United States Department of the Interior

FISH AND WILDLIFE SERVICE
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April 21, 2008

Memorandum

To: Noreen Walsh, Assistant Regional Director, Ecological Services, Southeast Region

From: David Hankla, Field Supervisor, North Florida Ecological Services Office
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Subject: Final Biological Opinion: Proposed Issuance of Incidental Take Permits under an Umbrella Habitat Conservation Plan for the Threatened Florida Scrub-jay

This document transmits the U.S. Fish and Wildlife Service's (Service) final Biological Opinion based on our review of the proposed issuance of incidental take permits (ITP) over a 7-year period under an umbrella habitat conservation plan and environmental assessment (umbrella HCP/EA), and the resulting effects on the threatened Florida scrub-jay (*Aphelocoma coerulescens*) (scrub-jay). This Biological Opinion is provided in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (87 Stat. 884; 16 U.S.C. 1531 *et seq.*).

This Biological Opinion is based on information provided in the umbrella HCP/EA prepared by the Service and published and unpublished research findings. An administrative record is on file in the Service's North Florida Ecological Services Office and South Florida Ecological Services Office.

Consultation History

Since the listing of the scrub-jay in 1987 as threatened (Service, 1987), owners of property in urban areas that are occupied by scrub-jays have been challenged with the difficulty of complying with section 9 of the Act, which prohibits the take of scrub-jays. The majority of urban landowners with scrub-jays have been faced with the choice of complying with the Act by not clearing, or constructing in occupied scrub-jay habitat, or by obtaining a section 10(a)(1)(B) ITP prior to land clearing, or violating the Act by clearing lots without coverage from an ITP. Each of these alternatives has limitations; landowners may incur costs associated with ongoing property tax burdens and local government assessments for infrastructure improvements while not developing property they own, or they may incur costs and time constraints associated with obtaining an ITP. Lot owners choosing not to pursue an ITP for land clearing may be faced with violating section 9 of the Act, which can result in fines and/or imprisonment.

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The cost and complexity of complying with the Act is thought to have precluded many individual lot owners from seeking an ITP for otherwise lawful activities, such as land clearing and construction. Additionally, most local governments have not embraced large-scale scrub-jay conservation planning efforts and have not encouraged their residents to comply with the Act because of perceived legal and fiscal constraints the Act may impose on them. The failure of individual lot owners to seek regulatory relief from the prohibitions of take has also resulted in the continued degradation of scrub-jay habitat because their properties remain unmanaged and impacts are not mitigated.

Indian River County and the City of Sebastian successfully completed an ITP application and received authorization to take scrub-jays within city limits resulting from residential and commercial development. This planning effort resulted in the only area-wide HCP that is currently available to landowners whose property is occupied by scrub-jays. However, the plan area for this HCP/EA and area covered by the incidental take authorization are restricted to the city limits of the City of Sebastian and offer no regulatory or financial relief to landowners in other areas of the state.

Recognizing the limitations that the above-mentioned alternatives place on owners of property in urban areas, the Service considered methods to streamline the section 10(a)(1)(B) permitting process, while still providing conservation benefits to the scrub-jay. The umbrella HCP/EA is the culmination of the Service's review of streamlining options. Although the focus of the umbrella HCP/EA is on modifications to existing permitting processes, the premise for these modifications is based on available biological information indicating that Florida scrub-jays in some urban areas will not persist long-term and are unlikely to substantially contribute to the recovery of the species.

BIOLOGICAL OPINION

DESCRIPTION OF PROPOSED ACTION

In determining the action area for this biological opinion, the Service considered the demographic characteristics of the scrub-jay. In particular, we considered metapopulation dynamics to determine the extent to which the proposed action would affect the species. Current research suggests metapopulation theory may be appropriate for describing the spatial structure of most scrub-jay populations (Stith et al. 1996; Breininger, 1999). There are 21 scrub-jay metapopulations found in 34 counties in peninsular Florida (Service 2006). By definition, metapopulations represent groups of scrub-jays that have the capacity to interact demographically. Thus, any factor affecting one segment of a metapopulation may also affect birds in the remainder of the metapopulation over time. Consequently, the Service considered occupied or potentially occupied scrub-jay within each of the 21 metapopulations in peninsular Florida as the action area for this analysis. The action area for scrub-jays is not continuous because habitat fragmentation and existing urban and agricultural uses have isolated scrub-jay populations in this area. The limits of the action area generally coincide with Stith's (1999)

demarcation of scrub-jay metapopulations in Florida and the one-half mile dispersal buffer surrounding scrub-jay populations identified during a statewide survey conducted from 1992-1994 (Fitzpatrick et al. 1994) (Figure 1).

