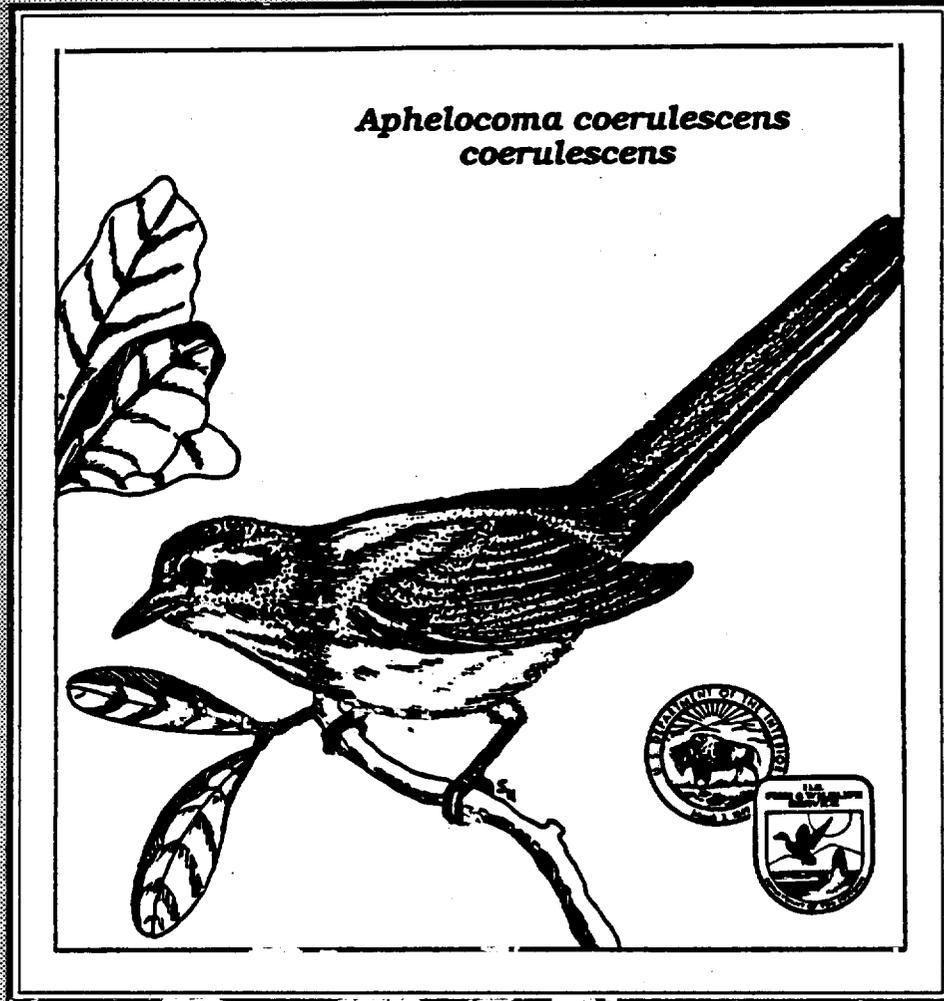


# Florida Scrub Jay Recovery Plan



**U.S. Fish and Wildlife Service**  
Southeast Region, Atlanta, GA

RECOVERY PLAN  
FOR THE FLORIDA SCRUB JAY

Prepared by  
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Jacksonville, Florida

for

Southeast Region  
U.S. Fish and Wildlife Service  
Atlanta, Georgia

Approved:

  
Regional Director, U.S. Fish and Wildlife Service

Date: May 9, 1990

Recovery plans delineate reasonable actions which are believed to be required to recover and/or protect the species. Plans are prepared by the U.S. Fish and Wildlife Service, sometimes with the assistance of recovery teams, contractors, State agencies, and others. Objectives will only be attained and funds expended contingent upon appropriations, priorities, and other budgetary constraints. Recovery plans do not necessarily represent the views nor the official positions or approvals of any individuals or agencies, other than the U.S. Fish and Wildlife Service, involved in the plan formulation. They represent the official position of the U.S. Fish and Wildlife Service only after they have been signed by the Regional Director or Director as approved. Approved recovery plans are subject to modification as dictated by new findings, changes in species status, and the completion of recovery tasks.

Literature citations should read as follows:

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5430 Grosvenor Lane  
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(301)492-6403 or  
1-800-582-3421

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## EXECUTIVE SUMMARY

**CURRENT STATUS:** The Florida scrub jay occurs in small, isolated patches of scrub in peninsular Florida. The estimated population is between 7,010 and 10,978 individuals. This species is federally listed as threatened due to loss of habitat. Most land favored by scrub jays is in areas of high real estate values.

**GOALS:** The Florida scrub jay is classified as a threatened species. The three most viable populations occur on Federal land. Protection under the Endangered Species Act (through Section 7 consultation) is the best way to maintain these populations. The remaining populations on private land are under constant threat from development. Removing the scrub jay from the endangered species list would eliminate the protection these species are afforded on Federal land. Therefore, delisting the scrub jay is not a prudent goal for recovery of the species. Recovery actions must continue to ensure that this species remains at no less than its present status and does not decline further.

**RECOVERY CRITERIA:** The following criteria must be met in order to at least maintain the species at its present status and prevent reclassification from threatened to endangered.

1. The population must be stable or increasing from the current population level at the three existing, large population sites (Ocala National Forest, Merritt Island/Cape Canaveral, and Archbold Biological Station). Each site must have an approved management plan.
2. There must be documented evidence of scrub jays recolonizing restored or uninhabited areas throughout their historic range.
3. Establishment of several scrub preserves with sufficient acreage to sustain viable scrub jay populations.
4. Use of scrub jay habitat management guidelines by developers when proposing development in scrub habitat.

**ACTIONS NEEDED:** Five major actions are necessary to maintain or improve the status of this species.

1. Protect, manage and enhance populations on public and private lands.
2. Work with Federal, State, and private organizations to establish protected scrub preserves through acquisition, landowner agreements, or easements.
3. Implement habitat management guidelines with specific recommendations for developers and landowners.
4. Determine basic biological needs through research.
5. Reestablish populations of scrub jays where they have been extirpated, and reclaim potentially suitable habitat.

