

REVIEW DRAFT – 1 MAY 2007

**Habitat Conservation Plan
and Adaptive Management Recommendations
for the Threatened
Florida Scrub-Jay (*Aphelocoma coerulescens*)
in Sarasota County, Florida**

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**SARASOTA COUNTY
HABITAT CONSERVATION PLAN
FOR THE
THREATENED FLORIDA SCRUB-JAY (*Aphelocoma coerulescens*)**

List of Acronyms

CARL	State of Florida Conservation and Recreational Lands Acquisition Program
EPA	Environmental Protection Agency
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FDRP	Florida Department of Parks and Recreation
FSJ	Florida Scrub-Jay
HCP	Habitat Conservation Plan
ITP	Incidental Take Permit
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
OFW	Outstanding Florida Water
SCS	Soil Conservation Service, U.S. Department of Agriculture
SWFWMD	Southwest Florida Water Management District
USFWS	U.S. Fish and Wildlife Service

Executive Summary

Purpose of this HCP

Sarasota County has prepared this Habitat Conservation Plan (HCP) to fulfill requirements of Section 10(a)(1)(B) of the Endangered Species Act, in order to conserve the federally Threatened Florida Scrub-Jay (FSJ) and its habitat within the County. This plan also will benefit other vertebrate and plant species of the Florida oak scrub. Sarasota County has lost 80-90 percent of this unique habitat, and remnant patches continue to be fragmented by new development. The Florida Scrub-Jay is an excellent indicator species, an “umbrella” whose survival requires substantial acreage in an entire ecosystem that is threatened across its range.

This HCP will reduce regulatory burden on County residents and developers by providing a regional framework for enhancing long-term survivability of the Florida Scrub-Jay amidst continued development. Specifically, continued residential and commercial construction, plus associated infrastructure, will destroy occupied Florida Scrub-Jay habitat. This HCP will help bypass the need for individual HCPs otherwise required by regulatory agencies before such projects may proceed. The Sarasota County Board of Commissioners, as the Applicant for the Incidental Take Permit (ITP) required under Section 10(a)(1)(B) of the Endangered Species Act, is requesting a permit from the U.S. Fish and Wildlife Service covering a period from the present to the year 2050. During the permitted period, the County will:

- Review individual clearing permit applications;
- Grant Incidental Take Permits to qualified applicants;
- Actively monitor preserve lands as to the status of Florida Scrub-Jays;
- Monitor, minimize, and mitigate impacts to scrub habitat;
- Adaptively manage all county-owned scrub preserves;
- Develop contingencies for changed circumstances;
- Fund land acquisition and management via off-site mitigation funds;
- Handle minor amendments to the HCP as needed; and
- Maintain records and provide periodic accounting of Incidental Take Permits.

Status of the Florida Scrub-Jay in Sarasota County

The Florida Scrub-Jay depends entirely on habitat containing oak scrub in native or semi-native condition. The principle cause of the dramatic decline of the Florida Scrub-Jay has been conversion of scrub habitat for land uses by humans. In recent decades, numbers have declined further because of habitat succession owing to fire suppression. Long-term

persistence of the species within Sarasota County can only be accomplished by protecting and adaptively managing a sufficiently large network of native habitat preserves.

A thorough census in 2000 confirmed 171 Florida Scrub-Jay families and at least 466 individual jays. A similar effort in 2004-2005 documented only 132 families, representing a 23% loss in five years. To reverse this trend, concerted and well-planned conservation actions must commence immediately.

Nearly half of the County's FSJ families exist amidst suburban settings, where little habitat remains and local populations are doomed because of poor reproductive success. Only about 57 FSJ family groups live on protected lands, and only about 420 ha (1,000 acres) of excellent scrub habitat are fully protected. Florida Scrub-Jays living in suburban settings or in poorly managed habitat are demographically unstable, as birth rates are exceeded by death rates. Across Florida, such populations may persist for many years because of immigration from surrounding scrubs. Eventually, however, the supply of immigrants is exhausted and the population begins to collapse. *The Florida Scrub-Jay population in Sarasota County is on the verge of the latter scenario.*

Take Assessment

All aspects of human development have negative impacts on Florida Scrub-Jays and their persistence, because (1) adult and juvenile mortality are elevated, (2) annual reproductive success is reduced, (3) population size declines both locally and regionally, and (4) capacity for dispersers to move among potential habitat patches is reduced. Progressive and inevitable demographic failure of Florida Scrub-Jays in the presence of human development is well documented, and occurs as a direct consequence of direct habitat loss, habitat degradation (especially from fire suppression and introduced exotic vegetation), habitat fragmentation, nest site alterations, introduced predators (especially house cats), road mortality, and artificial feeding (which alters the natural nesting cycle in maladaptive ways).

The net effect of any loss of scrub habitat, no matter how small the acreage, is to reduce the regional population of Florida Scrub-Jays. Therefore, *any development affecting existing scrub habitat within Sarasota County shall be deemed to constitute take if it occurs on habitat available for Florida Scrub-Jays.* "Available habitat" is defined as (1) any tract of native habitat, of any vegetation composition, that is within the maximum normal daily movement radius (500 m) of a known individual, pair, or family group of Florida Scrub-Jays; (2) any tract of habitat containing native scrub oaks of any stature, and situated within typical expected dispersal distance (5 kilometers, or 3.125 miles) of one or more sites where Florida Scrub-Jays have been documented during or after the 2000 county-wide survey (Appendix 1).

For purposes of this HCP, take shall not be quantified in terms of the number of Florida Scrub-Jay individuals or family groups deemed to be affected or potentially affected directly by the anticipated action. Rather, the extent of anticipated take by any action shall be quantified as the number of acres (or fractions of acres) of available Florida Scrub-Jay habitat lost as a consequence of the anticipated action.

Biological Goal of the HCP

The overarching biological goal of this HCP is to ensure that viable, genetically interchanging subpopulations of Florida Scrub-Jays will continue to persist in Sarasota County. This will be accomplished through a system of habitat preserves and land-management strategies that offer a 95% to 99% probability of continued Florida Scrub-Jay subpopulations for a minimum of 100 years beyond the present.

Biological Objectives

- 1. No Net Loss.** *Maintain or restore, on protected and well managed habitat, a minimum of 132 territories of Florida Scrub-Jays within Sarasota County. This means a strict policy of zero net loss of territories for the County, using the 2004-2005 countywide survey (Appendix 1) as a benchmark.*
- 2. Maintain Connectivity.** *The Florida Scrub-Jay population in Sarasota County must remain biologically connected with those in larger metapopulations that include adjacent counties territories. For this reason, territories should persist in each of the four regions of the County (Appendix 3).*
- 3. Maintain Reproductive Success.** *Within each region, Florida Scrub-Jays must exhibit (a) annual reproductive success averaging at least one yearling jay produced for every two families of jays, and (b) demographic stability as measured over a 10-year monitoring period.*

Strategies for Achieving the Biological Objectives

- 1. Manage Habitat in Protected Areas.** *The most critical strategy underlying this HCP – even more critical than acquiring new land for protection -- is to take systematic and aggressive action to returning long-unburned, overgrown scrub habitat to optimal conditions for Florida Scrub-Jays within protected areas designated as occupied or potentially occupied FSJ habitat.*

2. Maintain Oscar Scherer State Park as a Source Population. *Manage the habitat in and around Oscar Scherer State Park so that this largest and best-protected subpopulation of Florida Scrub-Jays in Sarasota County contains 20 to 30 territories each year, and production of potential recruits within the region of the park matches or exceeds annual death rates of breeders (Appendix 4).*

3. Create a Source Population in the Eastern Region. *Through land acquisition and aggressive habitat management, establish at least one other well-managed source population of Florida Scrub-Jays on a significant expanse of contiguous native habitat, and comparable to or larger in size than the population occupying Oscar Scherer State Park. The region most amendable for this objective is in the East, along the western borders of North Port and the adjacent, county-owned land to its west.*

4. Expand and Stabilize Lemon Bay and Venice Airport. *Protect, restore, and manage habitat in the vicinity of Lemon Bay Preserve and the Venice Airport to support a minimum of 20-30 active Florida Scrub-Jay territories. Ensure that production of potential recruits within this region matches or exceeds annual death rates of breeders (Appendix 4).*

5. Re-establish the Myakka River Corridor. *Restore Florida Scrub-Jay habitat in all tracts where existing soil and vegetation suggest it once existed along the xeric levies (especially the western bank) of the Myakka River, thereby restoring this movement and dispersal corridor to connect the County's main subpopulations of Florida Scrub-Jays with those to the northeast (Verna well fields and adjacent Manatee County). Habitat sufficient to support a minimum of 8 Florida Scrub-Jay territories should be maintained in optimal or near-optimal condition at any one time along this crucial Myakka River corridor.*

6. Restore the Northeastern Corridor. *Restore and manage as protected habitat all suitable areas in the northeastern corner of Sarasota County (especially Verna Well Fields and adjacent scrub), so that these habitat patches act as conduits for movement of jays to and from the significant existing population that occupies increasingly well-managed scrub habitat patches in immediately adjacent Manatee County.*

7. Restore the Southeastern Corridor. *Maintain a population of at least 8 Florida Scrub-Jay territories at the southern end Sarasota County (Englewood and Myakka State Forest), such that these habitat tracts act as conduits for movement of jays to and from adjacent Charlotte County.*

8. Restore and Maintain Stepping Stones. *Maintain small scrub patches in early to mid-successional condition interspersed throughout the County, such that these act as “stepping stone” habitat patches that are occupied at least occasionally over a 10-year monitoring period. The exact identity of these patches may vary through time.*

Adaptive Management

Sarasota County will employ an adaptive strategy in managing all its scrub preserves, promoting continual improvements in management actions over time as more biological information about the system becomes available. Adaptive management acknowledges that any given management strategy represents an experiment based on still-imperfect information. As new information and levels of understanding come in, management strategies are refined, or even changed wholesale. Monitoring and research are key elements of an adaptive management strategy.

1. Priority Setting. The four subregions of the County support different numbers of jays, but each is key in fostering long-term persistence of the population as a whole. Within each subregion, criteria for prioritizing individual tracts in terms of biological importance for Florida Scrub-Jays are: **(1) Size and Contiguity of Population, (2) Quality of Usable Habitat, (3) Management Potential, (4) Restoration Potential, (5) Landscape Context, and (6) Intervening and Adjacent Habitat.** Certain habitat patches are too small or too compromised by surrounding human density to be worthy of management investment even if they currently contain Florida Scrub-Jays. Outright loss of these patches and jays will not affect long-term extinction probability. Permitting incidental take in such cases, *with appropriate compensation from the taking agent*, can contribute to a net increase in probability that the species will persist, by generating funds to acquire and restore currently unprotected and unmanaged habitat where such preserves can be best managed for long-term conservation. *We designate FSJ territories in such areas as “suburban” (Appendix 2).*

2. Acquiring Information. As a major component of this HCP, Sarasota County will develop and carry out a monitoring program for tracking the health and future prospects of the population of Florida Scrub-Jays. This program will consist of: (1) monitoring of Florida Scrub-Jay numbers, distribution, and reproductive output, and (2) habitat monitoring. All data will be maintained by the County within a permanent spatial database.

3. Implementation of Land Management. *The goal of land management in the context of this HCP is to ensure that all publicly managed habitat that is potentially suitable for occupancy by Florida Scrub-Jays in Sarasota County remains in successional stages, vegetation composition, and overall structure conducive for optimal survival and reproduction by this species.* Currently, Sarasota County does not contain even a single tract of land that is in fully optimal condition for FSJs, but a large proportion of *potentially* optimal habitat is already under public ownership. Therefore, the foundation of the implementation strategy of this HCP involves habitat management and restoration rather than land acquisition. Establishing a systematic and aggressive approach to returning overgrown and degraded scrub habitat in protected areas to optimal conditions for Florida Scrub-Jays is absolutely critical to the success of this HCP.

Sarasota County will create an individually tailored “scrub management plan” for every tract of land managed by the County that contains any scrub habitat potentially suitable for FSJs. These management plans will address (1) infrastructure and protection, (2) long-term fire management, (3) above-ground mechanical clearing, (4) removing exotic species, (5) habitat restoration, (6) FSJ translocation.

4. Feedback. Key to success of this HCP will be land-management responses to critical changes in FSJ population size or stability. The adaptive approach requires systematic acquisition and application of data, and appropriate, site-specific responses in land management. Managers responsible for each site will (1) identify management goals and objectives, (2) define the appropriate management strategy, (3) implement the strategy, (4) design experiments and monitoring protocols for measuring results, (5) summarize the data on a regular basis, (6) periodically evaluate success at achieving the goals and objectives, and (7) revise the management strategy as dictated by results.

Biological Targets and Measures of Success

The long-term, minimum target for management of Florida Scrub-Jays in Sarasota County is no-net-loss compared to the 2004 comprehensive survey (132 breeding pairs). We mapped availability and dispersion of habitat patches capable of being managed long-term, and projected their capacity to support a demographically stable population of Florida Scrub-Jays at no-net-loss levels (Appendix 3). The following recommended configuration and target population sizes represents the overarching target for this HCP. Put another way, this table (Table 5-2) constitutes the yardstick against which success

or failure of this County-wide HCP will be measured. The County shall establish management plans and procedures to achieve stable Florida Scrub-Jay populations having these minimum numbers.

priority zone	type of subpopulation	patches included	minimum # of territories
NORTHEAST	Connector	Verna Well Field, Whidden & Jomar, Myakka River State Park, Fruitville & Utopia	10
CENTRAL	Core	Oscar Scherer State Park, Fox Creek, Knight's Trail Park	30
CENTRAL	Corridor	Myakka River Corridor	8
CENTRAL	Stepping Stone	Bayonne, Little Sarasota Bay, Curry Creek	3
SOUTHWEST	Core	Shamrock/Caspersen Park, Service Club Park, Venice Airport/Golf Course/W.C.I.N.D, Lemon Bay Preserve	30
SOUTHWEST	Corridor/Connector	Englewood Refuge, Winchester Boulevard	8
SOUTHWEST	Stepping Stone	Lemon Bay Park/Buchan Airport, Manasota Scrub	5
EAST	Core	Deer Prairie Creek, North Port West	30
EAST	Corridor/Connector	Myakka River State Forest, southern portion of North Port East	5
EAST	Stepping Stone	North Port East	3

Minimizing Impacts

In cases where take is deemed permissible, measures will be employed in order to reduce the impacts on FSJs and their habitat. These include avoiding nest disturbance, on-site habitat protection, leaving scrub oaks intact at project sites, planting scrub oaks alongside roads, xeriscaping with native vegetation, installing speed bumps and/or “Scrub-Jay X-ing” signs at strategic locations, and developing educational materials.

