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## THE STATUS OF SCRUB AND SCRUB JAYS IN BREVARD COUNTY, FLORIDA

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**Abstract.**—We used detailed maps of scrub habitat to estimate scrub loss in Brevard County and investigate the potential for long-term existence of Florida Scrub Jays (*Aphelocoma coerulescens coerulescens*) outside federal lands in Brevard County. Approximately 77% of Brevard County scrub habitat has been lost to development. The remaining patches are highly fragmented. Eighteen small (1-5 groups), eight medium (6-30 groups), and five large (> 30 groups) populations of Florida Scrub Jays were identified. Few populations were isolated (> 8 km from another population). We concluded that the present landscape of scrub patches and distribution of Florida Scrub Jays should allow the long-term existence of this bird outside federal lands in Brevard County, provided habitat protection measures are implemented rapidly.

Florida scrub habitat is characterized by dense stands of nearly evergreen oaks and occurs on well drained, low nutrient soils of relic dune lines. Pine trees often form an open to closed canopy. The community is pyrogenic and Myers (1991) estimated that 40 to 60% of its species are endemic. Several authors have estimated the loss of scrub to development. Peroni and Abrahamson (1986) estimated a > 70% loss on the southern Lake Wales Ridge. Fernald (1989) reported losses of 42, 50, 39, and 80% for Indian River, Martin, St. Lucie, and Palm Beach Counties, respectively, on the southern half of the Atlantic Coastal Ridge.

The Florida Scrub Jay (*Aphelocoma coerulescens coerulescens*) is endemic to Florida scrub and was listed as "Threatened" by the State of Florida in 1975 and by the U.S. Fish and Wildlife Service in 1987. Woolfenden and Fitzpatrick (1984) have described the biology of Florida Scrub Jays in detail, based on long-term studies at Archbold Biological Station. In 1981, Cox (1987) observed 108 Florida Scrub Jays outside federal lands in Brevard County.

The loss of scrub habitat in Brevard County has not been documented, and no studies investigating Florida Scrub Jay populations outside federal lands in Brevard County have been published since Cox (1987). In this paper we use detailed scrub maps for Brevard County to assess scrub habitat loss and Florida Scrub Jay populations.

#### STUDY SITE AND METHODS

Brevard County is located on the east central coast of Florida (Fig. 1). Several large tracts of federally owned land (John F. Kennedy Space Center, Cape Canaveral Air Force Base, and Canaveral National Seashore, hereafter referred to as federal lands) are found in Brevard. We excluded these areas from our study. Information on scrub and Florida Scrub Jays on these lands is provided by Breininger (1981, 1989) and Breininger et al. (1991).

Four types of scrub were mapped: scrub, scrubby flatwoods, sand pine scrub, and coastal strand. All types possessed a  $\geq 50\%$  cover of scrub oak species (*Quercus geminata*, *Q. chapmanii*, *Q. myrtifolia*) with the exception of coastal strand. Some areas designated as coastal strand were dominated by saw palmetto (*Serenoa repens*) but contained substantial amounts of scrub oak. Coastal strand also differs in some areas from the other scrub types in that a dwarf form of live oak (*Quercus virginiana*) dominates the scrub oak constituent of the community (Johnson et al. 1990). The scrub oaks of coastal strand are pruned due to the desiccating effects of on-shore ocean winds. Areas having this character were classified as coastal strand. Areas with  $< 10\%$  cover of pines were classified as scrub. Areas with a 10-25% cover of sand pine (*Pinus clausa*) or a  $> 10\%$  cover of slash or longleaf pine (*P. palustris*, *P. elliotii*) were classified as scrubby flatwoods. Areas with a  $> 25\%$  cover of sand pine were classified as sand pine scrub.

Scrub habitats were mapped using a three step process. First, areas with  $\geq 50\%$  cover of scrub oaks were identified using infrared aerial photographs and polygons drawn on USGS quadrangle scale (1:200000) mylar overlays. Second, groundtruthing was performed to determine scrub types. Third, we compared the resulting maps with soil characteristics by enlarging Brevard County soil maps from Huckle et al. (1974) to quadrangle scale and overlaying them with the scrub maps. Areas of inconsistency, scrub occurring on poorly drained soils or lack of scrub on well drained soils, were investigated further. While the third step in the process provided a check of our maps, all final classifications were based on the vegetative characters outlined above.