**DATE OF RECOVERY:** There is no anticipated date of recovery because it may never be feasible to delist this species. Protection under the Endangered Species Act is one of the major tools for protecting this bird. Recovery actions outlined in this plan must be completed to prevent reclassification from threatened to endangered.

**TOTAL COST OF RECOVERY:** Once sufficient habitat is protected and basic research complete, the cost of maintaining this species will be minimal. Estimated initial costs for the fiscal years outlined in the recovery plan are \$57,000. These costs do not reflect acquisition of land.

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## PART 1: INTRODUCTION

### Taxonomy

The Florida scrub jay (*Aphelocoma coerulescens coerulescens*) is in the order Passeriformes and the family Corvidae. It was originally described by Bosc in 1795 (Bull. Sci. Soc. Philom., Paris, 1(1791-1799), p. 87) as *Corvus coerulescens*. The type locality is "America Septentrional(e)" (=Florida). Cabanis transferred the species to his new genus *Aphelocoma* in 1851, and Baird, in 1858, made *coerulescens* the type species for the genus. *Aphelocoma c. coerulescens* is known by no other scientific name, and accepted by the American Ornithologists' Union as a valid taxon. Most commonly referred to by the vernacular name "Florida scrub jay," the bird was also known as simply "Florida jay" (Howell 1932, Sprunt 1946, Sprunt 1954). Many other subspecies of *Aphelocoma coerulescens* occur widely in Mexico and the western United States. The Florida subspecies is geographically isolated from the nearest other subspecies by nearly 1,000 miles.

### Description

The scrub jay is a 12-inch (30-centimeter) crestless jay, totally lacking the white-tipped wing and tail feathers of the common and widespread blue jay (*Cyanocitta cristata*). The nape, rump, and wings are dark sky-blue; the tail indigo blue; the back and the underparts smoke gray. A necklace of blue feathers separates the white throat from the gray underparts, and a white line over the eye often blends into a whitish forehead. The tail is long and loose in appearance (Sprunt 1954, Woolfenden 1978). Immature Florida scrub jays are much like adults in appearance, but the colors are duller with less blue on the breast, and the top of the head is lighter. The sexes are alike in all plumages (Sprunt 1946).

The Florida scrub jay is less vocal than the common blue jay. The notes are essentially jaylike but repeated at greater intervals and not so constant. Sprunt (1946), described the song as a mixture of low, sweet-toned calls, high in pitch, mingled with others that are variously slurred or trilled.

### Distribution

Scrub jays are found almost exclusively in peninsular Florida. They have been reported only once outside the State, on Jekyll Island, Georgia (Moore 1975). They formerly were known from Duval, Clay, Gilchrist, and Taylor Counties in the north, to Monroe and Collier Counties in the south (Cox 1984). They were locally distributed on the Florida east coast from the mouth of the St. Johns River south to Rockdale in Dade County. On the west coast they occurred from Piney Point, Taylor County, and Wannee, Gilchrist County, south to Naples in Collier County. In the interior,

they were known from Micanopy, Alachua County, south to Immokalee, Collier Counties (Sprunt 1954).

Scrub jays have been reported in: Alachua, Brevard, Broward, Charlotte, Citrus, Clay, Collier, Dade, De Soto, Dixie, Duval, Flagler, Gilchrist, Glades, Hardee, Hendry, Hernando, Highlands, Hillsboro, Indian River, Lake, Lee, Levy, Manatee, Marion, Martin, Okeechobee, Orange, Osceola, Palm Beach, Pasco, Pinellas, Polk, Putnam, St. Johns, St. Lucie, Sarasota, Seminole, Sumter, Taylor, and Volusia Counties (Cox 1984).

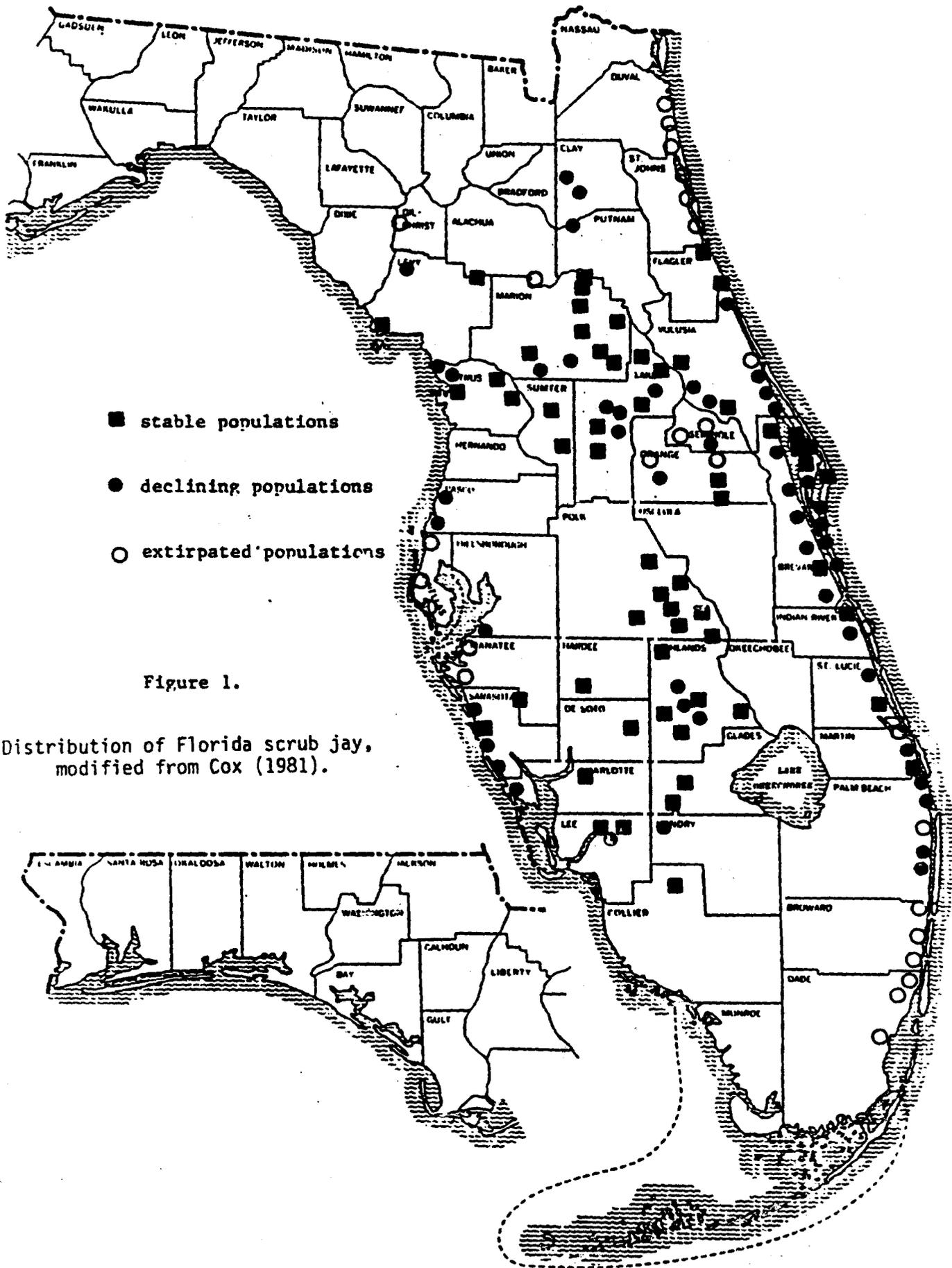
Today, scrub jays are restricted to scattered and often small, isolated patches of scrub in peninsular Florida (Woolfenden 1978) (Figure 1). They are extirpated in Broward, Dade, Duval, Pinellas, and St. Johns Counties, and their numbers are greatly reduced in Brevard, Highlands, Orange, Palm Beach, and Seminole Counties (Cox 1984).