Mitigating Unavoidable Impacts

Recognizing that there will be instances when single or cumulative project activities will cause unavoidable impacts on FSJs and their habitat, Sarasota County will ensure that

these activities will not increase FSJ extinction probabilities across the county via the following measures:

(1) Implementation of a countywide habitat management and restoration strategy. An aggressive habitat management and restoration strategy will be employed County-wide, using the adaptive approach. The County will develop a regional plan that integrates all site-specific adaptive management strategies on public lands within the County. To further this vital implementation strategy, the County will convene a new Interagency Florida Scrub-Jay Habitat Management Task Force consisting of land management representatives from the County, FL Division of State Parks, FL Division of Forestry, and the Southwest Florida Water Management District.

(2) Establishment of a Florida Scrub-Jay habitat mitigation fund. Sarasota County shall establish a Florida Scrub-Jay Habitat Conservation Mitigation Fund, to be used exclusively for acquisition and management of priority habitat tracts intended to support Florida Scrub-Jays. Mitigation funds will be directed toward protecting the highest priority tracts of scrub, assessed via the following criteria: large size; highest quality in terms of native plant cover and plant species composition; important in a landscape context (e.g. function as stepping stones between other larger units); amenable to permanent conservation management.

(3) Protection of new habitat. Acquisition and subsequent management of otherwise unprotected “available” habitat will continue to be of high priority. Emphasis will be placed on large tracts, sites occupied by jays, tracts adjacent to occupied sites, sites expected to experience relatively low development pressures, sites in optimal or near-optimal condition, and tracts amenable to restoration of native scrub.

Currently the highest priority tracts for new acquisition are along the western boundaries of North Port, the vicinity of Deer Prairie Creek, scattered habitat patches in the vicinity of Oscar Scherer State Park, expansions of Pinelands Reserve, Lemon Bay Park and the Manasota Scrub, Fox Creek scrubs, and Bayonne (Sarasota Square).

Monitoring and Reports

Sarasota County will prepare and provide the following HCP Reports to the U. S. Fish and Wildlife Service and the Florida Fish and Wildlife Commission for the duration of the forty-six year ITP permit: (1) *Annual Report*, including summaries of monitoring efforts, habitat monitoring, and any take occurring during that year; (2) *Biennial Report*, including results of countywide inventories, summaries of management/restoration efforts, and assessment of management/restoration efforts, including decisions to maintain current strategies or adjust them.

Changed Circumstances

Changes in circumstances are likely to be faced by Sarasota County over the period covered by this HCP. These might include (1) natural catastrophes, especially hurricanes; (2) accelerated habitat loss owing to continued human population growth within the County; (3) failure to manage scrub habitat properly. Hurricanes and other violent storms are unlikely to produce any long-term detrimental effects on FSJ populations in Sarasota County. If habitat loss were to accelerate before significant new management efforts take place, wholesale loss of FSJs could occur rapidly across the entire county through the “winking out” of small, currently unsustainable local populations. A number of existing preserves clearly can support more family groups than are currently present at these sites. The County needs to act fast to ensure that these potential numbers can be achieved.

It is likely that 20-30 FSJ families will be sacrificed in the Venice Suburbs owing to ongoing residential and commercial development on private outholdings. Jays still occupying these suburban tracts represent primary candidates for translocation into well managed preserves following habitat restoration.

Unforeseen Circumstances

Procedures for addressing unforeseen circumstances affecting survival and persistence of FSJs will be developed on an ad hoc basis. The most important circumstances to monitor for unexpected surprises are: (1) annual survival of juveniles, (2) new mandates in the upcoming Florida Statewide Florida Scrub-Jay Recovery Plan, (3) possible negative effects of prolonged drought, (4) budget shortfalls that force downsizing or curtailing of management efforts, (5) new introductions of exotic animals, plants, diseases, or pesticides that affect Florida Scrub-Jay survival.

Actions of Neighboring Counties

The fate of Florida Scrub-Jays in Sarasota County depends in part on actions in neighboring counties, especially Charlotte, Manatee, and DeSoto. It is highly advisable that these counties develop their own HCPs for long-term protection of their Florida Scrub-Jay. Such plans might be facilitated by the completion and acceptance of the Sarasota County plan. Failure to act will inevitably result in population decreases within most or all of southwest Florida's FSJ metapopulations. Sarasota County should, therefore, initiate conversations and cooperation with its neighboring Counties in order to foster a regional approach to FSJ conservation.

***** End of Executive Summary *****

**HABITAT CONSERVATION PLAN
AND ADAPTIVE MANAGEMENT RECOMMENDATIONS
FOR THE
THREATENED FLORIDA SCRUB-JAY (*Aphelocoma coerulescens*)
IN SARASOTA COUNTY**

1.0 INTRODUCTION AND BACKGROUND

1.1 Overview

Sarasota County has prepared this Habitat Conservation Plan (HCP) to fulfill partial requirements of Section 10(a)(1)(B) of the Endangered Species Act. The County is working with local, State, and Federal agencies, as well as stakeholders within the community, to develop a countywide plan for conserving the remaining Florida Scrub-Jays and their habitat.

A countywide Habitat Conservation Plan is a broad, regional approach that provides for a systematic method of protecting Florida Scrub-Jays and their habitat. Thus, this HCP addresses the entire range of Florida Scrub-Jays within Sarasota County and provides benefits to other vertebrate species and plant species that are restricted to Florida oak scrub and would not otherwise receive such protection. The intent of this HCP is to reduce the regulatory burden on community members at large by providing a regional framework as a way to enhance the long-term survivability of the Florida Scrub-Jay amidst continued development.

In order to create a Habitat Conservation Plan that considers a broad perspective, Sarasota County has invited a multitude of stakeholders including representatives of private landowners, other governmental agencies, incorporated areas, the general public, and environmental and developmental communities to discuss and react during this Plan's development (see [HCP Steering Committee Roster, Appendix F](#)).

This HCP has been developed in response to continued growth in the human population of Sarasota County. Specifically, it is anticipated that continued preparation for residential and commercial construction and installation of county infrastructure will result in the destruction of occupied Florida Scrub-Jay habitat. Currently in Sarasota County, each party proposing development activity in Florida Scrub-Jay habitat is required to consult with the regulatory agencies. If the proposed activities will impact the species or its ecosystem, an individual HCP may be required for that project. Such a

piecemeal approach does little for the overall conservation of any native species of plant or animal inhabiting Florida oak scrub.

In addition to its positive effects on threatened and endangered wildlife, the HCP will have significant positive economic impacts on private landowners and developers in Sarasota County. The existing requirement that every individual project prepare a separate HCP and acquire a separately issued permit for each instance of scrub clearing imposes a considerable burden in both money and time. With a countywide HCP in place, the need to hire professional consultants to survey the habitat and prepare a permit application is eliminated. Furthermore, the often-lengthy periods required for review, modification, resubmission, and eventual approval of the permit application will no longer be required, as the entire process will take place within Sarasota County offices.

1.2 Purpose of HCP Effort

The purpose for the U.S. Fish and Wildlife Service's Habitat Conservation Plan effort is to protect, preserve, and restore habitats that are critical to the preservation of a Threatened or Endangered Species, such as the Florida Scrub-Jay. The Sarasota County HCP is expected to provide a benefit to both FSJs and to property owners within the county by providing an avenue for continued land use by humans in and around FSJ habitat without decreasing the long-term chances of survival of the species. Sarasota County has lost an estimated 80 percent of its native Florida oak scrub and scrubby flatwoods habitats, and those patches that remain continue to be lost and fragmented by new development.

The Florida Scrub-Jay is an excellent indicator species, an "umbrella" whose survival requires substantial acreage in an entire ecosystem that is threatened. Therefore, addressing the needs of FSJs as a focal species serves the much broader purpose of protecting whole assemblages of endangered scrub organisms and communities living beneath them. In Sarasota County, dozens of listed and candidate species exist beneath the umbrella (e.g., gopher tortoise, Eastern indigo snake, gopher frog, Florida mouse, Florida coontie, Custiss' milkweed, Florida goldenaster, and Florida bonamia), and most have much higher population densities or smaller home range requirements. Thus, an HCP protecting the Florida Scrub-Jay will provide an important vehicle for protecting the entire Florida scrub ecosystem.

The principle purposes of this HCP document are to provide information regarding:

- Existing areas of actual or potential Florida Scrub-Jay habitat within the County, and a general description of the ecological landscape within which these occur;

- Distribution of recently-documented families of Florida Scrub-Jays residing within the County;
- Opportunities for improving the expected persistence of Florida Scrub-Jays through targeted acquisition of new habitat preserves, restoration of currently unoccupied habitat, and management of existing preserves;
- Long-term management plans for the protection of Florida Scrub-Jay families;
- Description of the reasonable results to be expected from the implementation of these programs and strategies for Florida Scrub-Jay management;
- Funding mechanisms available for these protection strategies.

1.3 Permit Duration

The Sarasota County Board of Commissioners, as the Applicant for the Incidental Take Permit (ITP) required under Section 10(a)(1)(B) of the Endangered Species Act, is requesting a permit from the U.S. Fish and Wildlife Service covering a period from the present to the year 2050. The reasons for requesting such long-term duration are: (1) to create genuine efficiencies in permitting procedures by allowing the county to act on behalf of Florida Scrub-Jay protection without the necessity of renewing its authority to do so every few years, and (2) the activities related to land acquisition, land management, and habitat monitoring required for successful protection, restoration, and monitoring of Florida Scrub-Jays and their habitat are, by their nature, long-term.

Upon receipt of the requested 44-year permit from the USFWS, the Sarasota County will assume responsibility for a number of tasks over this period. As the human population grows and permits continue to be sought to develop the currently significant amount of vacant land in the county, the county will:

- Review individual clearing permit applications;
- Grant Incidental Take Permits to qualified applicants;
- Actively monitor preserve lands, including conducting surveys to determine the status of Florida Scrub-Jays in project areas, mitigation habitats, and elsewhere;
- Identify and carry out measures to monitor, minimize, and mitigate impacts to scrub habitat;
- Provide for the perpetual management of county-owned scrub preserves;
- Develop contingencies for changed circumstances, such as unexpectedly dramatic declines in the Florida Scrub-Jay population within the county;
- Continue to develop funding strategies for land acquisition and management, including (but not necessarily limited to) the collection of off-site mitigation funds;
- Handle minor amendments to the HCP as needed; and
- Maintain records and provide periodic accounting of Incidental Take Permits.

1.4 Regulatory Framework for the HCP

The Endangered Species Act (ESA) of 1973 was enacted by Congress to preserve species and the ecosystems on which they depend. The ESA exists to preserve North American species and their habitats that are nearing extinction, as well as those that are declining precipitously and could be on the brink soon. The Florida Scrub-Jay is in the latter category, and was listed as Threatened by the U.S. Fish and Wildlife Service in 1987 (Federal Register vol. 52, no. 106, pp. 20715-20719, 3 June 1987).

A fundamental element of the ESA, essential for accomplishing the goal of protecting species, is the prohibition against "take" on non-federally owned land (ESA, Section 9). Take is defined broadly by the ESA to mean, "...harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct." The U.S. Fish and Wildlife Service (USFWS) further defines "harm" to include any actions, sometimes including habitat modification, that result in injury to members of the protected species. In the case of the Florida Scrub-Jay, which is an extreme habitat specialist, the USFWS has adopted the position that any alteration of oak scrub habitat occupied by this species potentially constitutes "take" under the ESA. Therefore, alteration of scrub occupied by FSJs that results in impaired or curtailed nesting and reproduction, abandonment of a defended area required for reproduction, or causes a decline in the total potential population density of an area may be unlawful unless properly authorized in advance.

The purpose of an Incidental Take Permit (ITP) is to authorize the incidental take of a listed species – in the present case, the Florida Scrub-Jay – as a consequence of conducting otherwise legal and permitted activities. Under Section 10, the USFWS may grant a permit to take individuals of a listed species in exchange for an approved plan, which ensures that overall, the species is no worse off as a result of the permitted activity. These plans are known as Habitat Conservation Plans (HCP), and they must accompany an application for an Incidental Take Permit. Based on scientific information pertinent to the species in question, HCPs balance long-term conservation of protected species with properly planned economic development (Bean et al. 1991). The purpose of the HCP process is to ensure that the effects of the incidental take are adequately and appropriately minimized and/or mitigated to the maximum extent practical. Incidental Take Permits do not, in themselves, authorize the activities that result in take.

HCPs are most successful when they encompass as broad a biological scope as possible. The USFWS encourages planners to include all listed species in an affected area, and to consider any additional "candidate species" that are likely to be listed in the near future.

Plans that encompass a large geographic area convey greater biological and economic benefits than those for single sites or isolated, small projects. Larger scale plans not only allow greater flexibility than small ones, but they also are more likely than small ones to materially improve the overall chances that the species and its ecosystem will survive indefinitely. Further, they can create an economy of scale that increases conservation capacity while reducing the incremental costs of individual landowners complying with the ESA.

1.5 Plan Area

This Habitat Conservation Plan has been developed to address all natural to semi-natural eco-systems in which Florida Scrub-Jays currently or recently have existed in unincorporated Sarasota County (plus all participating municipalities). Special focus is given to the cities of Sarasota, Venice, North Port, and Englewood. During the preparation of this document, Sarasota County staff have coordinated with the local governments within Sarasota County, with private landowners throughout the county, and with a variety of professional and non-governmental organizations having stakes in the future of Florida Scrub-Jay management across the county. Representatives of Charlotte County and Manatee County also have participated from time to time on the Sarasota County HCP Steering Committee.

1.6 Species to Be Covered By Permit

The Florida Scrub-Jay (*Aphelocoma coerulescens*) is the sole species to be covered by this permit. It is listed by both State and Federal governments as a *Threatened species*, having been listed by the U.S. Fish and Wildlife Service in 1987 and by the Florida Fish and Wildlife Conservation Commission (FFWCC) in 1975. All major Florida Scrub-Jay populations are declining (Woolfenden and Fitzpatrick 1996; R. Bowman and J. Fitzpatrick, unpubl. data), and the species recently has been proposed for revised listing as an *Endangered species* as a result of this continued, rangewide decline.