Under the proposed action, the Service would make the umbrella HCP/EA available for use by certain individual property owners needing the regulatory protection of a section 10 permit. Only properties meeting certain criteria would be eligible under the umbrella HCP/EA. Including those that are: (1) in urban areas in the action area; (2) one acre or less; (3) platted prior to January 1, 2006; and (4) accessible by two wheel-drive vehicles through a dedicated ingress/egress right-of-way that is maintained by a government entity, local taxing district, or road maintenance agreement (or similar instrument). To apply for incidental take authorization, owners of eligible properties would submit a "Certificate of Intent to Participate" in which they agree to the terms provided in the umbrella HCP/EA, complete application form 3-200-56, and pay a $50 processing fee.

The Service estimates that up to 14,928 acres of occupied scrub-jay habitat may occur within properties eligible to participate under the umbrella HCP/EA. If all property owners with eligible parcels participate during the 7-year period of the umbrella HCP/EA, all scrub-jays occurring in urban areas will be taken because of residential development. Mitigation measures required as a condition of participation in the umbrella HCP/EA include contribution of funds for habitat acquisition and management or credit acquisition at a Service-approved conservation bank. An estimated 29,856 acres of habitat will be protected with the mitigation funding, assuming all eligible properties participate under the umbrella HCP/EA.

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, 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 Ornithological 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).

Cabanis transferred the Florida scrub-jay, originally named *Corvus coerulescens* by Bosc in 1795, to the genus *Aphelocoma* in 1851. 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).

This species account references the full species name, *A. coerulescens*, as listed in the most recent Service's Federal Register notice of Endangered and Threatened Wildlife and Plants (50 CFR §§ [sections] 17.11 and 17.12).

No critical habitat has been designated for this species.

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, 1968; Myers 1990; Fitzpatrick et al. unpublished data). 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 consists 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 and 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 (*P. elliotii*); sand pine is 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 (*P. palustris*) 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. A 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, 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, 2002). Degradation or replacement of native matrix habitats with habitat fragments and industrial areas attract predators of scrub-jays, such as fish crows, 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, 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. Pre-breeding 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 intra-familial dominance hierarchy with breeder males most dominant, followed by helper males, breeder females, and, finally, female helpers (Woolfenden and Fitzpatrick 1977, 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, 1990), and all family members seek cover in dense shrub vegetation (Fitzpatrick et al. 1991).

Scrub-jay pairs occupy year-round, multi-purpose territories (Woolfenden and Fitzpatrick 1978, 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, non-breeding 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) indicates 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 courtship behavior or copulation between unpaired scrub-jays. Age at first breeding in the scrub-jay varies from 1 to 7 years, although most individuals become breeders between 2 to 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 a 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 shrub 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 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 three to four 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 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 (Toland 1996; 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 two percent on the Lake Wales Ridge (Toland 1996; Thaxton 1998). Scrub-jay eggs measure 1.1 by 0.8 inches (length by 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 *in* Bent 1946). Eggs are incubated for 17 to 19 days (Woolfenden, 1974), and fledging occurs 15 to 21 days after hatching (Woolfenden, 1978; Fitzpatrick et al. unpublished data). 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 both breeders and helpers feed them (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 (Fitzpatrick et al. unpublished data). Data from Archbold Biological Station, however, suggest that survival and reproductive success of scrub-jays in sub-optimal 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 that mean annual productivity declines significantly in suburban areas where Toland (1991) reported that 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 (birth) territory for up to 6 years before dispersing to become breeders (Woolfenden and Fitzpatrick 1984, 1986). Once scrub-jays pair and become breeders, generally within two territories of their natal (birth) area, they stay on their breeding territory until death. In suitable habitat, fewer than 5 percent of scrub-jays disperse more than 5 miles (Fitzpatrick et al. unpublished data). 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 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*, *Cnemidophorus sexlineatus*, *Sceloporus woodi*, *Eumeces inexpectatus*, *Neoseps reynoldsi*, *Ophisaurus compressus*, *O. ventralis*), small snakes (*Thamnophis sauritus*, *Opheodrys aestivus*, *Diadophis punctatus*), small rodents (*Sigmodon hispidus*, *Peromyscus polionotus*, *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 one to 30 feet tall (Toland 1996). 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, 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 trends result in declines in

habitat use and demographic success (Woolfenden and Fitzpatrick 1984, 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, 2001).

Status and distribution

The scrub-jay was federally listed as threatened 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 "The advent of man has created a new environmental complex."

A statewide scrub-jay census was last conducted in 1992-1993 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 10 counties (Alachua, Broward, Clay, Duval, Gilchrist, Hernando, Hendry, Pinellas, and St. Johns), and was considered functionally extinct in an additional 5 counties (Flagler, Hardee, Levy, Orange, and Putnam), where 10 or fewer pair remained. Recent information indicates that 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 County south to Collier County) (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 that in the northern third of the species' range, the scrub-jay has declined 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 (Camardese 1997; Hastie and Eckl 1999; Stith 1999; The Nature Conservancy [TNC] 2001; Birch 2002).