Scrub jays occur on public lands administered by the following agencies: U.S. Air Force (Avon Park Air Force Range, Cape Canaveral Air Force Station), NASA (Kennedy Space Center), U.S. Fish and Wildlife Service (Merritt Island National Wildlife Refuge), U.S. Forest Service (Ocala National Forest), and Florida Department of Natural Resources (Jonathan Dickinson State Park). The largest populations (80 percent of total numbers) currently occur in two general areas: Merritt Island National Wildlife Refuge/Cape Canaveral and Ocala National Forest.

Habitat (from Cox [1984], unless otherwise noted)

Scrub jays are non-migratory, extremely sedentary, and have very specific habitat requirements (Woolfenden 1978). They reside only in oak scrub consisting of sand live oak (Quercus geminata), myrtle oak (Quercus myrtifolia), inopine oak (Quercus inopina), and Chapman oak (Quercus chapmanii), along with saw palmetto (Serenoa repens), scrub palmetto (Sabal etonia), scattered sand pine (Pinus clausa) and rosemary (Ceratiola ericoides) (Woolfenden 1978). Such scrub habitat occurs only on fine, white, drained sand. This scrub occurs along the coastlines in Florida, and in dunes deposited during the Pleistocene when sea levels were much higher than at present (Laessle 1958, 1968). The most important dune systems are near the 30-foot, 100-foot, and 150-foot contour levels, and include the Atlantic coastal ridge, the Lake Wales Ridge in Polk and Highlands counties, and the extensive sand dunes of the Ocala National Forest.

Scrub comes in a variety of forms. The type most commonly occupied by scrub jays is oak scrub. It consists of a single layer of evergreen shrubs, usually dominated by three species of oak -- myrtle oak, sand live oak, and Chapman oak. Other species common to oak scrub include crookedwood (Lyonia ferruginea), silkbay (Persea humilis), rosemary, scrub palmetto, saw palmetto, and Garberia fruticosa (no common name). Large trees and herbaceous vegetation are lacking in oak scrub, which some authorities refer to as "scrubby flatwoods." Sand pine scrub and slash pine scrub have shrub layers like that of oak scrub, plus a canopy of



- stable populations
- declining populations
- extirpated populations

Figure 1.

Distribution of Florida scrub jay, modified from Cox (1981).

either sand pine or slash pine (Pinus elliottii). Open sand pine or slash pine scrub has less than 50 percent canopy cover by trees over 3 meters tall. Scrub jays are rarely found in habitats with more than 50 percent canopy cover over 3 meters tall. Turkey oak scrub, palmetto scrub, and rosemary scrub are, respectively, oak scrubs with large numbers of turkey oaks (Quercus laevis), palmettos, and rosemary. Oak scrub occurs primarily on well-drained ridges, oak/palmetto scrub on moderately drained soils, and palmetto scrub on poorly drained soils (Breininger, pers. comm. 1988).

In general, scrub jay habitat consists of dense thickets of scrub oaks less than 3 meters in height, interspersed with bare sand used for foraging and storing acorns. Austin (1976) provided a general overview of the scrub vegetation and its associated animals. Jays commonly avoid forests, prairies and marshes (Sprunt 1954).

Scrub jay use of microhabitats show obligatory reliance on oaks, especially those growing in short, open scrub maintained by periodic fire. When the scrub becomes taller, and dominated by pines, blue jays replace scrub jays (Woolfenden and Fitzpatrick 1984). Historical patterns of climate and vegetation in eastern North America relegated Florida scrub jays to tiny, fragmented, and sharply bounded patches of homogeneous habitat. Few other North American birds, including the western scrub jay, are as habitat restricted as Florida scrub jays. In the Ocala National Forest, scrub jays inhabit regenerating sand pine plantations aged 2 to 15 years. Optimal habitat is in sand pine plantations 3 to 10 years. Sand and clay road edges provide the necessary open space, along with small bare areas in the interior of the plantations.