1.6.1 Characteristics of the Florida Scrub-Jay

The Florida Scrub-Jay (*Aphelocoma coerulescens*) is a 12-inch crestless jay, totally lacking the white-tipped wing and tail feathers and black barring of the much more common and widespread Blue Jay (*Cyanocitta cristata*). The Florida Scrub-Jay occurs exclusively in peninsular Florida, and is the only bird species whose distribution is entirely restricted to this state. Along Florida's western coast, the species has occurred historically from Piney Point, Taylor County, and Swannee, Gilchrist County, south to Naples in Collier County. In recent decades, however, the highest concentrations of FSJ

populations along the Gulf Coast have been limited to Sarasota, Charlotte, and Lee Counties. The Florida Scrub-Jay is rapidly disappearing throughout its historic range in Florida, and today is probably represented by less than five percent of its original pre-settlement numbers (Fitzpatrick et al. 1991, Woolfenden and Fitzpatrick 1996).

The continued existence of this species depends completely on protecting and managing habitat preserves that contain oak scrub in its native or semi-native condition. Many habitat patches that originally contained Florida Scrub-Jays in good numbers have lost them completely. Most patches where the species is still found are supporting far fewer families than in their presumed pre-settlement condition. As detailed below, the principle cause of the dramatic decline of the Florida Scrub-Jay has been conversion of its habitat for use by humans. However, in recent decades numbers have declined in many areas because of habitat succession owing to fire suppression.

Florida Scrub-Jays are sedentary, permanently territorial, and permanently monogamous, cooperatively breeding birds that can live up to 15 years (Woolfenden and Fitzpatrick 1984, 1996). Group sizes range from simple pairs to extended families of up to eight individuals. Each group typically contains a single mated pair plus offspring from one or more preceding breeding seasons. Reproductively mature “helpers” may remain on their natal territories for up to several years and assist their parents in defending the territory, surveying for predators via “sentinel” behavior, and feeding nestlings and fledglings.

Group members spend virtually every minute of their lives within their oak scrub habitat, often foraging on or near the ground or perched on high, exposed perches. Their optimal habitat always contains significant areas of bare sand, within which they cache thousands of acorns each fall. Nesting takes place from late February through early June, with a peak in April and May. Nests are placed in dense shrubs (most often in scrub oaks), usually about one meter above ground, and typically located at the edge of an oak thicket near an open area. Clutch size is 2 to 5, and fledgling brood sizes vary from 1 to 4. Juveniles are brown-headed, and remain dependent on parents and older group members for food and protection until mid-summer. They molt into essentially adult plumage during the early fall.

From a conservation standpoint, an important feature of the Florida Scrub-Jay is that its territories are relatively large compared to the home ranges of other rare and threatened plants and animals. Therefore, this jay represents a classic “umbrella” species: protecting scrub habitat in sufficient area to secure a local population of Florida Scrub-Jays also serves to protect virtually all the other plants and animals that share its ecosystem. Most places where the Florida Scrub-Jay occurs also harbor significant populations of dozens of other rare plant and animal species, many of which also appear on State and Federal

protected-species lists. Hence, focusing on protecting the Florida Scrub-Jay provides a good proxy for a multiple-species habitat protection plan.

1.7 Need for a Recovery Plan in Sarasota County

As identified in the Florida Scrub-Jay recovery Plan (U.S. Fish and Wildlife Service 2006), the main cause of the Florida Scrub-Jay's dramatic population decline, including its complete disappearance from hundreds of specific sites across its historic range, is outright habitat loss.

Most patches of scrub habitat still containing Florida Scrub-Jays in southwestern Florida are on the driest soils of southern Sarasota County, Manatee County, and Charlotte County, (see Appendix 3, Figure A3-2). All these areas are undergoing explosive growth in real estate development, so that even the most rural portions of these counties are under huge pressure for new residential housing. As a result, protection of key scrub parcels within these high-growth areas is absolutely essential if the Gulf Coast populations of Florida Scrub-Jays (Stith et al. 1996) are to be maintained long-term.

Rather than developing individual HCPs for each landowner and real estate developer, an organized, regional approach to habitat protection provides a far more effective avenue for long-term stabilization of Florida Scrub-Jay populations in Sarasota County. Such a plan would provide for accumulation of funds through mitigation and impact fees mostly intended for off-site mitigation. Besides relieving the individual parties from the burden of developing their own HCP, this approach also presents a cost-effective method whereby the developers and the Federal, State, and local governments can ensure that the most valuable scrub remnants are being preserved and managed for long-term benefit of FSJs.

Throughout Sarasota County (and adjacent counties), the human population is growing explosively. For example, between 1990 and 2000 Sarasota County's population grew by seventeen (17) percent. Most of Sarasota's anticipated growth over the next decade will continue to occur in the southern and southeastern districts, which coincides with the location of the highest concentrations of Florida Scrub-Jays. Development eventually could fragment, degrade, and ultimately eliminate virtually every remaining tract of Florida Scrub-Jay habitat in the County.

A thorough census conducted by Sarasota County personnel in 2000 confirmed the existence of 171 Florida Scrub-Jay families, represented by a minimum of 466 individuals. These jays occurred in three distinct metapopulations, each of which overlaps with adjacent counties (Stith et al. 1996). In 2004-2005, as a component of this HCP process, we again surveyed the entire county. Alarming, only 132 families were

documented during this re-survey, indicating a 23% loss over just five years (see Appendix 1 for details). Clearly, if this trend is to be reversed, concerted and well-planned conservation action must commence immediately.

Developing a countywide plan is essential now. Traditional regulatory methods to protect Florida Scrub-Jays from the effects of habitat loss have been met with limited success. As a result, nearly half of Sarasota County's FSJ families now exist amidst suburban settings, where little habitat remains and local populations are declining precipitously. Currently, only about 57 FSJ family groups live on protected lands, while almost half of the County-wide population lives in suburban settings where juvenile survival and adult recruitment rates are significantly diminished (see Table 4-1, below). Those few jays that live in more or less natural settings on private lands in the County are under ever-accelerating risk of losing their habitat to residential or commercial development. Fewer than 2,000 ha (5,000 acres) of scrub habitat still exist in Sarasota County, and only about 420 ha (1,000 acres) of this habitat are currently under any form of protection.

The current draft revision of the Florida Scrub-Jay Recovery Plan (U.S. Fish and Wildlife Service 2006) includes the following specific action objectives designed to foster recovery of the species:

- Restore and/or manage and monitor protected scrub habitat;
- Acquire (or otherwise protect), restore and/or manage, and monitor scrub habitat on private lands;
- Update scrub-jay surveys and habitat mapping in selected recovery units;
- Re-introduce scrub-jays (when deemed necessary) into restored areas of selected recovery units; and
- Continue research to answer questions about scrub-jay biology and behavior.

From the standpoint of the Florida Scrub-Jay across its entire range, protecting significant areas of scrub habitat in Sarasota County is vitally important to the recovery of this Threatened species as a whole. Sarasota County harbors the largest remaining population in western Florida, where the jays have been identified as a genetically distinct subpopulation (McDonald, et al 1999; Coulon et al. MS). Scrub habitat and jay populations in Sarasota County also serve as "stepping stones" that link populations in adjacent counties together along the Gulf Coast.

Sarasota County seeks to balance long-term protection of its Florida Scrub-Jays with continued economic growth and sustainability by developing this comprehensive, biologically defensible, countywide Habitat Conservation Plan. Its specific objective is to identify very explicitly the network of habitat preserves that can provide the best

reasonable assurance that the Florida Scrub-Jay will persist for a hundred or more years within the County.

2.0 ENVIRONMENTAL SETTING OF SARASOTA COUNTY

2.1 Overview

As a coastal county with a major river system and substantial upland areas, Sarasota County possesses a variety of habitats that are vital for the wildlife of the area, including a large number of species listed as *Threatened*, *Endangered*, or *Species of Special Concern*. Coastal wetlands, mangroves and tidal marshes improve water quality, act as storm buffers, provide shelter for coastal wading birds, and have primary roles in the important and complex estuarine food chain linking the land and freshwater with the sea. Coastal strand provides primary habitat for numerous species of concern, including the American Oystercatcher, Piping Plover, Snowy Plover, Roseate Tern, and Least Tern. Mangroves and marsh habitats provide shelter for wading birds and additional listed species (e.g., Brown Pelican, Wood Stork, and Roseate Spoonbill, and Bald Eagle).

Uplands also provide habitat for a number of rare species. Pine flatwoods provide habitat for the rain lily, gopher tortoise, American Kestrel, and Sherman's fox squirrel. Red-cockaded woodpecker historically occurred in Sarasota County, but is now extirpated. Grassy dry prairies provide habitat for the Crested Caracara, Sandhill Crane, and Burrowing Owl. Pine flatwoods and prairies are also used by the eastern indigo snake and bobcat.

Wetland habitats associated with uplands are vital habitats for many species of wading birds and amphibians. Sarasota County has a strong program to protect wetlands and requires at least a 1:1 replacement for unavoidable destruction of wetland habitat.

For Florida Scrub-Jays, sand pine scrub and scrubby flatwoods are the vital habitats, and these are essential to several other rare species as well (e.g, gopher tortoise, eastern indigo snake, gopher frog, Florida mouse, and Florida coontie). According to the Florida Department of Environmental Protection, "Scrub outside the Ocala National Forest and other publicly owned lands should be considered to be highly endangered." Sand pine scrub, a habitat of low growing oaks and scattered sand pines, is considered the "most distinct habitat in Florida and maybe one of the rarest habitats in North America." Indeed, sand pine scrub is especially rare in Sarasota County.

2.2 Topography/Geology

The subsurface geology and subsurface features of Sarasota County are directly related to historic sea level fluctuations, near-shore deposition of sediment, precipitation of chemicals directly from seawater, and accumulation of the skeletal remains of marine organisms. These geologic formations range in age from the Oligocene epoch (38 to 22.5 million years ago) to the Holocene epoch (10,000 years ago to present).

Surface and near-surface sediments consist of quartz sand, consolidated and unconsolidated shell beds, clays, limestone, and dolomite. Stratified layers of relatively pure limestones and phosphatic clays (clays rich in phosphate, salts of phosphoric acid) developed gradually in Sarasota County. Quartz sands that eroded from exposed higher land were also deposited. These near-surface sediments, which occur within approximately 1,500 feet of ground elevation, were of major importance to settlement because of their capacity to store and/or contain potable water. In addition to supplying water, the marine sediments provide phosphate and other mineral resources.

2.2.1 Mineral Resource Development

Nearly the entire area east and north of I-75 in the county contains sand and gravel deposits that support several commercial sand and gravel mining operations. Known phosphate deposits in Sarasota County are relatively small and phosphate mining has focused on the extensive deposits in adjacent counties (especially Polk and Manatee).

In 1982, Sarasota County adopted an ordinance that limits mining activities to areas designated as Rural on the "Future Land Use Map". However, mining activities are prohibited within designated areas of special environmental significance and/or sensitivity. The watersheds of Cow Pen Slough, the Myakka River, and the Braden River are designated areas of special environmental significance.

Shell is excavated in certain parts of the county to be used for construction projects such as roadways. These commercial earthmoving enterprises provide a valuable service and positive economic benefit to the community. Earthmoving operations such as shell excavation may cause adverse impacts to watersheds, drainage patterns, native habitats, air and water quality, land use compatibility and roads, and may create erosion and sedimentation problems. The county's Earthmoving Ordinance (No. 81-060, as amended) contains provisions for protecting the integrity of the environment and meeting the social and economic needs of Sarasota County residents. Mining of other materials is regulated in accordance with Sarasota County Ordinance No. 82-111.

2.2.2 Surface Features

Sarasota County is physiographically defined by a series of marine scarps and terraces that developed during the Pleistocene epoch. These terraces, combined with the underlying marine sediments, are responsible for Sarasota County's topography, which ranges in elevation from mean sea level along the coast and the lower Myakka River to a height of 95 feet in the northeast corner of the county near Verna.

The County's generally flat topography is characterized by isolated swamps and marshes, which connect into sloughs and meandering streams. Depressions in the landscape seasonally fill with water and form intermittent ponds. Series of ponds often link together during heavy rains to create shallow and slow-moving waterways, while streams may form when flow, volume, and velocity increase. This topography results in a very slow rate of storm water runoff. The County lies within three physiographic provinces: the Gulf Coastal Lowlands, the Desoto Plain, and the Barrier Island Chain (Fig. 2-1). The majority of the County is in the Gulf Coastal Lowlands province, which ranges in elevation from sea level to approximately 40 feet. The Myakka River is the principal feature of the Gulf Coastal Lowlands. The Myakka, along with its tributaries, is the County's largest drainage system and flows into Charlotte Harbor to the south. Several small creeks, which empty into the County's bays and estuaries, drain the coastal portion of the County. Soils in the Gulf Coastal Lowlands are generally unconsolidated sands that increase in clay content with depth. Organic soils are found underlying wetland areas.

A small part of the northeastern County lies within the Desoto Plain province. Elevations in this province range from 40 to 75 feet. Soils in the Desoto Plain are somewhat poorly drained with shallow sediments overlying organic hardpans, which are layers of strongly cemented material.

The Barrier Island Chain province is a dynamic system of barrier islands, inlets, and lagoons, which consists of marine and estuarine terrace deposits that were laid down at the same time as receding water created Tampa Bay and Charlotte Harbor. River valleys were eroded during the periods of receding seas and vast quantities of sediments were transported offshore. The riverine sediments, combined with shells and other materials, gradually washed landward to form the Barrier Islands. The bay waters shaped by these dynamic features include Sarasota Bay, Little Sarasota Bay, Dona/Roberts Bays, and Lemon Bay. Elevations on the Barrier Islands are generally less than 15 feet.