Stith (1999) used 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 collections of relatively discrete demographic populations distributed over the landscape; these populations are connected within the metapopulations through dispersal or migration (National Research Council 1995). 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 ten 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 was acquired (central Brevard, north Brevard, central Charlotte, northwest Charlotte, Citrus, Lee, Levy, Manatee, Pasco, St. Lucie, and west Volusia). The model predicted that 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 that the remaining four metapopulations (Citrus, Lee, Manatee, and Pasco) would moderately benefit from more acquisitions.

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 subpopulations 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.

Research and monitoring of scrub-jays has revealed more information about threats to this species since the scrub-jay recovery plan was approved in 1990. 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 (Fitzpatrick et al. 1991). 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. Statewide estimates of scrub habitat loss range from 70 to 90 percent (Woolfenden and Fitzpatrick 1996a; Fitzpatrick et al. unpublished data). Various populations of scrub-jays within the species' range have been monitored, and more precise estimates of habitat loss in these locations are available.

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 10,656 acres of scrub and scrubby flatwoods remain in Brevard County (excluding Federal ownership), of which 1,600 acres (15 percent) is in public ownership for the purposes of conservation. Less than 1,977 acres of an estimated pre-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). Viable coastal scrub and scrubby flatwoods of 10,673 acres remained in the Treasure Coast region of Florida (Indian River, St. 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).

More is currently known about the effects of disease and predation on scrub-jay populations than when the species was listed. 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, b); 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 (*Pituophis melanoleucus*), and corn snake (*E. guttata*). Mammalian predators include bobcats (*Lynx rufus*), raccoons (*Procyon lotor*), sometimes cotton rats (*Sigmodon hispidus*, known to eat eggs), black rat (*Rattus rattus*), and domestic 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. Some scientists believe that populations of domestic

cats are able to eliminate small populations of scrub-jays (Fitzpatrick et al. 1991). 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 (*Corvus ossifragus*), boat-tailed grackle (*Quiscalus major*), common grackle (*Q. quiscula*), American crow (*C. brachyrhynchos*), blue jay (*Cyanocitta cristata*), and swallow-tailed kites (*Elanoides forficatus*). Fitzpatrick et al. (1991) reported that blue jays often occupy overgrown scrub habitats, 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 that 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 that 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 that 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 (Garvin pers. comm., cited in 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"; Garvin and Day personal communication, cited in 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 (Wallace, 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, 1990). The 1979 and 1980 incident coincided with a known outbreak of eastern equine encephalitis among domestic birds in central Florida (Day personal communication, cited in 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 to 1998. It stayed low (only 25 percent) in 1998 to 1999 before again climbing into the mid-60 percent range. In addition, adult survival dropped from 70 to 80 percent survival, in the preceding years to 50 to 60 percent in 1997 to 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 and summer of 1973, 15 species of intestinal parasitic fauna (including eight nematodes, five trematodes, one cestode, and one 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 a fly, *Philornis* (= *Neomusca*) *porteri*, occur irregularly on scrub-jay nestlings. The species pupates in the base of the nest; larvae locate in nares (nasal openings), mouth flanges, bases of remiges (wing feathers), and toes; apparently no serious effect on the scrub-jay host occurs (Woolfenden and Fitzpatrick 1996b). Additionally, one undescribed chewing louse (*Myrsidea* sp., Price, personal communication cited in Woolfenden and Fitzpatrick 1996b), one wing-feather mite (*Pterodectes* sp.), two chiggers (*Eutrombicula lipovskyana*), and a flea (*Echidnophaga gallinacea*; Kinsella, personal communication cited in 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 *Amblyomma maculatum* (Durden and Keirans, personal communication cited in Woolfenden and Fitzpatrick 1996b). These naturally occurring parasites are not believed to have a negative impact on scrub-jay population levels.

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, 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; Fitzpatrick et al. 1994 unpublished data; Percival et al. 1995; Stith et al. 1996; Thaxton and Hingtgen 1996; Woolfenden and Fitzpatrick 1990, 1996a; Toland 1999). Woolfenden and Fitzpatrick (1996a) cautioned, however, that fire applied too often to scrub habitat also could result unpublished data) show that fire-return intervals varying from 5 to 15 years are optimal for long-term maintenance of scrub-jay populations in central Florida. 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 be shorter in coastal habitats (Schmalzer and Hinkle 1992a, 1992b).

Stith et al. (1996) estimated that at least 2,100 breeding pairs of scrub-jays were living in overgrown habitat statewide. 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 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, 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/Kennedy Space Center, and Cape Canaveral Air Force Station, all supporting large contiguous populations of scrub-jays. They predicted that 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 that clusters of scrub-jay territories found next to the roadside represented population sinks (breeder mortality exceeds production of breeding-aged recruits), which could be supported only by immigration. Since this species may be attracted to roadsides because of their open habitat characteristics, road 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; Bowman unpubl. data, cited in 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 winds, these nests tend to be susceptible to destruction (Bowman and Woolfenden unpublished data cited in 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 a category three to five hurricane 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 findings of research underway in southwest Florida indicate that the effects of a category four hurricane on scrub-jays was not devastating and only resulted in the loss of a small number of individuals. However, the long-term effects on habitat quality will not be known for some time.