Breininger (1981) listed several characteristics of scrub jay habitat on Merritt Island. He found highest scrub jay densities in areas that had been unburned for many years where:

1. The percent of open space comprised of sandy areas, sandy herbaceous areas, and mowed grass was the major habitat parameter in the open oak scrub (the range of which was 20 to 55 percent). Scattered patches are favorable because they provide more edge than a single open area adjacent to scrub. Patch size was conservatively estimated at 15 to 50 meters in diameter.
2. Most utilized habitats had at least 60 percent of the vegetation covered by oaks.
3. The optimal mean height of the shrub layer seemed to be between 1.5 and 3.5 meters.
4. Palmettos covered less than 40 percent of an area.

Breining (1981), (pers. comm. 1988) found that lower densities of scrub jays (again in areas that had not been burned for many years) occurred where:

1. Open space amounted to less than 10 percent.
2. Less than 30 percent was in oak vegetation.
3. Height of shrub layer was under 1 meter or over 4 meters.
4. Greater than 40 percent was in palmettos.

Helpers (from Woolfenden and Fitzpatrick 1984, unless otherwise noted)

Florida scrub jays are monogamous and remain mated throughout the year (Sprunt 1946, Woolfenden 1978). They are cooperative breeders. Non-breeding adults, called "helpers", often help raise offspring which are not their own. A helper, as defined by Skutch (1961), is "a bird which assists in nesting of an individual other than its mate, or feeds or otherwise attends a bird of whatever age which is neither its mate nor its dependent offspring." Helpers assist the breeding pair in all territorial and breeding activities except nest construction, egg-laying, and incubation. Helpers assist only about one-half of the breeding pairs in a given area each season. Pairs may have up to six helpers, but most have one or two. Average group size is three, with only 10 percent having three or more helpers. Most helpers are yearling offspring of the resident breeding pair. Helping beyond the age of 2 years is infrequent, especially among females, but a few males at Archbold Biological Station are known to have helped up to 6 years before breeding themselves. Helpers continue in that status when their parents are replaced by unrelated breeders. When families break up from the loss of both breeders, helpers usually join unrelated families. A dominance hierarchy exists in all families. Males dominate females, breeders dominate helpers, older helpers dominate younger ones, and helpers of like sex and age show linear dominance-subordination relationships. This ranking among helpers appears to dictate the sequence by which helpers become breeders.

At the Archbold Biological Station, pairs with helpers fledged 1.5 times more young than pairs without helpers. Helpers, thereby, provide reproductive insurance in that they increase a pair's probability of fledging success during a given season and their probability of having at least one helper the following season. The presence of helpers, however, increases fledging success only early in the highly synchronized, short, early spring breeding season.

Reproduction (from Woolfenden and Fitzpatrick 1984, unless otherwise noted)

At the Archbold Biological Station, the breeding season for scrub jays spans about 90 days. Eggs are laid from early March to late June, with the majority laid in late March. One clutch was laid in late February.

Incubation lasts 15 to 17 days (Sprunt 1946). No nests remained active beyond late June. Scrub jays normally are single brooded, but can lay three, or rarely, four clutches a season. Clutch size varies from two to five eggs, averaging 3.4. Breeding rarely occurs before 2 years of age, and often not until 3 or 4 years (Woolfenden 1978). Females older than 5 years produce over one-half the offspring. Reproductive value peaks at 4 years, but remains high through age 14.

The ground color of eggs varies from pea green to pale glaucous green, blotched and spotted with irregular shaped markings of cinnamon rufous and vinaceous cinnamon, these being generally heaviest about the larger end of the egg. They are usually ovate in shape, though an occasional set may be called elongate ovate. The shell is smooth, compact, and shows little gloss (Bendire 1895).

#### Nesting (from Sprunt 1946, unless otherwise noted)

Florida scrub jays nest gregariously, gathering in small, scattered colonies. Sometimes half a dozen pairs will occupy a tract of scrub of limited extent, but a nest may occasionally be found at some distance from others.

Sprunt cites S. A. Grimes as stating that the wild olive (*Osmanthus*) seems to be a favorite site for nesting as it provides good cover. It is thick-branched and densely foliated when the scrub vegetation is in the "scrub jay state" (Sprunt 1954).

Nest material usually consists of oak twigs of varying shapes and thickness, formed into a substantial, thick-walled cup lined with fine rootlets. Smith and Breininger (pers. comm. Breininger 1988) found that at the Kennedy Space Center scrub jays line their nests with fibers pulled from cabbage palms. The nest is similar to that of a blue jay's in appearance and structure, but is not built as high off the ground, usually only 4 to 12 feet. Myrtle, sand pine, and various oaks (rather than wild olive) were the most commonly used trees. Breininger (pers. comm. 1988) reported that most scrub jays on Merritt Island nest in oak trees.

Both parents gather nest material, construct the nest, incubate, brood, feed, and attend the young. The female does the major part of the incubating, but the male obtains food for her while she is sitting.

#### Territoriality (from Woolfenden and Fitzpatrick 1984)

Florida scrub jays have well-defined territories defended year-round by all group members. Territorial defense is most active immediately before nesting in the spring and after molt is completed in autumn. Territories typically occupy the same areas for many years, and ownership is passed on by mate replacement or inheritance by helpers. Mean territory size is about 9 hectares (25 acres) at Archbold. However, Breininger (pers. comm. 1988) found that none of the 20 territories mapped at the Kennedy Space

Center was as large. Territory size increases significantly with family size, but some territories are consistently larger than others regardless of family size, probably owing to habitat differences. The presence of older male helpers appears to result in larger territory sizes in comparison to territories containing other classes of helpers. Territories can be incorporated into neighboring ones, usually after the death of one or both breeding jays. Such territory disappearances occur predominantly in small families occupying small territories.