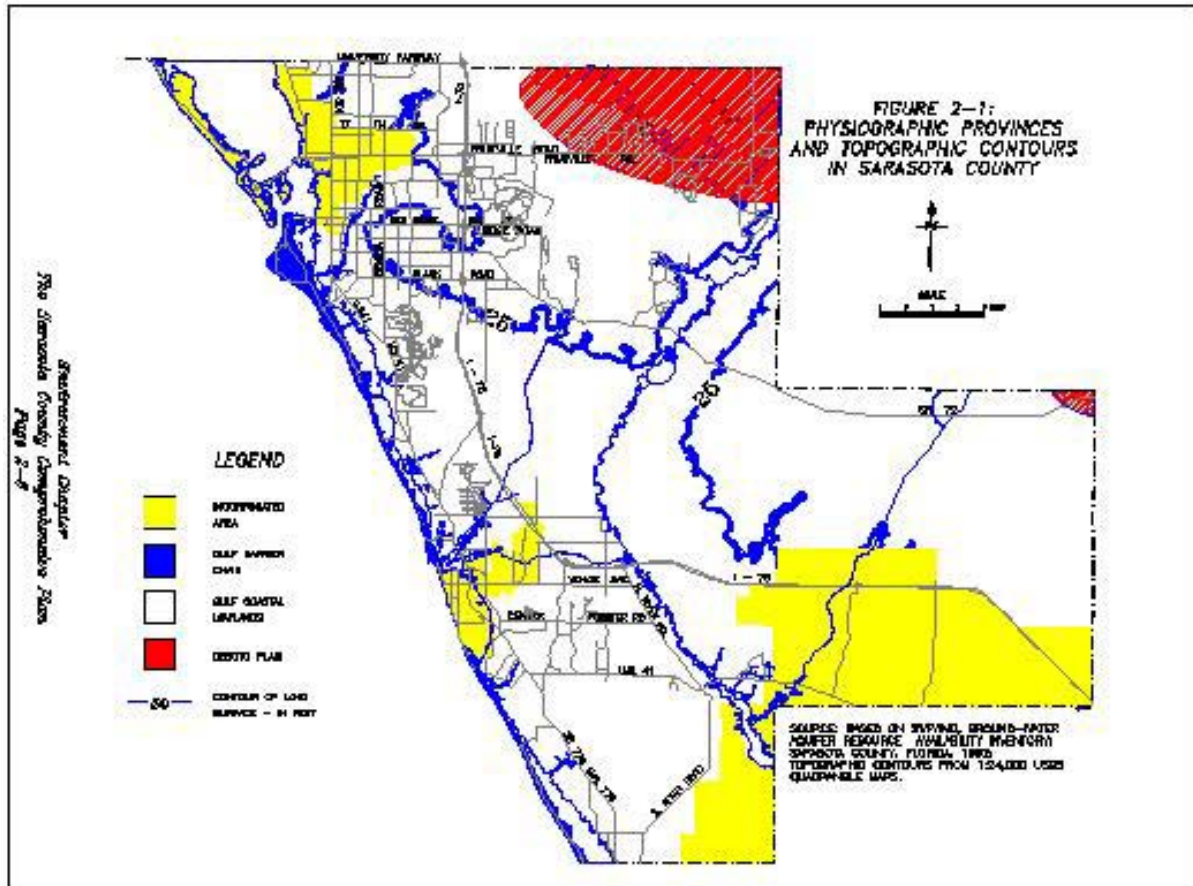


Figure 2-1 Physiographic Provinces and Topographic Contours in Sarasota County. Blue denotes the Gulf Barrier Chain, white denotes the Gulf Coastal Lowlands, and red denotes the Desoto Plain.

2.2.3 Soils

Soil characteristics are determined by climate, composition of parent materials, topography, biological activity, and the duration of soil development. Sarasota's warm, humid climate causes rapid chemical and biological reactions within the soil, which eventually deplete soil fertility. Because the ground rarely freezes, these reactions continue year-round, which results in continual depletion of soil fertility. Further losses occur due to abundant seasonal rains, which cause leaching (downward movement of soluble materials by a percolating liquid). Together, the depletion of soil nutrients that are essential to plant growth and the overall reduction of soil fertility have limited the

development and distribution of intensive agriculture. The low soil fertility requires improvements for farming and large acreage of land to support livestock.

There are no widespread soil erosion problems in Sarasota County. Due to the relatively flat terrain, soils are generally stable. Under normal volumes of precipitation, the slow-moving rivers of Sarasota County create few erosional changes. Erosion does occur, though, when the rate of runoff is increased by improper or poorly designed drainage modifications that carry away topsoils. Soil erosion is also a problem during the construction activities of development. Topsoils, which are end products of thousands of years of natural buildup, are important to vegetation. Once carried off, not only are they lost to the vegetation, but they often create siltation and sedimentation problems in the receiving estuaries. To mitigate soil erosion problems created during agricultural and urban development activities, the County Natural Resources Department encourages developers to follow the Natural Resources Conservation Service (NRCS) and the Florida Department of Transportation's (FDOT) Best Management Practices.

Many soils in Sarasota County have natural characteristics that limit the ease with which they can be used for purposes such as residential/commercial development and agriculture. While poor drainage is perhaps the major limitation, others include wetness (amount of water in the soil at various times of the year), effective depth (to water and plant nutrients), depth to rock, shrink and swell behavior (changes in soil volume due to the amount of moisture), presumptive bearing value (ability of soil to sustain dead weight), and corrosion.

As a result of these limitations, major soil modifications (such as draining or excavating) are frequently necessary before areas can be developed for human use. The modifications necessary to overcome these natural limitations may destroy valuable soil and vegetation. In addition, such modifications often destroy the valuable habitats that have evolved in response to the natural characteristics of the soil. An example of this would be the destruction of wetland vegetation when naturally wet soils are subjected to improperly designed artificial drainage.

Due to the fact that well-drained soils have little surface runoff and allow fairly easy water movement, they may serve as important recharge areas for ground-water systems. With the limited extent of these soils in Sarasota County and the degree to which they have experienced urban development, undisturbed habitats associated with these soils are rare.

Riverine soils and coastal soils also serve valuable environmental functions. Riverine soils are important for water-table recharge, flood control (by storing excess water), and filtration of stormwater runoff; they also serve as transition areas along riverbanks and

support hammock and freshwater marsh vegetation. Coastal soils, in turn, are important stabilizers of shorelines, act to filter runoff, and support coastal strand vegetation, including mangroves and salt marshes.

Table 2-1 identifies the characteristics for five broad soil categories: Coastal Islands, Hammocks, Flatwoods, Depressions and Sloughs, and Floodplains. Figure 2-2, which is adopted as part of the Future Land Use Map Series, identifies general soil associations, including floodplain associated soils and mineral resources in Sarasota County. Due to the generalized scale, the soils map is not suitable for specific planning purposes. Refer to the detailed soil map in the United States Department of Agriculture Soil Conservation Service (SCS) publication, "Soil Survey, Sarasota County, Florida," for a detailed description of soil types.

<u>Coastal Islands</u>	
Slope	Nearly level to gently sloping
Drainage	Moderately well to very poor
Soil Associations	Canaveral, Beaches, Kesson
Location	Sandy beaches, coastal dunes, low mangrove areas
Comments	Sandy, contains shell fragments
<u>Hammocks</u>	
Slope	Nearly level
Drainage	Poor to very poor
Soil Associations	Wabasso, EauGallie, Felda
Location	Generally both sides of Myakka in a narrow strip
Comments	Dark-colored subsoil, upper part sandy, lower part loamy

Table 2-1 (continued on next page): Sarasota County Soil Characteristics by Category. Source: U.S. Dept. Of Agriculture, Soil Conservation Service, Gainesville, Fl., March 1985.

Flatwoods

Slope	Nearly level
Drainage	Moderately well to very poor
Soil Associations	EauGalle, Myakka, Holopaw, Pineda, Pomello
Location	Throughout Sarasota County (except Barrier Islands, floodplains, mangrove swamps)
Comments	Largest category in County (approximately 83%)

Depressions/Sloughs

Slope	Nearly level
Drainage	Very Poor
Soil Associations	Floridana, Felda, Holopaw, Delray
Location	In depressions in eastern part of County
Comments	Sandy soils, Floridana used for improved pasture and truck farming.

Floodplains

Slope	Nearly level
Drainage	Poor to very poor
Soil Associations	Delray, Felda, Pompano, Kesson, Wulfert
Location	Mangrove swamps at mouth of Myakka River and Roberts Bay
Comments	Very poorly drained

Table 2-1 (continued from previous page): Sarasota County Soil Characteristics by Category. Source: U.S. Dept. Of Agriculture, Soil Conservation Service, Gainesville, Fl., March 1985.

2.2.4 Air Quality

The Sarasota County Natural Resources Department has been monitoring air quality since 1978. Four (4) air-quality parameters have been measured at a variety of monitoring sites; ozone, carbon monoxide, particulate matter, and sulfur dioxide are monitored on a continuous basis (twenty-four hours a day, seven days a week). Particulate matter is also monitored by another method every sixth day for twenty-four hours. A monitoring plan for ambient air was approved by the Board of County Commissioners in January 1987.

Air quality in the County is considered good and has not exceeded the Environmental Protection Agency's (EPA) and Florida Department of Environmental Protection's (FDEP) established standards to date. In the future, meeting these standards may be more difficult due to ozone pollution associated with the increasing number of automobiles in Sarasota County. The impact, extent, and form of future growth should be considered to determine what effect it would have on local air quality. The Air Quality Section of the Pollution Control Division reviews permit applications in Sarasota County and has representation on the Sarasota/Manatee Metropolitan Planning Organization's Congestion Management System Task Force. Sarasota County's Local Air Pollution Control Program complies with the Florida Air and Water Pollution Control Act, Chapter 403 Florida Statutes.

2.2.5 Streams, Rivers, Drainages

Water is among Sarasota County's most important natural resources. There are four freshwater-bearing aquifers in Sarasota County: the surficial aquifer; two intermediate aquifers (Tamiami-upper Hawthorn and Lower Hawthorn-upper Tampa); and the Floridan aquifer. Most of the County's consumptive water use is derived from these aquifers.

2.2.5.1 Surface Water Systems

Surface water is collected by streams and lakes, numerous sloughs, ponds, and swampy areas. Rainfall accounts for the majority of surface water in the County. However, due to the flat terrain typical in Sarasota County, there is little gravitational impetus for stream flow and not all of the rainfall is retained as part of the surface-water system. According to the Southwest Florida Water Management District (SWFWMD), only 30 to 35 percent of the rainfall contributes to that system through surface-water runoff. The balance is lost to evapotranspiration (65-70 percent) with a small amount (5 percent) recharged into the ground-water system.

The Myakka River, the largest natural drainage system in Sarasota County, drains approximately 540 square miles. Several creeks and shallow sloughs – including Phillippi

and Howard Creeks, and Cow Pen, Deer Prairie, and Big Sloughs – drain the County's lowlands. The Upper and Lower Myakka Lakes are the County's two largest bodies of freshwater. Together the two lakes cover approximately 1,380 acres.

2.2.5.2 Floodplains

There are four major floodplains in the County: Phillippi Creek; Cow Pen Slough; the Myakka River; and Big Slough (also known as the Myakkahatchee Creek). While some development has occurred within each of these floodplains, the Phillippi Creek floodplain is the most urbanized. Since much of the County's settlement occurs in the coastal lowlands, where the majority of population is located within the 100-year floodplain, many residential and agricultural areas have experienced flooding.

Excess volumes of water that enter the County's meandering channels and wide floodplains create flooding owing to low elevations and flat terrain. In 1962, severe flooding of the County's urban and agricultural areas spurred a series of structural modifications to drainage systems (for example Phillippi Creek, Cow Pen Slough, and Big Slough). These natural meandering streams were replaced with straight, box-cut channels. During periods of intense and prolonged rainfall, stormwater rapidly drains through the channelized streams into the County's bays and estuaries. This rapid runoff increases sediment loading, pollution, and freshwater influx into the bays, and can result in severe damage to the estuarine waters. Nutrients, pesticides, solid wastes, bacteria, heavy metals, and petroleum products have been found in stormwater runoff.

Channelization also reduces the capacity for natural water storage by placing greater stress on existing drainage systems and increasing the potential for downstream flooding. In the natural drainage system, when a heavy rainfall generates large volumes of runoff, excess surface water is stored in the floodplain and is gradually drained by the natural wetland waterways. Development can also produce flooding in areas not normally flood prone. When fill and/or impermeable surfaces are placed within the floodplain, flooding occurs because natural stormwater retention areas have been displaced. Vegetation buffers along the shore and adjacent to wetlands are at least partially intended to protect the natural function of floodplains and flood-prone areas.

2.2.5.3 Surface-Water Quality

Several water bodies in Sarasota County have been designated Outstanding Florida Waters (OFWs). The Outstanding Florida Water designation was developed to provide additional protection to special waters recognized for their ecological and recreational significance. OFWs in the County include Sarasota Bay, Little Sarasota Bay, Lemon Bay, and the Myakka River. The exceptions within these waters include two areas of

degradation at the mouth of Whitaker Bayou and Phillippi Creek. Sarasota Bay, Little Sarasota Bay, and Lemon Bay were designated OFWs in February 1987. In 1988, the OFW designation for the Myakka River was extended to cover its entire length within the County. This designation provides these waterbodies with the highest degree of protection under the FDEP permitting policy. In general, direct discharges into an OFW cannot lower ambient water quality in the year prior to designation, while direct discharges cannot significantly degrade the OFW. These provisions are predicated on the antidegradation concept, which states that degradation should not occur except after full consideration of the consequences and then only to the extent necessitated by desirable economic and social development. Designation as an Aquatic Preserve by FDEP provides additional water-quality protection to Lemon Bay.

According to FDEP surface water classifications, surface waters in the County are designated as follows: Class I, potable water supply; Class II, shellfish propagation or harvesting; and Class III, recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The Class I waters include Big Slough Canal to US 41, the Myakka River south to I-75, and the Upper and Lower Myakka Lakes. Class II waters include the western half of Sarasota Bay in the County, Lemon Bay from Forked Creek south to the County line, and a portion of the Myakka River between US 41 and the south County line. The remaining surface waters in Sarasota County are Class III surface waters. The Myakka River in Sarasota County has also been designated a State Wild and Scenic River.