Fernald (1989) reported that 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*), cypress pine (*Callitris* sp.), and Australian pine (*Casuarina equisetifolia*) was a problem. Other human-induced impacts identified by Fernald (1989) include the introduction of domestic dogs (*Canis familiaris*) and cats, black rats (*Rattus rattus*), 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 contribute to habitat degradation or become scrub-jay predators or competitors. In some areas, native scrub has been replaced by exotic vegetation and scrub-jays are known to use shrubs that are structurally similar to native scrub oaks as nesting sites. Scrub-jays may occasionally feed on small exotic animals.

Analysis of the species/critical habitat likely to be affected

The scrub-jay occurs in scrub habitat throughout peninsular Florida. Historical and current habitat loss, fragmentation, and degradation compromise the ability of scrub-jays to survive throughout their range. Scrub-jays residing in habitat within and adjacent to urban areas are not likely to persist. Urban scrub-jays, however, may provide a source of birds for re-colonization of nearby habitat that has been restored. No critical habitat has been designated for the species; therefore, none will be affected.

ENVIRONMENTAL BASELINE

Status of the species in the action area

The action area encompasses the entire range of the scrub-jay. Therefore, no further analysis of the status of the scrub-jay is required.

Factors affecting the species' environment within the action area

The action area encompasses the entire range of the scrub-jay; therefore, all of the adverse and beneficial factors discussed above that affect scrub-jays throughout their range also affect scrub-jays within the action area. In addition, there have been federally authorized or funded actions that have impacted scrub-jays. Various statutory requirements have resulted in the authorization of incidental take of scrub-jays resulting from development-related destruction of occupied habitat. These previous actions include issuance of 26 ITPs by the Service resulting in the destruction of 357 acres of occupied habitat and the protection and management of 1,236 acres of habitat. Thirty-one section 7 consultations required under the Act have documented the loss of 570 acres of occupied scrub-jay habitat. One thousand five hundred seventy four (1,574) acres have been set aside or otherwise protected to compensate or minimize the effects of previous section 7 consultations. In total, regulatory programs administered by the Service have documented the loss of 927 acres of occupied scrub-jay habitat while resulting in the protection and management of about 2,810 acres of scrub-jay habitat.

Habitat acquisition and management by private and local, State, and Federal governments have resulted in benefits to scrub-jays throughout the action area. Based partially on Florida Natural Areas Inventory (FNAI 2005) data, we estimate that there are about 131 parcels of conservation lands that are publicly or privately owned that contain occupied scrub-jay habitat. Some of these parcels are small and contain sufficient habitat to support only one scrub-jay family, while others are large and provide habitat for hundreds of scrub-jay families. The U.S. Forest Service (Ocala National Forest) contains the largest amount of occupied scrub-jay habitat with the number of scrub-jays families currently estimated to be about 750. The total number of scrub-jay families residing on public lands cannot be estimated because some public land managers do not survey for scrub-jays, while others survey only portions of their properties. Stith (1999) calculated the percentage of occupied scrub-jay habitat protected by public ownership within each metapopulation (see Table 3.3 in Stith 1999) based on statewide scrub-jay surveys conducted in the early 1990s. These data indicate that publicly protected scrub-jay habitat ranged from 0 percent in the Central Lake metapopulation to 92.3 percent in the Merritt Island metapopulation. The fewest number of scrub-jay families protected within public property in any metapopulation was zero, and the highest number protected was 535.

Stith (1999) considered the demographic importance of scrub-jays known to exist on public lands during the early 1990s. In his modeling, he noted the relative importance of public lands in determining the viability of various scrub-jay metapopulations. In some cases, high metapopulation viability was attributed to the fact that a majority of the metapopulation occurred on public lands (Ocala National Forest, Merritt Island, Lake Wales Ridge metapopulations). In other cases, the lack of public lands in some smaller metapopulations likely contributed to high quasi-extinction risks. However, Stith (1999) assumed that all scrub-jay habitat on public lands was actively managed, and we know that this assumption is not accurate. It is clear that not all public lands that contain scrub-jays are actively managed specifically for scrub-jays. However, we have not quantified the amount or distribution of public lands that are actively managed or for which scrub-jay management plans exist.

Overall, we believe that scrub-jays are relatively well-represented on public lands because past and ongoing land acquisitions by the state of Florida targeted scrub vegetative communities as an underrepresented ecological community in the State's land assets. As a result, priority has been given to acquisition of scrub habitat and other under-represented vegetative communities.