#### Food Habits (From Woolfenden and Fitzpatrick 1984, and Sprunt 1946)

Florida scrub jays are omnivorous, consuming about 60 percent animal matter. Insects, principally orthopterans and lepidopteran larvae, form the bulk of the diet over most of the year. Other insects consumed include: grasshoppers, locusts, crickets, termites, burrower-bugs, squash bugs, leafhoppers, earwigs, beetles, weevils, butterflies, moths, cutworms, bees, wasps, ants, angewings, and flies. Millipedes, centipedes, spiders, scorpions, ticks, mites, and snails are also eaten. Jays most frequently seek food by hopping along bare sand under scrub oaks, or by jumping from shrub to shrub within the oak foliage, or palmetto fronds, examining leaves and darting after startled animals that attempt to escape.

When encountered, a variety of small vertebrates are also taken. Vertebrate prey at the Archbold Biological Station include frogs, toads, lizards, small snakes, small rodents, downy chicks of bobwhite, and eggs and fledglings of small birds. Carrion is also occasionally eaten.

Acorns form the principal plant food. In late summer and fall jays spend a considerable part of their day gathering ripening acorns. Many are eaten immediately, but the majority are cached in the sand, husks intact. These are recovered, husked, and eaten throughout the rest of the year. Woolfenden and Fitzpatrick suspect that acorns form a necessary and year-round vegetable staple for Florida scrub jays.

Other small nuts, fruits, and seeds are taken occasionally, most notably: hickory nuts, palmetto seeds, tread softly, briars, Smilax, blueberries, gallberries, and rosemary seeds. Weed and grass seeds are rarely, if ever, eaten. Corn, peanuts, sunflower seeds, and many other human-offered foods are readily taken when jays are introduced to them.

#### Mortality (from Woolfenden and Fitzpatrick 1984)

Mortality of young fledglings is high. Survivorship increases continuously over the first 12 months of life, after which it approximates that of adults. Fledgling survival to age 1 year is 34 percent, with mean life expectancy for a fledgling at about 2 years. Breeder survival is 82 percent annually. Senescence occurs after 15 years.

Little information is available on nest predators of Florida scrub jays. They cannot repel nocturnal predators, nor probably certain diurnal predators, such as snakes. Mobbing may deter other diurnal predators.

Certain predators, such as corvids, are readily driven from the nest. The mobbing of large snakes includes diving on the individual and sometimes pecking fiercely. Small-bodied snakes up to 300 millimeters in length are eaten. Evidence suggests that virtually all breeder deaths occur through predation.

#### Status of the Species (from Cox 1984, 1987)

The extent of the Florida scrub jay's decline is not known precisely, but it has been substantial. Scrub jays have disappeared from 40 percent of the historic locations reported in the literature and their numbers have severely declined in remaining areas. In general, it appears that scrub jays have decreased in numbers by at least one-half in the last 100 years. The number of Florida scrub jays was estimated in 1984 to be between 15,330 and 22,530, with 13,100 to 20,300 on public lands and about 2,230 on private property. However, a study done by Breininger in 1985-86 on Merritt Island National Wildlife Refuge estimated that population to range between 1,415 and 3,603 birds (Breininger 1989). The Merritt Island population was first estimated in 1980 to be 2,616 to 4,777 (Salata in Breininger 1989). Based on this current estimate, Breininger suggests that the entire scrub jay population may be much smaller than is currently believed. He estimates a current state population of 7,010 to 10,978 birds.

Most present scrub jay populations occur on public lands. These birds are able to survive wherever their habitat has not been completely destroyed. For these reasons, Florida scrub jays are considered threatened rather than endangered. Scrub jays have persisted in some areas with no more than a few scrub oaks by the side of a road, surrounded by pastures, citrus groves, or pine plantations.

#### Reasons for Decline (from U.S. Fish and Wildlife Service 1987, unless otherwise noted)

The major cause of the decline and disappearance of scrub jays in Florida is habitat loss. Unfortunately, most of the scrub lands favored by scrub jays are in areas of high real estate value. Much coastal scrub has been cleared for beachfront hotels, houses, and condominiums. Scrub habitats in the interior of the State are subject to development for citrus groves and housing.

The pace of development in Florida has accelerated significantly since the 1960's. The human population nearly doubled between 1960 and 1980, from 4.95 million to 9.75 million (Terhune 1982). This trend will continue into the future, placing even more pressure on natural habitats. Most housing developments located in scrub habitats are less than 20 years old. In many developments, scrub jays are barely hanging on, and they will probably disappear in a few years as land clearing continues. The sites most likely to be destroyed by development in the near future are concentrated in Brevard, Highlands, and Palm Beach Counties. In Palm Beach County, most of the original existing xeric scrub habitat has already

been developed (Florida Department of Community Affairs, pers. comm. 1986), and it is possible that no scrub jays will remain by 1990 (Cox 1984).

Human interference with the natural functioning and development of an ecosystem has played an important part in the decline of scrub jays in certain areas. Historically, fires caused by lightning were major factors in maintaining the sparse, low scrub vegetation preferred by scrub jays. In some areas prevention and/or control of natural fires have allowed the scrub to become too dense and tall to support jay populations. One example is the miles of coastal barrier scrub in St. Johns County, north of St. Augustine, where fire suppression to protect human interests allowed the scrub to become too dense for scrub jays. Thus, a large area of coastal St. Johns County, which once supported a healthy jay population, no longer contains suitable habitat.

Although habitat loss plays a major role in the decline of the Florida scrub jay, there is evidence that, in St. Johns County at least, some scrub jays have been shot by vandals. People have been seen with guns in the area along SR A1A, and scrub jays would present easy targets (Cox 1984). In addition, the tameness and beauty of the bird make it desirable (although illegal) as a pet, and it is known to have been used for such purposes in the recent past.

Cox (1984) believed that in St. Johns County one factor in the extirpation of the scrub jay may have been roadkills by passing vehicles. Scrub jays frequently forage along roadsides and other openings in the scrub. Since State Route A1A runs directly down the center of the scrub on long, narrow, barrier island, there is high potential for passing vehicles to kill birds.

#### Conservation Measures Already Taken

The Florida scrub jay is protected as a threatened species under the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). This Act mandates that all Federal agencies insure that no activities authorized, funded, or carried out by them, jeopardize the continued survival of listed endangered or threatened species. Sizeable populations of scrub jays occur on lands administered by Federal agencies (Ocala National Forest, Merritt Island National Wildlife Refuge, NASA, and others).