2.3 Vegetation Important to Florida Scrub-Jays

Florida Scrub-Jays have very specific habitat requirements, as summarized extensively in a number of publications (Woolfenden 1978, Woolfenden and Fitzpatrick 1984, 1996, Fitzpatrick et al. 1991, Breininger and Morris 1982, Breininger et al. 1995, 1998, 2006, Breininger and Carter 2003). All these studies conclude that the species resides and reproduces successfully only in the presence of low-growing xeric oak scrub, a plant community restricted to well-drained sandy soils and unique to the peninsula of Florida. The following sections describe the characteristics and values of scrub habitat, along with current threats to persistence of this habitat in Sarasota County

2.3.1 Xeric Scrubs

The best examples of scrub habitat are dominated by several species of stunted, xeric-adapted oaks, especially sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*), Archold or inopine oak (*Quercus inopina*), and Chapman oak (*Quercus cahmpanii*). Besides oaks, the habitat typically contains saw palmetto (*Serenoa repens*),

scrub palmetto (*Sabal etonia*, Lake Wales Ridge only), scattered sand pine (*Pinus clausa*), and rosemary (*Ceratiola erocoides*). A widespread variant of oak scrub known as “scrubby flatwoods” occurs on sandy soils containing slightly more moisture. This formation has scattered slash pines (*Pinus elliotii*), wiregrass (*Aristida stricta*), runner oak (*Quercus minima*), and a number of other woody shrubs in the genera *Lyonia* and *Ilex*.

2.3.2 Sand pine scrub, scrubby flatwoods, turkey oak ridges

The early history of settlement in Sarasota County is clearly associated with the high, dry scrubs, sand pine scrub, and scrubby flatwoods. The communities of Myakka, Fruitville, Englewood, Venice, Nokomis, Osprey, Vamo, Laurel, and the City of Sarasota all were located on high, dry scrubs, probably dominated by sand pines. The process of settlement has all but obliterated sand pine scrub from the County.

Intact scrub in its pure form is dominated by dwarfed, tangled-looking oaks, widely interspersed with pine trees. Scrub in Florida grows on extremely well-drained, light-orange to white, sandy soils --generally similar to modern sand dunes. Indeed, most of today’s scrubs are the remains of prehistoric wind or water-deposited dunes. Sarasota’s scrub soils differ from its dune soils in that the latter are alkaline (owing to the presence of shell material), while the former are usually acidic (owing to thousands of years of leaching by rainfall). Sarasota’s scrubs are mainly deposited near the coast and as levies bordering the major natural waterways. Restoration of scrub vegetation on appropriate, xeric soils where it once occurred (e.g. under old citrus groves) is a growing opportunity for communities throughout Sarasota County.

Sand Pine Scrub is characterized by the presence of sand pines – a short, fast-growing, pine with short needles, which can begin producing viable seeds as few as ten years after germinating. In pre-settlement conditions, sand pines were usually killed by the frequent wildfires that spread across the landscape. Fire clears the ground of competing vegetation and causes sand pine cones to open, releasing viable seeds. Rosemary (*Ceratiola ericoides*) and abundant epiphytic lichens are also characteristic sand pine scrub plants. Many plants endemic to Florida are found in sand pine scrub, including several that occur or once occurred in Sarasota County. A population of crowned snakes (*Tantilla relictta*) has been recorded, and gopher frogs and gopher tortoises occur in the County’s scrub areas. Sand pine scrub in Sarasota County appears to be confined to Orsino or Pomello fine sands. Together, these two soils originally accounted for less than one percent of the County. Remnant stands of sand pine scrub are found on the Englewood Wellfield and east of the eastern end of Fruitville Road. Every effort should be made to preserve these remaining areas. Sand pine scrub is widely recognized as one of the most endangered habitats in Florida.

Scrubby Flatwoods may lack sand pines altogether, but do have scrub oaks as the dominant vegetation interspersed with scattered slash pines. Scrubby flatwoods are found on sandy soil (especially Cassia fine sand or Pomello fine sand) that is slightly nearer to the water table than those soils supporting sand pine scrub. These are especially prevalent near original waterways. Phillippi Creek, South Creek (Oscar Scherer State Park), and Shamrock Park and Nature Center are good examples of scrubby flatwoods in Sarasota County.

Turkey Oak Ridges. A few widely scattered examples of sand ridges dominated by turkey oak (*Quercus laevis*) occur in Sarasota County, and these can serve as stop-over points for dispersing Florida Scrub-Jays. One patch exists near the corner of Hauri Road and 42nd Street, on Lakeland soils, others are located at the eastern terminus of Fruitville Road and in a northern section of Myakka River State Park.

2.3.2.1 Values of scrub

Scrub soils are nutrient poor, high in elevation, well-drained, and often located near water because they were deposited as beach or alluvial sediments. Scientifically, these habitats are of enormous importance in that they support numerous unusual species of both plants and animals that are adapted to frequent fire, low nutrient availability, intermittent water, and naturally patchy distributions. The relatively high number of threatened, endangered, or rare plants and animals found in scrubs reflects the endemic nature of these species. Many Florida scrub plants and animals are endemic to the state. Because the scrubs of Florida's southwest coast were never extensive, and because they were always so popular for development, the habitat itself must be regarded as endangered. For the expanding human population of Sarasota County these habitats typically serve as local aquifer recharge areas.

2.3.2.2 Threats to scrub

Urbanization. As early settlers of Florida chose town sites for their elevation around surrounding wetlands, many scrub areas were all but obliterated early in the settlement of the peninsula (until 1977, the sand pine with the largest diameter in the State stood in a vacant lot in downtown Sarasota.)

Recreational Use. The few remaining examples of high, dry scrub are relatively small and sensitive. FDEP considers both foot and mechanized traffic to be major threats to scrub systems. ATV trails are especially prevalent in rural areas containing native scrub.

Nuisance and Invasive Vegetation. Although intact scrub is quite resistant to colonization by non-scrub plants, scrub that has been mechanically disturbed (especially where located

along waterways) is prone to contamination by alien exotic species such as Brazilian pepper and various tropical grasses.

Exclusion of Fire. Fire is a natural force in many plant communities, such as turkey oak ridges, sandhills, pine flatwoods and scrub. Without fire, these communities tend to succeed into xeric hammock and, ultimately, become oak forests. These structural changes progressively alter both the micro-climate underneath the dominant overstory and the animal communities that can live in this habitat. In general, species that are unique to periodically burned scrubs slowly disappear in the absence of fire. The Florida Scrub-Jay is among these highly fire-dependent species. Prescribed fire is used often in Florida to maintain the variety of plant communities, to approximate natural conditions, and to reduce the chances of devastating wildfires.

2.3.3 Pine flatwoods and prairies

The pine prairie is Sarasota County's "background" habitat, against which other less extensive habitats stand out. Located on nearly level, acidic and poorly drained beds of sand left by receding seas, the pine prairies are characterized mainly by slash pine and saw palmetto, with herbaceous ground cover. From the Gulf of Mexico near the Venice Airport to the northern, eastern, and southern boundaries of the County, pine flatwoods and dry prairies (collectively called "pine prairies") remain the County's most extensive natural habitat.

Large areas of pine prairie remain within Sarasota County, although these are somewhat altered by timbering, turpentine production and cattle ranching. Barbed wire fences and cattle are common sights today on the pine prairies, which ranchers call "native range." The soils of this habitat are predominately sandy, with moderate permeability and a seasonal high water table within one foot of ground level. These soil characteristics limit downward percolation in the wet season and restrict upward movement in the dry season. The result is a habitat that may be very wet at times and very dry at others.

The pine prairies are perpetuated and rejuvenated by fires. Saw palmettos sprout green leaves with seemingly undiminished vigor just a few days after a fire. When fires do not occur, shrubby hardwoods invade and ultimately change the habitat by creating upland hammocks.

Pine Flatwoods. Sarasota County has extensive areas of native pine flatwoods, approximately 35 percent in 1995. The longleaf pine (*Pinus palustris*) approaches the southern limit of its range in Sarasota County. Knowledge of the original and current extent of longleaf pines in the County is incomplete; but the remaining longleaf pines may be found on undisturbed, relatively dry flatwood ridges. Slash pine flatwoods are

typically dominated by such well-known plants as slash pine (*Pinus elliotti*), saw palmetto (*Serenoa repens*), and wax myrtle (*Myrica cerifera*). EauGallie fine sand, Ona fine sand, Smyrna fine sand, Wabasso fine sand, Myakka fine sand, and Ft. Green fine sand soils frequently support slash pine flatwoods. In the southern area of the County, cabbage palms (*Sabal palmetto*) are frequently encountered within these flatwoods. Pople, Bradenton, and Malabar soils support a habitat variant, sometimes referred to as "cabbage palm flatwood."

Dry Prairies are now commonly thought of as flatwoods without the trees. Many original dry prairies were at one time true prairies of grasses and other herbs, notably wire grass (*Aristida stricta*). Little is known of the current status of grassy dry prairies in Sarasota County. Some grassy dry prairies are located within Myakka River State Park and the adjacent lands acquired through the Save Our Rivers Program. FDEP regards dry prairies as "highly endangered," owing to conversion into improved pasture. Native saw palmetto prairies contain many members of the heath family (*Ericaceae*), including blueberries, staggerbush, and fetterbush. Dry prairies are frequently found on Myakka fine sand, Wabasso fine sand, Ona fine sand, EauGallie fine sand, Smyrna fine sand, and Ft. Green fine sand soils.

2.3.3.1 Values of pine flatwoods and dry prairie

Agricultural. Many cattle-raising operations in Sarasota County rely on native range, or a combination of native and improved prairie pastures. A balance of native range and improved pasture is advantageous because the more native landscape is well-adapted to drought and requires little maintenance.

Habitat. Game species – deer, quail, rabbit – are commonly found in the pine prairies. In addition, a number of relatively rare species are found in this habitat, including the burrowing owl, the Audubon's crested caracara, and the red cockaded woodpecker (although no red cockaded woodpeckers are known to occur in Sarasota County). Gopher tortoises, gopher frogs, and Sherman's fox squirrel, all species of special concern, are known to utilize pine prairies in Sarasota County. Bald eagles nest below the canopy of mature slash pines in this habitat.

2.3.3.2 Threats to pine flatwoods and dry prairie

Agriculture. Ranchers are, paradoxically, major forces in both the protection and the demise of the pine prairies. Land-clearing and vegetable-raising often precede the conversion of pine prairies to improved pasture. Timbering can also change the habitat.

Invasion. In the South County area particularly, the invasion of the punk tree (*Melaleuca leucadendron*) is threatening many stands of pine prairie. Virtually impossible to eradicate and very difficult and expensive to control, punk tree invasion threatens most known flatwood functions with the possible exception of timber production.

Residential Development. With the human population of Sarasota County burgeoning, the clearing of undeveloped land inland from the coast has become rampant virtually throughout the County. Developers are now depending mainly on the pine prairies, the hammocks, and other relatively dry inland habitats for most new development sites.

2.4 Species of Concern in the Plan Area

Although this countywide Habitat Conservation Plan is intended for securing Incidental Take Permits for only the Federally-listed Florida Scrub-Jay, a total of nine scrub-endemic species currently or historically occurring in Sarasota County (and listed on various state or federal lists) will be positively affected by the creation of this Plan (Florida Scrub-Jay, Gopher tortoise, Eastern indigo snake, Gopher frog, Florida mouse, Florida Coontie, Custiss' milkweed, Florida goldenaster, and Florida bonamia). The most important of these, besides the Florida Scrub-Jay, are described briefly here.

2.4.1 Gopher Tortoise

In Florida, the gopher tortoise (*Gopherus polyphemus*) is a state-listed Species of Special Concern. Only four species of land tortoises remain in North America, three of which reside only in the Southwestern United States and Northern Mexico. Only the gopher tortoise resides in the Southeastern United States, where it is found in upland habitats along the coastal plain.

The gopher tortoise digs burrows deep in dry upland areas, including longleaf pine sandhills, xeric oak hammocks, scrub, pine flatwoods, dry prairies and dunes. The habitat must have sandy soil, herbaceous plants for food, and some open sunny areas. Periodic fire is essential in keeping the canopy open, promoting growth of ground-level food plants.

Burrows created by gopher tortoises provide refuge to many other animals, some of which are threatened species in their own right. These include the Eastern indigo snake, Florida pine snake, Gopher frog, Florida mouse, Burrowing owl, and Gopher cricket. Gopher tortoises typically breed from April to June. Public access to burrows should be restricted during these months, or longer, as necessary to protect nests and hatchlings, according to sources within the Florida Fish and Wildlife Conservation Commission.

The Gopher Tortoise Council notes that a highly contagious upper respiratory tract disease (URTD) has been observed in gopher tortoises in Florida, Georgia, and Mississippi, as well as in desert tortoises in the Western United States. Tortoises can be “silent” carriers and pass along the disease without themselves exhibiting any symptoms. The Council further notes that at one California preserve for desert tortoises, the release of sick captive tortoises may have been a factor in the 90 percent decline of tortoises living in the preserve. Therefore, while Florida requires testing of tortoises prior to relocation, the risk of spreading disease and destroying previously unaffected tortoise populations is significant. Establishment of large-scale preserves and mitigation banks for Florida Scrub-Jays will contribute to the preservation of gopher tortoises, and clearly provides the biologically preferable alternative to tortoise relocation as a mitigation strategy.

2.4.2 Eastern Indigo Snake

The federally threatened Eastern indigo snake (*Drymarchon corais couperii*) is a large, docile, non-poisonous snake that reaches a maximum length of more than 2.5 meters. The color in both young and adult snakes is a shiny bluish-black, including the belly, with some red or cream coloring about the chin and sides of the head. The indigo subdues its prey (including venomous snakes) through the use of its powerful jaws, swallowing the prey usually still alive. Food items include snakes, frogs, salamanders, toads, small mammals, birds, and, occasionally, young turtles.

At one time, this distinctive subspecies of indigo snake was found in Georgia, South Carolina, Alabama, Mississippi, and all along the Florida peninsula, but today it is confined to Georgia and Florida. Its numbers and habitat are sharply declining. In most areas it is strongly associated with high, dry, well-drained sandy soils, closely paralleling the sandhill habitat preferred by the gopher tortoise and Florida Scrub-Jay.