We know that the three largest scrub-jay metapopulations (Ocala National Forest, Merritt Island, and Lake Wales Ridge) occur predominately on public land and habitat management is undertaken on portions of these public parcels.

EFFECTS OF THE ACTION

Factors to be considered

Proximity of the action: Issuance of ITPs under the umbrella HCP/EA will result in the incremental destruction of occupied scrub-jay habitat in urban areas.

Distribution: Properties eligible to participate under the umbrella HCP/EA are most likely to be imbedded in a matrix of urban development and associated infrastructure.

Timing: To participate in the umbrella HCP/EA permit applicants must agree to not remove, alter, or clear vegetation on their property during the scrub-jay nesting season that begins March 1 and ends June 30 each year. The destruction of occupied habitat resulting from issuance of ITPs over the 7-year period of the umbrella HCP/EA can not predicted as it will depend on how market forces affect the housing industry.

Nature of the effect: Each ITP issued under the umbrella HCP/EA would result in the authorization to take scrub-jays resulting from the destruction of up to one acre of occupied habitat. 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 reduced 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 risks (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).

Duration: The impacts of habitat loss associated with issuance of the ITPs under the umbrella HCP/EA will result in the permanent, incremental loss of scrub-jay habitat.

Disturbance frequency: The frequency of taking of scrub-jays will vary by area within the range of the species and be dependent on:

1. The number of eligible properties that participate under the umbrella HCP/EA;
2. Local economic conditions that influence the rate and location of future urban development; and
3. The numbers and distribution of scrub-jays within and between metapopulations.

The disturbance frequency cannot be predicted with accuracy because the Service does not control the first two variables.

Disturbance intensity: Participation by every eligible property would result in the destruction of up to 14,928 acres of occupied scrub-jay habitat in urban areas. It is estimated that about 30 percent of all remaining scrub-jays occur in an urban landscape matrix (Stith et al. 1996).

Disturbance severity: Although up to 30 percent of the remaining scrub-jays may be taken, the demographic severity of this impact is expected to be far less. As discussed above, urban scrub-jays provide little demographic benefit for scrub-jays overall. Thus, while the numbers of scrub-jays taken may be large, the demographic impacts and the ability to recover this species will not be substantially reduced with issuance of ITPs under the umbrella HCP/EA.

Analysis for effects of the action

Beneficial Effects

Individuals participating under the umbrella HCP/EA will mitigate the impacts of taking through a monetary contribution to The Nature Conservancy (TNC) or acquire credits through a Service-approved conservation bank. In turn, TNC will use these funds to acquire scrub-jay habitat within vulnerable scrub-jay metapopulations. The mitigation fee prescribed by the Service provides for the acquisition of two acres of habitat for every one acre of habitat lost to urban development. If every eligible property participates in the umbrella HCP/EA, it will result in the purchase and protection of up to 29,856 acres.

Assuming that all 29,856 acres acquired with mitigation funding contain occupied or potential habitat for scrub-jays, we estimate that the mitigation provided with implementation of the HCP/EA will result in the protection (or restoration) and management of enough habitat to support about 1,200 scrub-jay families. Realistically, however, future acquisitions are unlikely to successfully acquire parcels that contain only suitable or potential habitat, but at this time, we cannot predict what portion of the future acquisitions will contain scrub-jay habitat.

The acquisition of habitat removes the risk of habitat loss through land use changes. With the contribution of funding for management built into the mitigation component of the HCP/EA, active land management on these parcels ensures long-term maintenance of habitat so that scrub-jays may persist indefinitely. Enlarging existing conservation lands or acquiring new, stand-alone conservation lands has the potential to increase the number of scrub-jay families within metapopulations. Increasing metapopulation size generally corresponds to a decrease in the risk of quasi-extinction. Thus, the mitigation proposed in the HCP/EA has the potential to decrease extinction risks in some metapopulations.

Direct Effects

The direct effect of issuance of ITPs under the umbrella HCP/EA will be the permanent loss of occupied scrub-jay habitat. While we cannot predict the actual number of property owners with

eligible parcels that will participate, were all eligible parcels enrolled during the 7-year period of the umbrella HCP/EA, about 14,928 acres of occupied habitat would be developed. The loss of occupied habitat is expected to result in reduced scrub-jay survival and recruitment as build out of the urban landscape occurs in future years. Increasing urban development and habitat loss will eventually result in scrub-jays abandoning their territories. Most scrub-jays that abandon their territories will likely die because no suitable unoccupied habitat will be available. Some scrub-jays may disperse from these increasingly unsuitable habitats and find recently restored scrub habitat in nearby conservation lands. We expect few birds to disperse successfully from urban areas to conservation areas because there are not conservation parcels in proximity to all scrub-jays that occur in urban areas.

Interrelated and Interdependent Effects

There are no known interrelated and interdependent effects related to issuance of ITPs under the umbrella HCP/EA.

