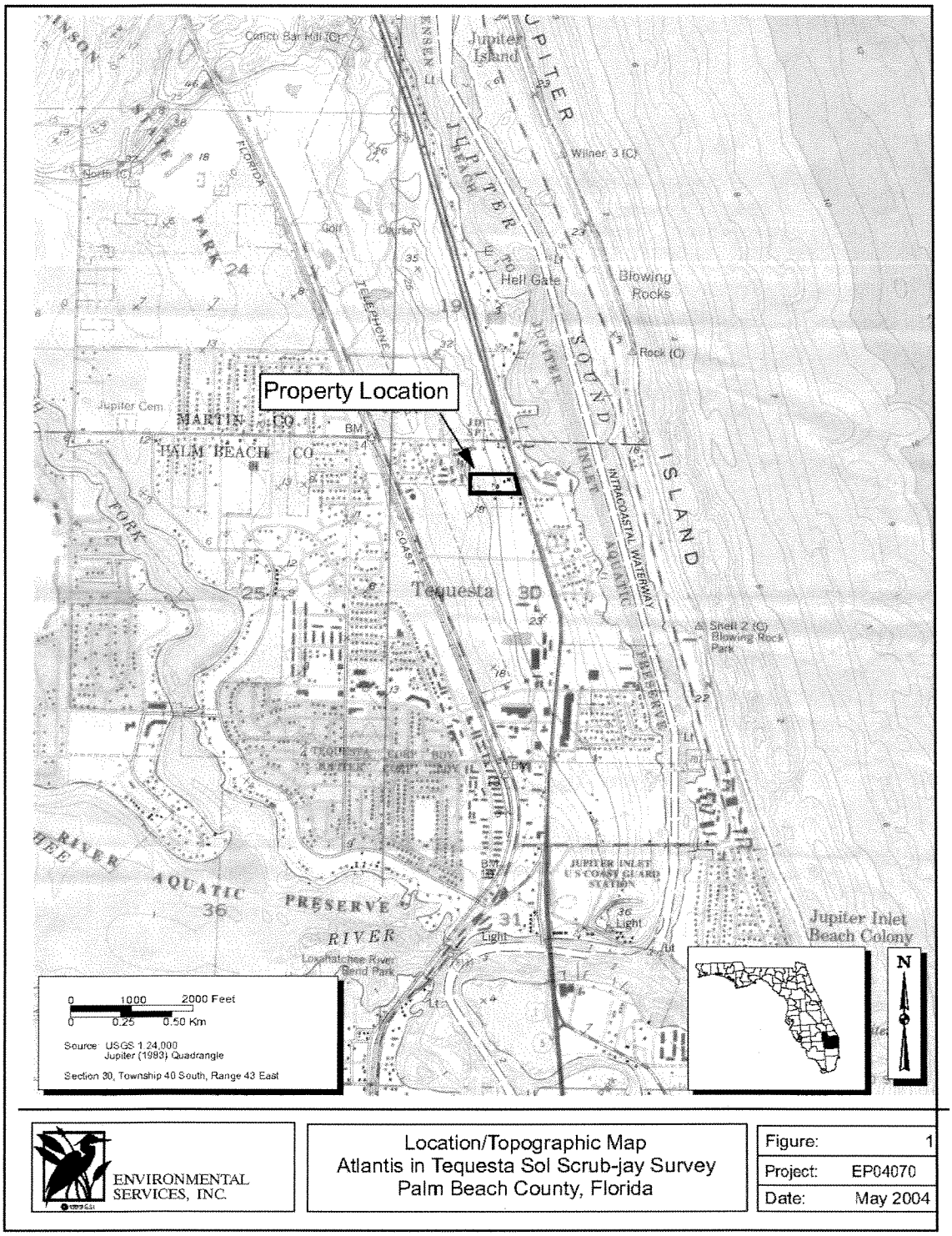

Figure 1. Royal Tequesta L.L.C. property in the Village of Tequesta, Palm Beach County, Florida.

Table 1. Land acquisitions within the action area.

Protected Habitat (ownership)	Area (acres)
BLM/Coast Guard (Federal)	86
Forest Glade (Private)	40
Hobe Sound NWR (Federal)	225
Jonathan Dickinson State Park (State)	2,704
Juno Hills (Palm Beach County)	190
Jupiter Ridge (Palm Beach County)	216
Medalist Tract (State)	125
Pineapple Plantation (private)	17
Seabranch State Reserve (State)	476
St. Judes Catholic Church (private)	5
The Nature Conservancy (private)	40
Estimated Total Area	4,124

Table 2. List of incidental take permits for the Florida scrub-jay issued in the M15 metapopulation.

Project Name	**Permit Number**	**County**	**Area Impacted**	**Area Mitigated**	**Type**
Tropic Vista	TE067104-0	Martin	9 acre	36.8 acre	Land
Casa del Sol	TE095780-0	Palm Beach	0.70 acre	1.40 acre	Land