2.4.3 Gopher Frog (*Rana capito aesopus*)

The gopher frog is a large, stout-bodied frog scattered throughout most of the Florida peninsula in moist meadows, prairie woodlands, and pine scrub. They are cream-to-brown colored, with irregular dark spots on their backs and sides. Gopher frogs will travel great distances, as much as a mile or more, to breed in temporary ponds year-round, laying eggs in shallow water, sometimes attached to vegetation. As adults, they occupy upland habitats, mainly living in active gopher tortoise burrows. They may also use a stump hole or the abandoned burrow of a small rodent. They are nocturnal, and seldom range far from their daytime retreat. Their call is a deep guttural snore, and heavy rains at any season may stimulate choruses in which dozens may call at once. Because of

habitat destruction, the gopher frog has become rare across the entire southern portion of its range. It is listed as a species of special concern in Florida.

2.4.4 Florida Mouse (*Podomys floridanus*)

This large mouse (7.3 -8 inches = 179 -203 mm, including tail) is found exclusively in the xeric uplands of central Florida, where it often inhabits the burrows of gopher tortoises. It is distinguished from all other mice within its range by the presence of five plantar tubercles on the hind feet (versus six or seven in *Peromyscus* spp.). This mouse remains reasonably common locally, but only in native xeric upland communities with sandy soils, including scrub, sandhill, and turkey-oak ridges. The largest populations occur within Ocala National Forest and the scrubs along Lake Wales Ridge, where its future depends on the continued protection of native scrub habitat. Prescribed burning is essential for maintaining openings in scrub and encouraging the growth of grasses and forbs important for food and cover. Protecting populations of gopher tortoises is also essential for creating optimal conditions for Florida Mouse. Significant preserves and mitigation banks for Florida Scrub-Jays will also preserve substantial populations of this species of special concern in Florida, including Sarasota County.

2.4.5 Florida goldenaster (*Chrysopsis floridana*)

This federally endangered, perennial herb grows in open, sunny areas on excessively-drained fine white sand, especially in sand pine scrub and dry scrubby-flatwoods. Formerly, the species also grew on beach dunes. It forms rosettes with leaves that are covered with dense, white, short-wooly hairs. Upright stems emerge from these rosettes in late summer to produce showy plants up to half a meter tall, bearing yellow flower heads arranged in a more or less flat-topped cluster. Individual plants are relatively short-lived, and reproduction occurs strictly by seeds, which are wind-dispersed.

The Florida golden aster is currently known only from Hillsborough and Hardee Counties, but was collected in recent years near Bradenton in Manatee County, and in Pinellas County. Therefore, the possibility that it exists in De Soto and Sarasota Counties warrants further research and inventory.

2.4.6 Florida bonamia (*Bonamia grandiflora*)

The only morning glory vine with large, blue flowers in Florida scrub vegetation, the federally threatened Florida bonamia is a perennial with sturdy prostrate stems about a meter long. It has leathery, oval or ovate leaves, up to about 4 centimeters (1.6 inches) long, either upright or spreading. The flowers are solitary in the leaf axils, with a funnel-

shaped corolla 7 to 10 cm long and 7 to 8 centimeters across. They are pale but vivid blue with a paler center, similar to the cultivated "Heavenly Blue" morning glory.

Florida bonamia is endemic to the Florida peninsula. Currently, its largest populations are in the Ocala National Forest, Marion County, but it also occurs in Polk County (10 sites); Orange County (5 historic sites, of which only one still existed in 1992, near Fenton), Highlands County (2 sites), Hardee County (1 site), Lake County (1 site), and Manatee County (1 site). The historic range of Florida bonamia was even wider, and included Sarasota County (collected in 1878 and 1916; Wunderlin et al. 1980), but urban and agricultural development extirpated the plant from most of its former range. It would be worthwhile to search for this plant as sand pine scrubs are restored in Sarasota County; in addition, translocations could be successful in the County's highest, driest scrubs. The plant requires sunny openings, such as those often occupied by reindeer moss (*Cladonia*), lichens, and herbs, and like other scrub endemics, prescribed burning is mandatory in order to maintain the open conditions it requires.

3.0 PROJECT DESCRIPTION/ACTIVITIES COVERED BY PERMIT

TEXT TO BE PROVIDED BY SARASOTA COUNTY

4.0 POTENTIAL BIOLOGICAL IMPACTS: TAKE ASSESSMENT

Projected activities covered by this HCP include all forms of residential and commercial development, including construction of single-family homes, multiple-unit residential complexes, commercial properties, public works projects, and all associated improvements of road and utility infrastructure to service this development, wherever these activities have the effect of displacing any amount of native habitat deemed “available” to Florida Scrub-Jays. See below for the definition of “available habitat” as it applies to this HCP.

4.1 Direct and Indirect Impacts of Development on Florida Scrub-Jays

The profound impacts of residential and commercial development where these progressively displace Florida Scrub-Jay habitat are well understood and well documented in many places, including the Florida Scrub-Jay Recovery Plan (U.S. Fish and Wildlife Service 2006). All impacts of development are negative. In the proximity of residential and commercial development, (1) adult and juvenile mortality are elevated, (2) annual reproductive success of breeding pairs is reduced, (3) overall population size declines both locally and regionally, and (4) the capacity for dispersers to move among potential habitat patches is reduced. The biological details underlying these impacts are summarized below, and they explain why, for purposes of this HCP, any development affecting available habitat within Sarasota County shall be deemed to constitute take.

4.1.1 Habitat Loss

Because Florida Scrub-Jays are habitat specialists their presence and population size in a local area are determined, first and foremost, by the presence and total acreage of existing oak scrub habitat. Each breeding pair or family group typically requires 4 to 10 hectares (10 to 25 acres) of scrub habitat. As housing density increases and/or commercial development displaces scrub, the total area of habitat available for jays declines. The net effect of any loss of scrub habitat, no matter how small the acreage, is to reduce the regional population of Florida Scrub-Jays.

4.1.2 Habitat Degradation

Florida oak scrub is a distinctive, open-structured habitat dominated by woody perennial shrubs of low stature interspersed with bare sand. In its native condition, both the structure and the species composition of Florida oak scrub were maintained in comparatively early successional condition by fires recurring at 5 to 20-year intervals. As housing density increases and/or commercial development displaces scrub, a number of habitat characteristics are altered even in patches where scrub is allowed to persist.

The most important consequence of increased human density is fire suppression, an inevitable consequence of safety precautions around human habitation. Fire suppression results in taller, denser scrub (providing more cover for ground predators), a thick leaf litter (inhibiting acorn-caching), and dense pine overstory (favoring Blue Jays and other aerial predators). Introduced shrubs (e.g. Brazilian Pepper), grasses (e.g. natal grass), and domesticated predators (especially house cats) dramatically alter ability of scrub in the immediate vicinity of human habitation to support Florida Scrub-Jays.

4.1.3 Habitat Fragmentation

As housing density increases and/or commercial development displaces scrub regionally, patches of scrub are reduced to smaller and smaller “islands” separated from one another by larger and larger areas of unsuitable habitat. Fragmentation of scrub patches is extremely detrimental to Florida Scrub-Jay populations, for many reasons. The more fragmented an area of scrub becomes, (1) the more each patch of scrub tends to lose its small population of jays simply by chance; (2) the more difficult it becomes for dispersing jays to recolonize after a local extirpation; (3) the less frequently each patch of scrub burns; and (4) the more likely each patch of scrub is to be influenced by the surrounding matrix of non-scrub habitat (edge effects). The effect of fragmentation is to accelerate the regional extirpation of Florida Scrub-Jays through an accumulation of local extirpations.

4.1.4 Nest Site Alterations

In their native habitat, Florida Scrub-Jays typically construct well-concealed nests from 1 to 2 m above ground in dense shrubs. They favor the densest oak clumps, often nesting in *Q. geminata* preferentially. In the vicinity of human habitation, especially where fire suppression has been implemented for many years, jays tend to place their nests higher above the ground than in native scrub. Often they use ornamental plantings along property-lines and hedges. Nests of Florida Scrub-Jays in suburban settings have been shown to be less successful at surviving to fledge young than in native habitat (Bowman and Woolfenden 2002). Mechanical disturbance from wind appears to be a major reason for this pattern.

4.1.5 Introduced Predators

A devastating corollary to increased housing density in the vicinity of Florida Scrub-Jays is a well-documented and dramatic reduction in the survival rates of jays during the first year post-fledging. Considerable evidence implicates domestic and feral animals, especially cats and dogs, as the main cause of this increased mortality. The effect is so

severe that Florida Scrub-Jay populations even in low-density suburban settings fail to maintain demographic parity. Where suburban populations are not subsidized by immigration from surrounding populations, they eventually go extinct.

4.1.6 Road Mortality

Comparative studies of Florida Scrub-Jay demography in settings with and without rural, paved roads show that both juveniles and naïve (immigrant) adults suffer significantly elevated mortality in the vicinity of the road. The effect is so severe that Florida Scrub-Jay populations along rural, paved roadways on average fail to maintain demographic parity. Where these populations are not subsidized by immigration from surrounding populations (especially occupying roadless habitat) they eventually will go extinct.

4.1.7 Artificial Feeding

In the vicinity of human habitation, Florida Scrub-Jays have access to a variety of novel foods. Corn, millet, sunflower seed, peanuts, bread, dog food, cat food, compost, and garbage are often available ad libitum at predictable places in or near a jay territory, hence the jays grow accustomed to feeding on these foods instead of their native fare (mostly arthropods, small vertebrates, and acorns). Studies of such populations have shown that the presence of ad libitum food frequently result in abnormally early nesting, especially during years in which local conditions cause jays in native habitat to delay nesting. Artificially early nesting during such years results in impoverishment of the nestlings, as adults are unable to provide sufficient arthropod food required by early nestlings. High nestling mortality and severe brood reduction result (R. Bowman unpubl. data).

4.1.8 Single-family Homes

Even the construction of individual single-family homes within a suburban or semi-rural mosaic has a negative impact on Florida Scrub-Jay biology and persistence, if it eliminates otherwise undeveloped oak scrub habitat and is within several km of recently or currently resident jays. This is because Florida Scrub-Jays in suburban settings make sporadic use of a large number of small habitat patches (i.e., undeveloped lots) and often travel significant distances between such patches (lots). Typically a resident pair or group spends long periods of time most closely associated with just one or a few of these patches, but also moves to other patches from time to time or in alternate seasons for foraging, acorn harvesting, sentinel behavior, territory establishment, evening roosting, or nesting. Moreover, dispersing jays often take up short-term residence in small scrub patches for days or weeks at a time while searching for a potential mate or attempting to

establish a new territory. Therefore, every undeveloped lot still containing scrub is important to maintaining a local jay population over the long term. As individual lots disappear, one-by-one, the overall capacity of the neighborhood to sustain Florida Scrub-Jays inevitably declines.

4.1.9 Demographic Failure in Suburban Settings

The accumulation of negative influences detailed above means that residential development has disastrous consequences on survival, reproductive success, and long-term persistence of Florida Scrub-Jays occupying habitat in the immediate vicinity of any such development. The magnitude of this impact, in the context of the ESA and Habitat Conservation Planning, cannot be overstated. To our knowledge, no population of Florida Scrub-Jays anywhere within the range of the species has ever demonstrated the ability to remain stable in the presence of continued population growth and residential build-out. To the contrary, all such populations inevitably decline. Range-wide, dozens of these already have been extirpated altogether.

The biological underpinnings of demographic failure in suburban contexts are becoming well understood, largely as a consequence of detailed field studies of a failing population by Dr. Reed Bowman, Research Biologist at Archbold Biological Station. Bowman has studied jay demography within a steadily growing rural residential community in Highlands County, FL (Placid Lakes Estates) since 1993. This community is within jay-dispersal-distance of the long-studied Florida Scrub-Jay population occupying well-managed, native habitat at Archbold Biological Station. Comparisons between these two populations are exceptionally revealing (Table 4-1). Most important, survival of fledglings to age one-year is significantly reduced in the suburban setting compared to native habitat only a few km away (0.24 versus 0.33, respectively). Combined with somewhat lower average fledgling production, the result is that significantly fewer potential recruits are produced in the suburban habitat, yielding a population that is persistently below replacement level. Across Florida, such populations are often maintained for long periods of time through immigration from surrounding scrubs (as was the case early in Bowman's Placid Lakes study). Once these populations exhaust the supply of immigrants, the population begins to collapse (as is currently occurring at Placid Lakes). *The Florida Scrub Jay population in Sarasota County is on the verge of the latter scenario.*

Table 4 - 1. Contrasting Indices of Reproduction and Survival by Florida Scrub-Jays
in Native Scrub (Archbold Biological Sta.) and Suburban Development (Placid Lakes Estates)

	<u>Native Scrub (1970 - 2003)</u>			Range	<u>Suburban Scrub (1993 - 2005)</u>			Range
	N (years)	mean	S.D.		N(years)	mean	S.D.	
Fledglings per Pair	34	1.84	0.63	0.78 - 2.89	13	1.2	0.39	0.48 - 1.88
First-year Survival	32	0.33	0.13	0.01 - 0.63	13	0.24***	0.06	0.13 - 0.35
Yearlings per Pair	32	0.6	0.31	0.03 - 1.39	13	0.29***	0.1	0.13 - 0.48
Breeder Survival	34	0.76	0.1	0.53 - 0.96	13	0.73	0.06	0.61 - 0.82

4.2 Anticipated Take

4.2.1 Definition of available habitat

The above-summarized biological facts explain why no action resulting in the loss of even one quarter-acre of native oak scrub habitat in areas where Florida Scrub-Jays recently have occurred or could be expected to occur can be considered benign to the regional Florida Scrub-Jay population. Therefore, protecting the remnant Florida Scrub-Jays of Sarasota County in the face of continued residential and commercial development (i.e., the purpose of this HCP) requires adoption of a uniform, predictable, and biologically based convention as to what constitutes “available habitat” within the county. Key to this HCP is explicit recognition that – for all the reasons outlined above -- any such convention must encompass significant areas of habitat that may lack jays on any given day, week, or month. As long as such areas are both demonstrably usable and potentially visited by jays in the region, they must be considered available from a biological perspective.

Based on the above, this HCP designates “available Florida Scrub-Jay habitat” within Sarasota County as follows: (1) any tract of habitat, of any vegetation composition, that is within the maximum normal daily movement radius (500 m) of a known individual, pair, or family group of Florida Scrub-Jays; (2) any tract of habitat containing native scrub oaks (*Quercus geminata*, *Q. chapmanii*, *Q. myrtifolia*, *Q. minima*, or *Q. inopina*) of any stature, and situated within typical expected dispersal distance of one or more sites where Florida Scrub-Jays were documented during or after the 2000 county-wide survey (see Appendix 1). For purposes of this HCP, typical expected dispersal distance is defined as 5 kilometers (3.125 miles).