Indirect Effects

Scrub-jays are killed by collisions with cars. Urban development over the 7-year permit period will likely result in an increase in the number of cars in urban areas. There will be a corresponding increased risk of scrub-jay road mortality. This increase in risk may include harm to individual birds and reduced demographic success (Mumme et al. 2000). Increasing urbanization also leads higher numbers of free-roaming 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).

Species' response to the proposed action

Scrub-jays may persist for some time in urban landscapes. However, these hostile anthropogenic environments adversely affect demographic success and will eventually lead to the extirpation of scrub-jays in these areas (Bowman et al. 1993; Breininger 1999). The possible loss of scrub-jays from much of the urban landscape is not unexpected or necessarily alarming. Past modeling efforts (Stith, 1999) acknowledged the demographic plight of urban scrub-jays. Using published data, Stith (1999) assigned lower survival rates for first year helpers, older helpers, and novice breeders. Lower survival rates were also assigned to dispersing first year helpers and older helpers.

Much of the current literature depicts scrub-jays in urban areas as functionally extinct and suggests the only short-term value of scrub-jays in urban areas will be as sources of colonizers. Birds dispersing from urban areas may establish territories if nearby conservation lands contain suitable unoccupied habitat, there are territory vacancies in otherwise occupied habitat, or single birds with established territories pair with a dispersing scrub-jay.

As discussed above, population viability modeling (Stith, 1999) estimated the quasi-extinction and extinction risks of 21 scrub-jay metapopulations throughout Florida. The modeling

simulations compared these risks if no additional conservation lands were acquired to those risks if varying amounts of occupied scrub-jay habitat was acquired and protected. Not surprisingly, the simulation that considered the acquisition of all remaining scrub-jay habitat resulted in lower quasi-extinction and extinction risks (Table 1). In contrast, the simulation that assumed no additional habitat would be acquired in the future resulted in much higher quasi-extinction and extinction risks (Table 1).

Stith's (1999) model provides a limited tool to examine possible responses of scrub-jay metapopulations to implementation of the proposed HCP/EA even though the model was prepared to assist in identifying areas important for acquisition. However, the model is not useful in assessing impacts resulting from habitat loss because it assumes the amount and quality of habitat does not decrease. Thus, the direct effects of authorizing incidental take (and the loss of urban habitat) cannot be gleaned from the model simulations. However, the model already devalues certain demographic variables for urban scrub-jays resulting in the simulated extirpation of most (if not all) urban scrub-jays. This result cannot be observed in Stith's (1999) findings, however, because the reported responses are based on the overall response of scrub-jay metapopulations and not on specific scrub-jay populations (*e.g.*, urban scrub-jays) within metapopulations.

Even with the limitations discussed above, Stith's (1999) model can be used to grossly evaluate scrub-jay response to implementation of the HCP/EA if the following assumptions are accepted:

1. Those identified by Stith (1999);
2. Scrub-jays will not survive long-term in urban settings; and
3. Mitigation measures proposed in the HCP/EA will result in the acquisition of up to 30 percent of non-urban scrub-jay habitat (Stith refers to "significant" scrub-jay habitat parcels).

In Table 1, we have highlighted quasi-extinction and extinction risks for each metapopulation that we believe most accurately reflect what might be expected with implementation of the HCP/EA. Some of the highlighted sections of the table probably overestimate the likely response of certain metapopulations, while others probably underestimate metapopulation response because acquisition of habitat with the mitigation funding proposed in the HCP/EA may acquire less or more than 30 percent of available habitat. Where simulation results are provided only for the "no acquisition" and "maximum acquisition" alternatives described by Stith (1999), we believe the no acquisition alternative more accurately reflects the future fate of those specific metapopulations, because it is unlikely sufficient funding from other sources will become available to purchase all habitat. For some metapopulations, implementation of the HCP/EA will not affect the quasi-extinction or extinction risks because these metapopulations are already extremely vulnerable (100 percent) to these risks or because much of the metapopulation is already protected and additional habitat loss would not result in measurable increases in risk of quasi-extinction or extinction (those with 0 percent risk).

We do not expect the incidental take of scrub-jays in urban areas to alter most of the projected quasi-extinction or extinction risks as described by Stith (1999). However, the proposed

mitigation associated with implementation of the HCP/EA is likely to benefit several metapopulations. We anticipate the quasi-extinction and extinction risks in the Levy, Citrus, Pasco, Sarasota, north Brevard, and south Brevard metapopulations to decrease because funds provided as mitigation will target habitat in these vulnerable metapopulations. The Manatee, northwest Charlotte, central Charlotte, Lee, Flagler, Palm Beach, and central Lake metapopulations probably will continue to be at high risk of quasi-extinction and extinction either because not enough habitat is available to acquire to reduce these risks or because it is unlikely sufficient sources of other funding would be available to acquire enough unprotected habitat to substantially reduce the risks. Merritt Island, Martin, Ocala National Forest, northeast Lake, and Lake Wales Ridge metapopulations will likely continue to experience low risks of quasi-extinction or extinction because much of the scrub-jay habitat is already under public ownership and the loss of urban scrub-jays would not likely increase quasi-extinction or extinction risks.