The Endangered Species Act also makes it illegal for any person subject to the jurisdiction of the United States to take, import or export, ship in interstate commerce in the course of a commercial activity, or sell or offer for sale in interstate commerce any listed species (except for specific purposes under permit).

The Florida scrub jay is also protected under the Federal Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) and by Florida State law (Chapter 39-27, Florida Administrative Code). The State's listing of this species is particularly useful in providing conservation measures on State-managed lands such as Jonathan Dickinson State Park in Martin County. Scrub jays are also protected at the privately-owned Archbold Biological Station in Highlands County.

## Part II. Recovery

### A. Recovery Objectives

The primary recovery objectives and recovery efforts for this bird must be to halt the long-term and continuing decline in its numbers and distribution, and to protect and enhance as much of its remaining habitat as possible. The specific recovery objectives, therefore, are:

1. Protect, manage and enhance populations on public and private lands.
2. Work with Federal, State, and private organizations to establish protected scrub preserves through acquisition, landowner agreements or easements.
3. Implement habitat management guidelines with specific recommendations for developers and landowners.
4. Determine basic biological needs, through research.
5. Reestablish populations of scrub jays where they have been extirpated, and reclaim potentially suitable habitat.

Eighty percent of the remaining populations of scrub jays occur on Federal lands (Ocala National Forest and Merritt Island National Wildlife Refuge/Cape Canaveral). The Endangered Species Act is a powerful tool in providing these birds with protection. Because of the extreme usefulness of the Act in this case, it is not desirable to remove the scrub jay from protection under the Endangered Species Act. The Florida scrub jay may always require a threatened classification for its conservation.

### B. Outline Narrative

1. Protect, manage, and enhance Florida scrub jay populations and scrub jay habitat on public lands. Scrub jays are known to occur on the following Federal lands: Cape Canaveral Air Force Station (Brevard County), Patrick Air Force Base (Brevard County), Avon Park Air Force Range (Highlands and Polk Counties), Ocala National Forest (Marion, Lake, Putnam Counties), Merritt Island National Wildlife Refuge (Brevard County), Hobe Sound National Wildlife Refuge (Martin County), and Kennedy Space Center (Brevard County). Scrub jays also occur on the State-administered Jonathan Dickinson State Park in Martin County. Over 80 percent of all scrub jays occur on these public lands, primarily on Ocala National Forest and Merritt Island National Wildlife Refuge/Cape Canaveral. The survival of the Florida scrub jay depends to a large extent on maintaining and improving the habitat on these public lands.

11. Develop management plans for scrub jays on public lands. With assistance from the Service, each public property manager should develop and implement a long-term management plan designed to protect and enhance scrub jay populations on their property. The plans should include, but not be limited to, the following actions.
  111. Maintain mowed grass areas along roads and installations. Open sandy areas are essential in scrub jay habitat, possibly because they allow the jays to better survey for predators. Breininger (1981) reported that mowed grass areas can substitute for open sandy areas, and that jays on the Merritt Island National Wildlife Refuge forage there throughout the day. Therefore, mowing the grass along roads on public lands adds to the open space needed by the jays.
  112. Conduct periodic burns of oak scrub to keep it from undergoing succession into hammock or reaching a height unsuitable for scrub jays (about 4 meters). Burns should not be conducted in the same area too frequently because scrub jays usually do not nest in burned areas for at least 2 years after the burn (Breininger 1981). Woolfenden (in pers. comm. to Breininger) stated that burning any one patch of oak scrub at intervals more frequently than every 8 years should be avoided. As a result of these findings, it may be necessary to reevaluate fire management plans on Federal lands. In some cases, this action may lead to excessive fuel build-up. Land managers should evaluate each area carefully.
  113. Create habitat by mechanically opening areas in oak scrub. To create new habitat on public lands, selected areas should be bulldozed or otherwise cleared after which they can be maintained in a suitable condition by periodic burning.
  114. Conduct periodic timber harvest and regeneration of sand pine on public lands having a commercial sand pine timber resource. Ocala National Forest maintains scrub jay habitat by harvest and regeneration of sand pine. On those lands where burning is not an option, timber harvest is an economically profitable alternative.
12. Conduct Section 7 consultations on Federal activities that may affect scrub jays. Eighty percent of the total population of Florida scrub jays occurs in two areas administered by Federal agencies (Ocala National Forest and Merritt Island National Wildlife Refuge/Cape Canaveral). All Federal agencies must consult with the Fish and Wildlife Service on any of their activities (authorized, funded, or carried out) that might adversely affect resident scrub jay populations. Such activities include (among others) pesticide use, road

construction, military training exercises, and clearing of land for new buildings and runways.

2. Protect, manage, and enhance Florida scrub jay populations and habitat on privately-owned lands. Scattered and disjunct scrub jay populations occur widely on privately-owned lands throughout central Florida. The largest of these is on the Archbold Biological Station in Highlands County, where the bird has been extensively studied and is well protected.
21. Develop guidelines on habitat requirements for a single mated pair. Through research, outlined in 41, guidelines should be developed which advise on the amount of habitat needed to support a mated pair of jays. The Florida Game and Fresh Water Fish Commission and the Treasure Coast Regional Planning Council have been recommending that each scrub jay population be studied independently to determine appropriate preserve boundaries and management schedules on a case by case basis rather than by relying on an average territory size. They believe that as little as 5 or 10 acres of suitable habitat may support a mated pair, but this isolated population would be extremely susceptible to extirpation. They tentatively are recommending preservation of several habitat blocks, resulting in a minimum preserve area of about 15 to 30 acres for a single territory.
22. Conduct surveys to determine where suitable habitat still exists throughout former range of the subspecies. Conduct aerial or road surveys to determine where suitable habitat still exists. LANDSAT data could also be used to locate such areas.
23. Survey habitats found in 22. to determine if scrub jays are still present. Conduct surveys to determine the presence of scrub jays. Cox (1984) suggests that the following areas be examined carefully: Private lands adjacent to Gold Head Branch State Park, Clay County; scrub portions of Lykes Brothers Range (formerly Fish-eating Creek Wildlife Management Area), Glades County; scrub along U.S. 27, south of Lake Placid, Highlands County; private lands adjacent to Cedar Key Scrub State Preserve, Levy County; undeveloped portions of the Big Scrub, adjacent to Marion County; scrub along Lake Arbuckle Road, southeast of Frostproof, Polk County; and private lands adjacent to Oscar Scherer State Park, Sarasota County.
24. Preserve, manage, and enhance as many small, isolated populations and/or habitats as possible. All areas found to contain scrub jay populations, or suitable habitats, should be considered in the preparation of Development of Regional Impacts (DRI's) under Chapter 380, Florida Statutes. They should also be considered by all local governments in preparing