4.2.2 Definition and Quantification of Take

Any anticipated action that is expected to have the consequence of eliminating any available Florida Scrub-Jay habitat, as defined in Sec. 4.2.1, shall be deemed to constitute anticipated take. For purposes of this HCP, the extent of anticipated take by any action shall be quantified as the number of acres (or fractions of acres) of available Florida Scrub-Jay habitat, as defined in Sec. 4.2.1. For two reasons, take shall not be quantified in terms of the number of Florida Scrub-Jay individuals or family groups deemed to be affected or potentially affected directly by the anticipated action. First, even when Florida Scrub-Jays are known to be present on or near the proposed action site, direct impact on the jays themselves is impossible to measure directly without placing unrealistically onerous demands on the landowner to produce territory-maps and habitat-use information over the course of at least a full year prior to the action. Second, measuring take in terms of jays directly affected, as opposed to habitat lost, fails to account for (a) the permanent, net negative impact of scrub loss on local Florida Scrub-Jay carrying capacity, and (b) reduced opportunity for local scrub patches to provide stepping stones, temporary shelter, and food resources to jays in the region that may not be permanent residents on the site.

5.0 CONSERVATION PROGRAM - MEASURES TO MINIMIZE AND MITIGATE FOR IMPACTS

5.1 Biological Goal

The overarching biological goal of this HCP is to do all that is reasonably possible to ensure that viable, genetically interchanging subpopulations of Florida Scrub-Jays will continue to persist in Sarasota County in perpetuity. Because guarantees of perpetual persistence of any species (including common ones) are impossible, the practical goal of this HCP is better stated in terms of probabilities. Specifically, our goal is to establish a system of habitat preserves and land-management strategies that offer a 95% to 99% probability of continued Florida Scrub-Jay subpopulations for a minimum of 100 years beyond the present. Capacity of the Florida Scrub-Jay to persist through this 100 year period must be ensured even in the face of continued growth in the human population and spread of both residential and commercial development within Sarasota County.

5.2 Biological Objectives

5.2.1 No Net Loss

The guiding biological objective for achieving the goal of this HCP is to maintain or restore, on protected and well managed habitat, a minimum of *132 territories* of Florida Scrub-Jays within Sarasota County. This objective means establishing a strict policy of *zero net loss of territories* for the County, using the 2004-2005 countywide survey (Appendix 1) as a benchmark.

5.2.2 Maintain Connectivity

The Florida Scrub-Jay population in Sarasota County must remain biologically connected with those in larger metapopulations that include adjacent counties territories. For this reason, territories should persist in each of the four regions of the County (see Appendix 3).

5.2.3 Maintain Reproductive Success and Demographic Stability

Within each region, Florida Scrub-Jays must exhibit (a) annual reproductive success averaging at least one yearling jay produced for every two families of jays, and (b) demographic stability as measured over a 10-year monitoring period.

5.3 Strategies to Achieve Biological Goals

5.3.1 Manage Habitat in Protected Areas

The single most critical biological and management strategy underlying this HCP – even more critical than acquiring new land for protection -- is establishment of a systematic and aggressive approach to returning long-unburned, overgrown scrub habitat to optimal conditions for Florida Scrub-Jays within protected areas designated as occupied or potentially occupied FSJ habitat. Restoration of significant tracts of long-overgrown xeric habitat is absolutely vital to the success of this HCP. All areas of oak scrub identified as having priority for Florida Scrub-Jay protection in the County must be maintained at early- to mid-successional condition using prescribed burning, mechanical clearing, or a combination of both (see below).

5.3.2 Maintain Oscar Scherer as a Source Population

Manage the habitat in and around Oscar Scherer State Park so that this largest and best-protected subpopulation of Florida Scrub-Jays in Sarasota County contains 20 to 30 territories each year, and production of potential recruits within the region of the park

matches or exceeds annual death rates of breeders (i.e., the Park becomes a local source population; see Appendix 4).

5.3.3 Create a Source Population in the Eastern Region

Through land acquisition and aggressive habitat management, establish at least one other well-managed source population of Florida Scrub-Jays on a significant expanse of contiguous native habitat, and comparable to or larger in size than the population occupying Oscar Scherer State Park. The region most amendable for this objective is in the East, along the western borders of North Port and the adjacent, county-owned land to its west.

5.3.4 Expand and Stabilize Lemon Bay and Venice Airport

Protect and manage habitat in the vicinity of Lemon Bay Preserve and the Venice Airport, expanding suitable habitat in this region to an extent sufficient to support a minimum of 20-30 active Florida Scrub-Jay territories. Ensure that production of potential recruits within this region matches or exceeds annual death rates of breeders (i.e., Lemon Bay/Venice Airport serves as a local source population; see Appendix 4).

5.3.5 Re-establish the Myakka River Corridor

Restore Florida Scrub-Jay habitat in all tracts where existing soil and vegetation suggest it once existed along the xeric levies (especially the western bank) of the Myakka River, thereby restoring this movement and dispersal corridor to connect the County's main subpopulations of Florida Scrub-Jays (Oscar Scherer State Park, south Venice, and LOR-North Port) with those to the northeast (Verna well fields and adjacent Manatee County). Habitat sufficient to support a minimum of 8 Florida Scrub-Jay territories should be maintained in optimal or near-optimal condition at any one time along this crucial Myakka River corridor.

5.3.6 Restore the Northeastern Corridor

Restore and manage as protected habitat all suitable areas in the northeastern corner of Sarasota County (especially Verna Well Fields and adjacent scrub), so that these habitat patches act as conduits for movement of jays to and from the significant existing FSJ population that occupies increasingly well-managed scrub habitat patches in immediately adjacent Manatee County.

5.3.7 Restore the Southeastern Corridor

Maintain a population of at least 8 Florida Scrub-Jay territories at the southern end Sarasota County (Englewood and Myakka State Forest), such that these habitat tracts act as conduits for movement of jays to and from adjacent Charlotte County.

5.3.8 Restore and Maintain Stepping Stones

Maintain small scrub patches in early to mid-successional condition interspersed throughout the County, such that these act as “stepping stone” habitat patches that are occupied at least occasionally over a 10-year monitoring period. The exact identity of these patches may vary through time.

5.4 Adaptive management strategy

Adaptive management represents today’s paradigm for long-term, science-based management of ecosystems and critical populations such as Florida Scrub-Jays. The goal of an adaptive approach is to promote continual improvements in management actions over time as more biological information about the system becomes available. To achieve this goal, systematic acquisition of reliable information (e.g., focused monitoring) feeds periodic assessment of overall results, leading to appropriate adjustments in management policies (Wilhere 2002). The adaptive management approach is fundamentally dynamic, and acknowledges that any given management strategy represents an experiment based on still-imperfect information. As new information and levels of understanding come in, management strategies are refined, or even changed wholesale. Monitoring and research are key elements of an adaptive management strategy. Therefore, sufficient funds must be allocated to ensure that an appropriate level of monitoring and research are sustained over periods long enough to evaluate, adjust management practices, and repeat the evaluation.

The adaptive management strategy for Florida Scrub-Jays in Sarasota County will consist of three components:

- 5.4.1 Priority-setting
- 5.4.2 Acquisition and interpretation of reliable information
- 5.4.3 Implementation and adjustment of land management strategies

5.4.1 Priority Setting

Florida Scrub-Jay populations are in decline across their entire range, and Sarasota County is no exception. For many subpopulations in Sarasota County, today's declines reflect habitat changes that took place years ago: long-lived adult jays have persisted, but total numbers have been declining inexorably because average death rates exceed average recruitment. The Florida Scrub-Jay will stop declining in Sarasota County only as a result of long-term protection, restoration, and management of tracts of scrub habitat that are configured as a County-wide preserve network.

The maximum overall design of Sarasota County's network of scrub habitat preserves is dictated already. It is constrained first by the primordial distribution of xeric soils, and second by the modern-day distribution of human settlements, as the latter already has erased irrevocably most of the County's scrub. Suitable or restorable tracts of habitat do still exist around the County, in a variety of different sizes and landscape contexts, and these constitute the framework for the network. Given the "no net loss" objective (see **Section 5.2.1**), none of these extant tracts of scrub can be excluded from consideration *a priori*.

The four subregions of the County support different numbers of jays, but each subregion plays a potentially key role in fostering long-term persistence of the population as a whole. Each subregion has a unique configuration of habitat patches, different kinds of barriers separating subpopulations, different potential for habitat restoration, and different kinds of pressures on extant scrub habitat. Prioritization of the individual scrub tracts across the County – in terms of acquisition and management urgencies – is required, especially in light of inevitable limitations in resources for creating and managing the network.

Criteria used to prioritize tracts for receiving acquisition and management dollars include (1) physical and biological features of the individual tract (size, number of contiguous jay territories, quality and diversity of the habitat, etc.), (2) features of the surrounding landscape (e.g., habitat barriers, density of residential housing), and (3) potential landscape roles (i.e., capacity to facilitate jay movements among tracts and subregions). No single criterion (except, perhaps, size) automatically places a tract at the top of the list, but certain criteria (e.g., size) carry more weight than others. The following criteria are presented and discussed approximately in their sequence of biological importance for Florida Scrub-Jays. Based on these criteria, a summary ranking for all scrub habitat tracts in Sarasota County is presented in Table 5-1.

5.4.1.1 Size and Contiguity of Population.

Large subpopulations of FSJs occurring on optimal or potentially optimal habitat generally have more chance of surviving than small ones, and should receive the most urgent conservation efforts. *Of paramount importance are tracts of continuous habitat that support, or could support, numerous (10-30) adjoining jay territories.* Besides maximizing jay numbers alone, large tracts are critical for preserving the native demographic and social interactions that are peculiar to the FSJ (Woolfenden and Fitzpatrick 1996). Several studies recently have documented that FSJs disperse and settle preferentially within large, contiguous blocks of habitat, and that jays originating in such blocks refrain from leaving them (Breininger et al. 2006, Bowman, Woolfenden, and Fitzpatrick unpubl. data). The social importance of a large, contiguous neighborhood probably explains why small but seemingly suitable scrub habitat patches often go unoccupied for years at a time, and suggests that potential population size should be the dominant concern in prioritizing tracts. (It bears noting that large tracts also are most likely to support many other threatened elements and processes unique to the scrub ecosystem.) Currently, Sarasota County has only one genuinely large, contiguous FSJ subpopulation (Oscar Scherer State Park) and even here, significant demographic problems are apparent (Appendix 4). The County needs to assemble two more.

Current FSJ population size must be used with care in prioritizing habitat tracts because so much of today's scrub habitat is overgrown and unsuitable. In prioritizing tracts for protection and management, tracts currently containing only a few pairs of jays may rank higher than tracts with more pairs because of their potential for restoration (see below). Significant tracts of overgrown but otherwise suitable habitat present opportunities to support much larger populations after restoration. Such tracts even may be ranked over tracts that currently contain more jays, but lack opportunity for expansion.

5.4.1.2 Quality of Usable Habitat.

Populations living in high quality scrub habitat will persist longer than similarly sized populations using marginal, overgrown, or otherwise degraded habitat. Optimal Florida Scrub-Jay habitat has been defined both qualitatively and quantitatively in a number of publications (Woolfenden and Fitzpatrick 1984, 1996; Fitzpatrick et al. 1991; Breininger and Morris 1982, Breininger et al. 1991, 2006), and has the following characteristics:

- (a) At least 50% of its shrub canopy consists of scrub oaks (*Quercus geminata*, *Q. chapmanii*, *Q. myrtifolia*, *Q. inopina*);
- (b) an abundance of open sandy areas exists amidst the scrub oaks (5-15% bare sand cover);

- (c) shrub height varies between 1 to 3 meters over most of the area, with the dominant oak cover being less than 1.7 meters high;
- (d) crown cover of canopy trees (pines, tall oaks, bays, or other hardwoods) encompasses less than 15% of the habitat;
- (e) a substantial proportion of the scrub habitat exists more than 100 meters from the edge of natural or planted forests.

5.4.1.3 Management Potential

Especially in areas of suburban residential development, overall size of the local jay population is less important than the potential for conservation management of the habitat locally. Some relatively large local populations of FSJs (e.g. South Venice suburbs) will be ranked below smaller but more manageable ones elsewhere. Management potential varies with many factors. Overall size, shape, and contiguity of the tract affect the proportion of jay territories near an edge, thus round or square tracts are preferred over long, narrow ones. Minimizing human disturbance is vital, especially from motor vehicles, house cats, and exotic plants. Opportunity for prescribed burning is extremely desirable. Expected future land use in the surrounding area should be taken into account in assessing potential for long-term conservation management of a habitat tract. Agricultural or other committed open space land-uses provide much better buffer habitat than currently wild areas that are slated for residential or commercial development in the known future.

5.4.1.4 Restoration Potential

Populations located in or adjacent to tracts of unused, overgrown scrub habitat that could be restored and managed are excellent mitigation targets, and might sometimes be preferred over areas currently containing more jays. Of highest priority are large, unoccupied tracts of overgrown but restorable scrub, relatively isolated from human development, and located near or adjacent to existing FSJ populations. Such areas are perhaps even more important for long-term protection of FSJs and scrub habitat than are currently occupied tracts located among advancing human settlement. Key variables are total area, expected quality post-restoration, landscape context with respect to other occupied habitat, and potential manageability of the habitat tract after restoration.

5.4.1.5 Landscape Context

In general (but with exceptions), the closer two FSJ populations are to one another, the more interchange will occur naturally between them. Natural interchange (dispersal) among adjacent or nearby subpopulations promotes both genetic and demographic

stability. Interchange is fostered over the long term by protecting "stepping stone" tracts between larger protected areas, thereby minimizing the average distance among subpopulations. In good habitat, most individuals disperse to breed within 2 miles (3.2 km) of their natal territory, and normal dispersal distances (> 95% of those observed) are 5 miles (8 km) or less. Dispersal behavior is affected by the intervening habitat, however, as dispersing jays react differently to habitat barriers of different types (Stith 1999). An ideal preserve network in Sarasota County would facilitate movement of jays among subpopulations by locating preserves within normal dispersal distances of one another and ensuring that adequate corridor or "stepping stone" habitat exists in the area that separates them.