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 consideration under section 7 of the Act.

All impacts to scrub-jays within the action area are considered herein; thus no cumulative effects are anticipated.

CONCLUSION

After reviewing the status of the scrub-jay, the environmental baseline for the action area, and the cumulative effects, it is the Service's biological opinion that the issuance of ITPs under the umbrella HCP/EA is not likely to jeopardize the continued existence of the scrub-jay throughout its range. No critical habitat has been identified for the scrub-jay; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation under 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 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 Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the

terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The umbrella HCP/EA and its associated documents clearly 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. 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 umbrella HCP/EA, associated reporting requirements, and provisions for disposition of dead or injured animals are as described in the HCP/EA and its accompanying section 10(a)(1)(B) permit.

AMOUNT OF EXTENT OF TAKE ANTICIPATED

Based on the umbrella HCP/EA and available biological information, the Service anticipates a loss of up to 14,928 acres of occupied habitat over the 7-year period of the umbrella HCP/EA. This incidental take will be in the form of "harass."

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 species, or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURE/TERMS AND CONDITIONS

The umbrella HCP/EA includes measures to minimize nesting season habitat disturbances, provide for off-site mitigation, and deal with unforeseen future circumstances. The Service has reviewed these measures and believes that there are no other measures available to minimize the level of incidental take. Therefore, no reasonable and prudent measures nor terms and conditions are provided.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use 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 a listed species or critical habitat, to help implement recovery plans, or to develop information. The following recommendation is intended to improve the Service's knowledge about the biology of the scrub-jay. Such information will improve the Service's ability to verify and improve its analysis of conservation benefits and adverse effects of issuing ITPs that affect scrub-jays.

Fund scrub-jay research projects to better assess the demographic response of scrub-jays to habitat loss. Use these findings to refine assessments of vulnerable scrub-jay populations, update priority conservation areas, and refine mitigation strategies under section 10 of the Act.

REINITIATION NOTICE

This concludes section 7 consultation on the issuance of ITPs under the umbrella HCP/EA. As provided in 50 CFR 402.15, reinitiation of formal consultation is required where discretionary Service involvement or control over the action has been retained and if:

1. The amount of scrub-jay habitat loss is exceeded;
2. New information reveals effects of the issuance of ITPs under the umbrella HCP/EA that may affect listed species or critical habitat in a manner or to an extent not considered by this consultation;
3. The Service's action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered by this consultation, or
4. A federally listed species or its critical habitat not addressed in the HCP/EA 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.

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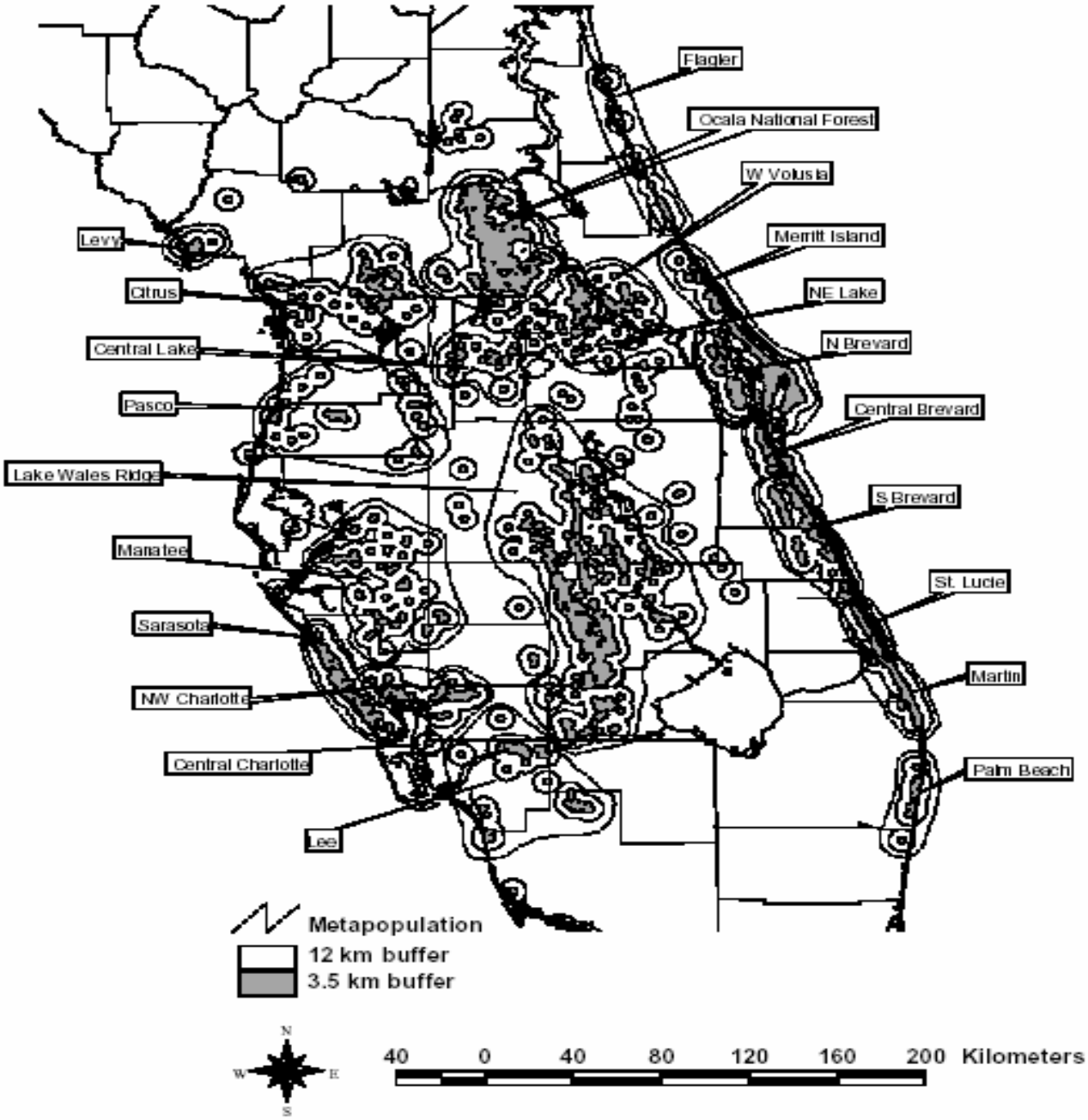