Local Comprehensive Plans as called for by Chapter 163 of the Florida Statutes.

25. Prepare management guidelines to be used when populations and habitat are impacted by proposed development. The Fish and Wildlife Service, in conjunction with the Florida Game and Fresh Water Fish Commission, will develop management guidelines to be used to encourage developers to protect habitat for scrub jays. These guidelines will follow the format established for the bald eagle.
26. Protect and enhance known populations on privately-owned lands. The U.S. Soil Conservation Service, the U.S. Agricultural Stabilization and Conservation Service, the Florida Department of Natural Resources, and the Florida Game and Fresh Water Fish Commission should maintain existing scrub jay populations and habitat on private lands by: (1) providing informational and educational brochures on scrub jays, and (2) providing funding programs for farmers, ranchers, and other private landowners.
  261. Arrange for protection of private lands wherever possible. The State and Federal Governments, local agencies, and conservation organizations should protect private lands through conservation agreements with landowners, lease agreements, acquisition, or other available measures on areas of suitable habitat.
    2611. Purchase private lands. In some cases, conservation/lease agreements or other management tools may not be enough to protect habitat threatened by development. When these options are not available, Federal, State, and local governments should attempt to purchase these essential scrub jay habitats.
    2612. Maintain habitat on protected lands. Through selective thinning or prescribed burning, habitat on secured lands should be maintained in a suitable successional stage to support scrub jays.
    2613. Attempt to maintain or establish habitat corridors between populations. It may be important to maintain genetic viability in this subspecies. Therefore, habitat corridors between existing populations should be maintained or created wherever possible.
  262. Where private lands cannot be secured through conservation easements, encourage landowners to maintain suitable habitat. Small, isolated populations of Florida scrub jays are known to occur on numerous small patches of privately-owned scrub in peninsular Florida. Every effort should be made to contact landowners of such habitat to encourage them to maintain the habitat, and to advise them on how to enhance it for the benefit of the scrub jays.

2621. Discourage private landowners from totally clearing scrub or from allowing scrub to mature to a degree unsuitable for scrub jays. Scrub jays are extremely habitat restricted. Landowners should be taught about the needs of the jays, and how to maintain their habitat through periodic controlled burning or chopping to thin out the vegetation.
3. Educate the public. The public, especially owners of scrub habitat, must be informed about the scrub jay's appearance, habits, and problems before any enthusiasm can be developed for a recovery program.
31. Develop a landowner contact program that would inform private landowners of the presence of scrub jays on their property, and would identify habitat management guidelines specific to their land. Landowners must be made aware that their property contains resident populations of a threatened species to facilitate cooperation in any recovery effort. State and/or Federal agents should regularly visit landowners to encourage continued cooperation in preserving scrub habitat on their property. Brochures should be prepared which show how to identify the birds and provide information on their habits and needs.
32. Inform the general public about scrub jays through personal contacts or literature. It is important to secure the interest and support of the general public in recovery efforts for any species. In the case of such an attractive and engaging bird as the Florida scrub jay, this should be a relatively simple task. Newspaper and magazine articles, illustrated with photos, should be prepared and published. Lectures should be presented to Florida birding groups and garden clubs. Short radio and/or TV spots should be aired. Every effort should be made to secure the public's support of the recovery program for this native Florida bird.
4. Conduct research to determine basic biological needs. Although scrub jays have been studied at Archbold Biological Station and Merritt Island National Wildlife Refuge, additional research work is needed.
41. Determine minimum size of an area with suitable habitat that can support a viable scrub jay population. Determine minimum acreage needed for scrub jays to maintain themselves as healthy and viable populations.
42. Develop more information on the scrub jay's basic biology. Work has been done at the Archbold Biological Station and at the Merritt Island National Wildlife Refuge on optimal habitat, reproductive success, nesting, dispersal of fledglings, mortality, predation, survival, and food habits. Studies of a similar nature need to be conducted elsewhere, especially in areas where populations are small and isolated.

43. Conduct studies on the ability of scrub jays to survive and reproduce in areas into which they have been introduced. Determine whether scrub jays, particularly helper birds, can be successfully transplanted into currently uninhabited areas. Determine whether such transplanted birds survive and reproduce.
44. Accurately determine current distribution of small scrub jay populations throughout the bird's overall range. Numerous small, isolated patches of scrub habitat are known to contain small but possibly significant populations. These areas should be accurately surveyed and mapped so that they can be properly considered in any future land use planning by Federal, State or local governments.
45. Conduct periodic censuses of wild populations. It will be necessary to continually monitor the stability and health of existing wild populations to assess recovery efforts.
5. Reestablish populations of scrub jays where they have been extirpated. Scrub jays have been extirpated in numerous areas, such as Guana State Park/Wildlife Management Area in St. Johns County. Efforts should be made to locate as many of these former sites as possible to determine whether or not they could be rehabilitated as suitable introduction sites for scrub jays.
  51. Restore and/or maintain habitats in such areas. Wherever possible, such areas should be returned to a condition suitable for scrub jays. In some cases, this may involve controlled burns or chopping to thin out the vegetation and create open spaces for scrub jay foraging; in others it may mean allowing oaks, pines, and scrub to grow back where they have been eliminated.
  52. Live-trap nonbreeder helpers from areas with viable populations (Merritt Island National Wildlife Refuge/Cape Canaveral, or Ocala National Forest) and introduce them into: (1) occupied areas in order to enhance existing populations; and, (2) reintroduce them into rehabilitated areas from which the subspecies has been extirpated. In areas where scrub jay populations are thriving, it may be possible to remove nonbreeding helper birds without damaging the viability of the parent stock. These helpers should be removed only from pairs with two or more helpers, and attempts should be made to secure older helpers since the species doesn't breed until 2 years of age. These helper birds should be introduced into rehabilitated habitats and into areas where resident populations need to be strengthened by the addition of new genetic material into the population. Trial introductions should be small. If successful, it might be better to release larger numbers into an area to ensure enough survivors to establish a self-sustaining population.