Areas that had been platted for development and showed advanced stages of development (presence of roads and 20% buildout or better) were considered as developed and were not mapped as scrub. The final maps were digitized and areas computed using GPG computer software (IBM 1990).

We determined the presence or absence of Florida Scrub Jays at scrub patches by playing a vocalization tape for 10 to 15 minutes throughout each patch or until birds were detected. If Florida Scrub Jays were detected at any time the patch and proximate patches (within 500 m) were considered occupied, and classified as a population. Each patch was visited on three different days before we classified it as unoccupied.

We also used records collected by Cox (1987) in 1980 and 1981 and the Indian River Audubon Society between 1986 and 1991, to locate Florida Scrub Jay populations. These records were helpful in locating populations in developed areas. Each record was investigated to determine if birds were still present during the summer of 1991. All field work was done in June, July, and August of 1991. Patches were visited between one half hour before to three hours after sunrise. Based on Fitzpatrick et al. (1991), we classified populations located more than 8 km from other populations as isolated and estimated the number of groups per population by dividing the area of the habitat occupied by the population by 10 ha.

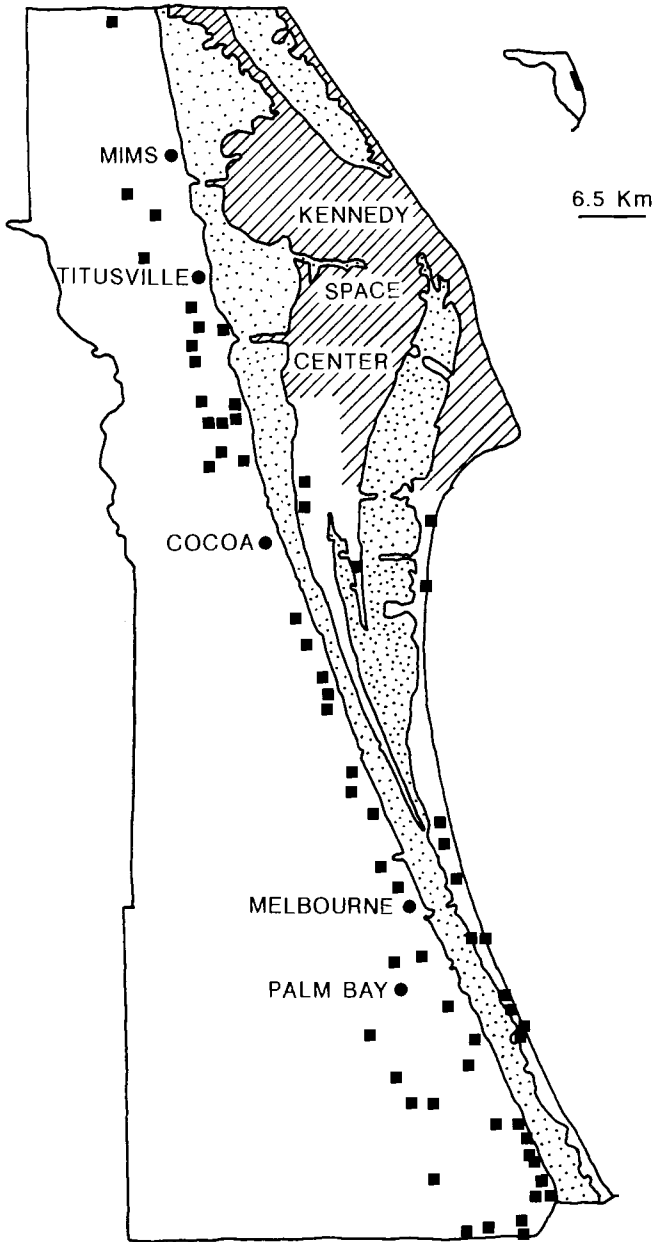


Figure 1. Location map of Brevard County and sites (squares) where Florida Scrub Jays were observed during the summer of 1991. Stippled areas are the Indian River Lagoon. Cross-hatched areas are federal lands not included in this study.

## RESULTS AND DISCUSSION

Scrub and scrubby flatwoods were the most abundant of the four scrub types constituting 34.7% and 37.4% of the remaining scrub in Brevard County. Very little sand pine scrub and coastal strand remains in Brevard County (Table 1). Scrub in Brevard County is highly fragmented with 37% of the remaining habitat occurring in patches < 10 ha in size (Table 2).