Figure 1. Metapopulations of scrub-jays as defined by Stith (1999).

Table 1. Summary of quasi-extinction and extinction risks for 21 scrub-jay metapopulations reported in Stith (1999). Highlighted cells indicate most likely response of scrub-jay metapopulations to implementation of the umbrella HCP/EA – red cells identify metapopulations likely to be extirpated in the future, yellow cells indicate vulnerable metapopulations, and green cells indicate scrub-jay metapopulations that have little or no long-term risk of extirpation.

Metapopulation	No Habitat Acquisition		30% Habitat Acquisition		70% Habitat Acquisition		Total Acquisition	
	Quasi-extinction	Extinction	Quasi-extinction	Extinction	Quasi-extinction	Extinction	Quasi-extinction	Extinction
Levy	0.82	0.10	0.05	0.00	0.00	0.00	0.00	0.00
Citrus	0.47	0.17	0.43	0.03	0.27	0.05	0.00	0.04
Pasco	0.30	0.03	n/a[1]	n/a	n/a	n/a	0.23	0.00
Manatee	1.00	0.97	n/a	n/a	0.97	0.60	0.90	0.30
Sarasota	0.10	0.03	0.00	0.00	0.02	0.00	0.00	0.00
N.W. Charlotte	1.00	0.67	n/a	n/a	0.57	0.17	0.30	0.07
Central Charlotte	1.00	1.00	n/a	n/a	0.33	0.10	0.07	0.07
Lee	1.00	0.73	1.00	0.67	0.90	0.43	0.90	0.40
Flagler	1.00	0.93	n/a	n/a	n/a	n/a	1.00	0.57
Merritt Island	0.00	0.00	n/a	n/a	n/a	n/a	0.00	0.00
N. Brevard	n/a	n/a	0.40	0.00	0.00	0.00	0.00	0.00
Central Brevard[2]	1.00	1.00	n/a	n/a	0.43	0.10	0.10	0.00
S. Brevard[2]	0.20	0.07	0.03	0.00	0.00	0.00	0.00	0.00
St. Lucie	0.73	0.20	n/a	n/a	n/a	n/a	0.27	0.03
Martin	0.00	0.00	n/a	n/a	n/a	n/a	0.00	0.00
Palm Beach	1.00	0.90	n/a	n/a	n/a	n/a	1.00	0.77
Ocala N.F.	0.00	0.00	n/a	n/a	n/a	n/a	n/a	n/a
NE Lake	0.03	0.00	n/a	n/a	n/a	n/a	0.00	0.00
W. Volusia	0.90	0.33	n/a	n/a	n/a	n/a	0.00	0.00
Central Lake	1.00	0.97	n/a	n/a	n/a	n/a	1.00	0.70
Lake Wales Ridge	0.00	0.00	n/a	n/a	n/a	n/a	0.00	0.00

[1] n/a = not assessed. Acquisition strategy not evaluated by Stith (1999).

[2] The central Brevard and south Brevard metapopulations are currently considered one metapopulation. Quasi-extinction and extinction risks from the less vulnerable south Brevard are considered representative of the combined metapopulations.