53. Monitor newly-established and enhanced populations. Monitor to determine success of newly-established or enhanced populations. If these populations are successful, introduction of helper birds into other areas should be attempted as new habitats are found or enhanced.

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### PART III. IMPLEMENTATION SCHEDULE

Priorities in Column 4 of the following implementation Schedule are assigned as follows:

- Priority 1 - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.
- Priority 2 - An action that must be taken to prevent a significant decline in species population/habitat quality or some other significant negative impact short of extinction.
- Priority 3 - All other actions necessary to provide for full recovery of the species. (Recognizing that the ultimate success of the program is species recovery, priority 3 actions likely to lead to full recovery and delisting of a species in the foreseeable future will tend to rank higher than other priority actions.)

**GENERAL CATEGORIES FOR IMPLEMENTATION SCHEDULES\***

**Information Gathering - I or R (research)**

1. Population status
2. Habitat status
3. Habitat requirements
4. Management techniques
5. Taxonomic studies
6. Demographic studies
7. Propagation
8. Migration
9. Predation
10. Competition
11. Disease
12. Environmental contaminant
13. Reintroduction
14. Other information

**Management - M**

1. Propagation
2. Reintroduction
3. Habitat maintenance and manipulation
4. Predator and competitor control
5. Depredation control
6. Disease control
7. Other management

**Acquisition - A**

1. Lease
2. Easement
3. Management agreement
4. Exchange
5. Withdrawal
6. Fee title
7. Other

**Other - O**

1. Information and education
2. Law enforcement
3. Regulations
4. Administration

\* (Column 1 - Primarily for use by the U.S. Fish and Wildlife Service.)

IMPLEMENTATION SCHEDULE

General Category	Plan Task	Task Number	Task Priority	Task Duration	Responsible Agencies		Estimated FY Costs			Comments/Notes
					FWS Region	Other	FY 1	FY 2	FY 3	
M-3	Develop management plans for scrub jays on public lands	11	1	ongoing/continuous	4	FGFWFC, USAF, USFS, FDNR, NASA				Relates to task 41.
0-4	Conduct Section 7 consultations	12	2	ongoing/continuous	4					
I-3	Develop guidelines to meet habitat requirements	21	3	1 year	4	FGFWFC, TCRPC USAF, NASA	2,000			
I-1,2	Conduct habitat surveys	22	2	2 years	4	(same as 11)	3,000	3,000		
M-3	Manage habitats	24	1	ongoing/continuous	4	(same as 11)				
M-3	Develop management guidelines	25	1	1 year	4	FGFWFC	5,000			
A-1,2,3	Protect private lands	261	1	ongoing/continuous	4	USFS, FDNR	?			
M-3 A-3	Encourage private landowners to maintain habitat	262	2	3 years	4	FGFWFC, FDNR				
M-3	Develop landowner contact program	31	3	3 yrs.	4	FGFWFC, TCRPC FDNR	5,000	5,000	5,000	

IMPLEMENTATION SCHEDULE

General Category	Plan Task	Task Number	Priority	Task Duration	Responsible Agencies		Estimated FY Costs			Comments/Notes
					FWS Region	Other	FY 1	FY 2	FY 2	
0-1	Educate the public	32	3	3 years	4	FGFWFC, FDNR				See 31
R-3	Determine minimum habitat size	41	3	1 year	4	FGFWFC, USAF, USFS, FDNR, NASA	5,000			
R-6,7,8	Obtain information on basic biology	42	2	3 years	4	same as 41	2,000	2,000	2,000	
R-13	Determine introduction capabilities of scrub jays	43	2	3 years	4	same as 41	5,000	5,000	5,000	This project should encompass tasks 43, 5, 51, 51 and 53
R-1	Determine current distribution of small populations	44	2	2 years	4	NASA, USAF, FDNR, FGFWFC, USFS				Included in task 23
R-1	Conduct periodic censuses	45	2	ongoing/continuous	4	FGFWFC, FDNR, NASA,, USAF, USFS	1,000	1,000	1,000	
M-2	Reestablish populations of scrub jays	5	2	3 years	4	NASA, USAF, FDNR, FGFWFC, USFS				Included in 43

IMPLEMENTATION SCHEDULE

General Category	Plan Task	Task Number	Task Priority	Task Duration	Responsible Agencies		Estimated FY Cost			Comments/Notes
					FWS Region	Other	FY 1	FY 2	FY 3	
M-2,3	Restore and maintain such habitats	51	2	continuous	4	same as 5				Included in 43
M-1,2,	Live trap helpers to enhance other populations	52	2	3 years	4	same as 5				Included in 43
M-2	Monitor newly-established or enhanced populations	53	3	3 years	4	same as 5				Included in 43

TOTAL ✓ 28,000

✓ 16,000

✓ 13,000

ABBREVIATIONS

FDNR Florida Department of Natural Resources

FGFWFC Florida Game and Fresh Water Fish Commission

NASA National Aeronautics and Space Administration (Includes Kennedy Space Center)

TCRPC Treasure Coast Regional Planning Council

USAF U.S. Air Force (Includes Cape Canaveral AFS, Patrick AFB, and Avon Park AFR)

USFS U.S. Forest Service (Includes Ocala National Forest)