The historical distribution of scrub can be reconstructed using soil distributions. Two soil associations (Paola/Pomello/Astatula and Canaveral/Palm Beach/Welaka) exclusively support well drained habitats in Brevard County. Huckle et al. (1974) approximated the area of these soil associations to be 28935 ha. We identified 4605 ha of scrub outside federally owned lands, and Breininger et al. (1991) identified 1600 ha of scrub and scrubby flatwoods on federal lands. In addition, 355 ha of coastal strand exist on federal lands (unpublished data, Biomedical Operations and Research Office and Bionetics Corporation, John F. Kennedy Space Center). This gives a total estimate of scrub in Brevard of 6560 ha. This represents a 77% loss of scrub in the count.

All scrub types found in Brevard are endangered; however, coastal strand and sand pine scrub are especially rare. Most of the remaining coastal strand (60%) is found on federal lands and is partially protected. Only 8 ha of sand pine scrub is found on federal lands (unpublished data, Biomedical Operations and Research Office and Bionetics Corporation, John F. Kennedy Space Center); therefore, sand pine scrub is unprotected relative to other scrub types.

A large majority of the remaining scrub habitat in Brevard County is occupied by Florida Scrub Jays (Table 1). We observed 185 adults and 57 juveniles, comprising 69 groups during our survey (Fig. 1). We grouped the observations into 31 populations. The estimated sizes of 18 populations, of which 5 were isolated, were  $\leq 5$  groups; the estimated sizes of 8 populations, of which one was isolated, were between 6 and 30

**Table 1. Hectares of remaining scrub types occupied and unoccupied by Florida Scrub Jays in Brevard County, exclusive of federally owned land.**

Status	Habitat types				Total
	Scrub	Scrubby flatwoods	Sand pine scrub	Coastal strand	
Occupied	1500.00	1418.05	0	267.73	3185.78
Unoccupied	96.06	306.57	1017.07	0	1419.70
Total	1596.06	1724.62	1017.07	267.73	4605.48

groups; and the estimated sizes of 5 populations were > 30 groups. One population of Florida Scrub Jays (locality 30, Cox 1987:27) has been extirpated since 1981.

Three aspects of our methodology may have lead to error in our estimation of Florida Scrub Jay population sizes: 1) the lack of density estimates for our study area, 2) use of 50% cover of scrub oak species to define scrub habitat, and 3) the exclusion of partially developed scrub. The latter two aspects would lead to an under-estimation of population size. The effects of the first aspect are unknown. Hence, our estimates represent a potential rather than an existing population size. However, we believe that we identified all remaining populations.

The distribution of all scrub types in Brevard County has declined considerably from historic levels. Particularly rare are coastal strand and sand pine scrub. The latter is also relatively unprotected. Few populations of Florida Scrub Jays are isolated and five large populations (> 30 groups) still exist outside federal lands in Brevard County. Populations of > 30 groups, and smaller populations, if located within dispersal distance of other populations (not isolated), have a high probability of persistence (Fitzpatrick et al. 1991). Therefore, while scrub is highly fragmented in Brevard County, the present habitat landscape and distribution of Florida Scrub Jay populations should allow the long term survival of this bird outside federal lands in Brevard County, provided habitat is protected and managed.

**Table 2. Number of scrub patches in 10-ha size ranges remaining in Brevard County. Percentages of the total amount of each scrub type and total scrub represented by size ranges are given in parentheses.**

Size range (ha)	Scrub	Scrubby flatwoods	Sand pine scrub	Coastal strand	Total
0 - 10	190 (32)	229 (33)	150 (44)	86 (59)	655 (37)
10 - 20	24 (21)	23 (16)	22 (25)	2 (14)	71 (20)
20 - 30	9 (14)	9 (12)	0	2 (27)	20 (9)
30 - 40	8 (17)	4 (7)	4 (13)	0	16 (13)
40 - 50	0	12 (28)	3 (12)	0	15 (14)
50 - 60	3 (10)	0	0	0	1 (3)
60 - 70	0	0	1 (5)	0	1 (<1)
70 - 80	0	1 (4)	0	0	0 (2)
80 - 90	0	0	0	0	0
> 90	1 (6)	0	0	0	1 (2)
Total	233	278	180	90	781

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