5.4.1.6 Intervening and Adjacent Habitat

Habitat tracts will protect FSJs most successfully if they are located within a matrix of surrounding habitats that jays can use, and occasionally traverse. Brushy pastures, scrubby margins along country road edges or railroad tracks, open and regularly burned flatwoods, and other open habitats allow for foraging and acorn storage, and provide corridors for colonization among subpopulations. Occasionally, such habitats contain scattered oak shrubs that even serve as habitat for breeding jays during population peaks. Seasonal or permanent wetlands are rarely used by Florida Scrub Jays, but provide excellent buffers and can themselves benefit from protected upland habitat along their boundaries.

Suburban residential areas, shopping malls, major highways, dense forest, wide-open pastures, and bodies of water more than 200 m across inhibit movement of jays. Dense tree cover (e.g. unburned pines, cypress, or maple/bay swamps) provides an especially poor perimeter for Florida Scrub Jay habitat, because jays are simply unwilling to enter – and rarely cross over – true forest. Reproductive success appears to correlate with distance to dense forest (Breininger et al. 1995, Breininger et al. 1996, and Breininger et al. 1999), reinforcing the importance of open habitats, even if not scrubby, around the perimeter of scrub preserves.

Table 5-1. Priority ranks of sites in Sarasota County where aggressive habitat restoration and management will have the most impact on Florida Scrub-Jay population recovery (Category 1 = highest priority, 2 = moderate, 3 = low priority). Sites are arranged in descending order of priority within each category. Compare with Table 5-3 (priority ranks for further protection through acquisition).

<u>site name</u>	<u>region</u>	poten pop	hab qual	mgmt poten	rest poten	lscp cntxt	adj hab	total	<u>priority category</u>
Oscar Scherer State Park	Central	1	1	1	1	2	2	8	1
Deer Prairie Creek	East	1	3	1	1	1	1	8	1
Shamrock/Caspersen Park	Southwest	2	2	1	1	1	2	9	1
Fox Creek	Central	2	3	1	1	1	1	9	1
Lemon Bay Preserve	Southwest	2	2	1	1	2	2	10	1
Verna Well Field	Northeast	2	2	2	2	1	1	10	1
Myakka River State Park	Northeast	3	2	1	1	2	1	10	1
Whidden and Jomar Scrub	Northeast	3	2	1	1	2	1	10	1
Venice Airport/Golf Course/WCIND	Southwest	1	2	3	2	1	2	11	1
Knight's Trail Park	Central	3	3	1	1	2	1	11	1
North Port West	East	1	2	3	2	1	2	11	1
Manasota Scrub	Southwest	3	2	1	1	2	3	12	2
Winchester Boulevard	Southwest	3	2	2	2	1	2	12	2
Myakka River Corridor	Central	2	3	2	2	2	1	12	2
Bayonne (Sarasota Square)	Central	3	2	2	1	2	3	13	2
Lemon Bay Park/Buchan Airport	Southwest	3	3	2	2	1	2	13	2
Service Club Park	Southwest	3	3	2	2	1	3	14	2
Englewood Refuge	Southwest	3	2	3	3	1	2	14	2
Myakka State Forest	East	3	3	2	3	2	2	15	3
Fruitville and Utopia Scrub	Northeast	3	3	3	3	2	1	15	3
North Port East	East	3	3	3	3	2	2	16	3
Little Sarasota Bay	Central	3	3	3	3	2	2	16	3
Venice Suburbs	Southwest	3	3	2	3	2	3	16	3

5.4.1.7 Permissible Net Loss

Prioritizing habitat tracts and individual jay pairs is essential to an efficient adaptive management strategy. Certain habitat patches are too small, or too compromised by the surrounding human density, to be worthy of management investment even if they currently contain Florida Scrub-Jays. On biological grounds, outright loss of these patches and jays will not affect long-term extinction probability across the County. Indeed, permitting incidental take in such cases, *with appropriate compensation from*

the taking agent, can contribute to a net increase in probability that the species will persist over the long term. The key will be to use funds generated from the permitting to acquire and restore currently unprotected and unmanaged habitat where such preserves can be best managed for long-term conservation.

In Sarasota County, locations where net loss of Florida Scrub-Jays has the least overall effect on the species as a whole – and on the scrub ecosystem generally – are mostly in areas of high human density or rapidly expanding residential development, where ecosystem management has already become impractical. For the purposes of this HCP, we have designated FSJ territories in such areas as “suburban” in the simulation model (see Appendix 2). To be deemed unmanageable, a location must be shown to lack individual tracts of high quality habitat that could be managed indefinitely for conservation purposes. In such cases, agricultural, residential, or commercial development is so advanced that native scrub habitat is essentially eliminated, with jays persisting for historical reasons in degraded habitat that cannot practically be restored.

5.4.2 Acquiring Information

Maintaining a countywide network of habitat preserves occupied by viable, reproductively active populations of FSJs is inherently probabilistic. No two places, and no two years, will be the same. Certain populations may flourish while others decline. Some years will be excellent for reproduction and survival, while in other years epizootics will sweep through the region and dramatically reduce the countywide jay population. Monitoring population functions and fluctuations throughout the County, and comparing these variables with habitat treatments, is an essential component of an adaptive management plan by which the species is given the best chance to persist.

Monitoring of FSJ populations also is an essential means for testing the success of this HCP. Therefore, as a major component of this HCP, Sarasota County will develop and carry out a monitoring program for tracking the health and future prospects of the population of Florida Scrub-Jays. This program will consist of: (1) monitoring of Florida Scrub-Jay numbers, distribution, and reproductive output, and (2) habitat monitoring.

5.4.2.1 Baseline monitoring at two scales

Baseline monitoring will be conducted at two scales, annual and biennial. The purpose of the annual censuses is to document in detail the numbers and reproductive success of Florida Scrub-Jays on County-managed lands, in order to gauge the success of the County’s habitat management strategies and actions. The purpose of the biennial census is to measure the overall population size of Florida Scrub-Jays, and its long-term trends, by replicating the County-wide censuses conducted in 2000 and 2004.

Each year, county personnel will coordinate a two-part census of breeding populations on all lands owned and/or managed by Sarasota County. The first part of the census will take place during pre-nesting (February-April) and data on total numbers of family groups and family sizes at each site will be recorded. The second part will take place post-fledging (June-July). During this time, the number of brown-headed juveniles present for each presumed family group will be recorded to provide data on breeding success and annual recruitment. In addition, approximate home range boundaries will be delineated based on observed behaviors, flight directions, and local habitat boundaries. To the extent practical and permitted by landowners, these data also will be recorded for breeding populations on private lands. All censuses and mapping will be conducted according to established Florida Scrub-Jay survey protocols (Fitzpatrick et al. 1991, Woolfenden and Fitzpatrick 1984).

Every two years between February and May, an exhaustive inventory of Sarasota County will be conducted, in which presence/absence and group sizes of Florida Scrub-Jays will be noted on all sites documented to have been occupied since 2000 (including private land sites).

5.4.2.2 Focal monitoring via banding

The County will supplement its annual baseline monitoring by establishing a banding program through which “indicator” (i.e. core) populations are maintained as permanently color-banded study populations. This involves maintaining active banding permits (one each from the U.S. Fish and Wildlife Service Endangered Species Office, the U.S. Fish and Wildlife Bird Banding Laboratory, and The Florida Fish and Wildlife Conservation Commission) and authorizing the appropriate county personnel (or a subcontracted biologist) to manage/implement the program. Data generated from regular surveys of these banded populations will provide vital measures of annual mortality and regional dispersal patterns among Florida Scrub-Jays around the key population centers in the County. A detailed population study (including data on nest sites, clutch sizes, and measurements of nestlings) should be maintained in at least one core population, most likely Oscar Scherer State Park.

All data for annual censuses, biennial inventories, and banding data will be maintained within a permanent spatial database. A network of local volunteers will be created to provide assistance, and these efforts will be coordinated with The Nature Conservancy’s Jay Watch program. Ideally, several long-term Jay Watch sites will be established throughout Sarasota County.

5.4.2.3 Habitat Monitoring

Annual habitat assessments will be performed between February and April on all “occupied habitat” (as defined in Section 4.2.1) owned and/or managed by Sarasota County. For each site, the following information will be recorded:

- (a) General habitat type: categorical classification of habitat as Type I, II, or III (sensu Fitzpatrick et al. 1991), based on percent cover of scrub oaks;
- (b) Species composition: qualitative notes on presence of native and non-native plant species;
- (c) Habitat structure: estimates for percent of the ground covered by bare sand, percent cover of scrub oaks, percent cover of pine trees, and estimated height of scrub oaks;
- (d) Successional stage: prime, somewhat overgrown, moderately overgrown, or heavily overgrown (sensu Miller and Stith 2002);

All data for annual habitat assessments will be maintained for each site within the same, permanent spatial database as are the FSJ monitoring data.

5.4.3 Implementation of Land Management Strategies

The overriding goal of land management in the context of this HCP is the following:

Throughout Sarasota County, ensure that all publicly managed habitat that is potentially suitable for occupancy by Florida Scrub-Jays remains in successional stages, vegetation composition, and overall structure conducive for optimal survival and reproduction by this species.

Currently, Sarasota County does not contain even a single tract of land that is in fully optimal condition for Florida Scrub-Jays. On the other hand, a remarkably large proportion of the *potentially* optimal habitat within the County is already under public ownership. Therefore, the foundation of the biological strategy of this HCP involves habitat management and restoration rather than land acquisition. Establishment of a systematic and aggressive approach to returning overgrown and degraded scrub habitat in protected areas to optimal conditions for Florida Scrub-Jays is absolutely critical to the success of this HCP.

Sarasota County will create an individually tailored “scrub management plan” for every tract of land managed by the County that contains any scrub habitat potentially suitable for FSJs. These management plans will include, but not necessarily be limited to, specific capacities and sustained activities of the following types.

5.4.3.1 Infrastructure and Protection

County-owned scrub habitat should be fenced and posted, with locked gates that restrict public access to controlled areas. Establishment of small parking areas for recreational access to appropriate sites, with informational kiosks and posted nature trails with rules discouraging destruction of oak scrub habitat are appropriate at some tracts. Road signs that encourage reduced motor vehicle speeds (such as the “Scrub Jay X-ing” signs along Winchester Boulevard) are appropriate in any tract bordering a paved road or highway. Fences designed to inhibit entry by house cats are appropriate where prime scrub habitat borders residential housing. Perimeter fire lanes are essential. Larger tracts should be divided into 100-200 acre fire management units separated by fire lanes.

5.4.3.2 Long-term Fire Management

Most scrub habitat tracts in Sarasota County are overgrown and marginally suitable for FSJs owing to decades of fire suppression, but otherwise exhibit little or no influence by exotic species. At these sites, the long-term land management strategy is to mimic the natural fire cycle typical of this native landscape. Except in areas where it is completely unfeasible, prescribed burning is far-and-away the preferred management tool for long-term maintenance of Florida Scrub-Jay habitat (Fitzpatrick et al. 1986, Fitzpatrick et al. 1991, Breininger 1999, Breininger et al. 1999). The County will create, maintain, and periodically update a prescribed-burn schedule for every scrub tract it manages.

Standard procedures for prescribed burning in scrub habitat are well established, and are currently being practiced by numerous public agencies (e.g., FL Division of Forestry, FL State Parks, most water management districts) and private conservation groups (e.g., The Nature Conservancy, Archbold Biological Station). Fire lanes surround individual “burn units” of 50 to 200 acres. Large vegetation growth such as tall pines and oaks may be mechanically cleared prior to burning, and fire lanes may be functionally widened by “bush-hogging” some days before a burn. Habitat currently occupied by Florida Scrub-Jays should not be burned in its entirety during any one year. In general, no more than 25% of any occupied tract should be burned at any one time, so that each tract exhibits a “mosaic” of habitat patches that differ in the time since they were last burned. This patchiness is intended to leave denser, older patches of scrub that provide acorns, nest sites, and roost sites while also maintaining large areas of open habitat that Florida Scrub-Jays use for foraging and caching.

Prescribed burn regimes should be designed to mimic as closely as possible the natural fire cycles in terms of frequency, season, and intensity. Burn frequencies vary with site characteristics, and no strict formula applies. In general, to maintain suitable FSJ habitat oak scrub should be burned at irregular intervals varying between 5 and 20 years, with a

median frequency of 7-10 years (Fitzpatrick et al. 1991, Breininger and Carter 2003, Breininger and Oddy 2004). Scrubby flatwoods burn at higher frequencies, while sand pine and rosemary scrubs burn at lower frequencies. Scrub habitat burned at less than 5-year intervals reduces acorn production below the level required to support jays, and causes proliferation of palmetto (*Sabal etonia*, *Serenoa repens*). Most kinds of scrub habitat begin to decline in suitability for FSJs at about 10 years post-fire. Scrub that has not burned in 20 years is overgrown and generally too dense to support jays. Such overgrown patches accommodate undesirable competitors, undergo unnatural successional changes in species composition of the vegetation, and develop an unnaturally high canopy cover (Breininger et al. 2002).

Burns should be conducted during the summer fire season, ideally after the FSJ nesting season ends (mid-June). Florida Scrub-Jays readily occupy, and even favor, recently-burned areas almost immediately after the fire.

5.4.3.3 Above-ground mechanical clearing

Where prescribed burning is utterly impossible because of close or imbedded human settlement, above-ground mechanical treatments such as “mowing” with a tree cutter, clear-cutting, and mechanical thinning provide acceptable alternatives to prescribed burning. In such cases, shrub height is mechanically reduced, vegetative debris is removed or burned (or both), and open sandy areas are created mechanically. Roller-chopping can cause significant soil disturbance (Thaxton and Hingtgen 1992), and should be used when only alternative, less destructive mechanical techniques are not feasible or available. As with prescribed burning, mechanical treatments should follow rotational schedules designed to create a “mosaic” of habitat patches. Thus, if occupied by Florida Scrub-Jays, a site undergoing mechanical treatment should be permitted to retain significant stands of mature (>5 year old) oak scrub while the recently treated scrub regenerates.

Scrub oaks that have been mowed are known to resprout and grow more quickly than those that have been burned (Thaxton and Hingtgen 1992), therefore it is likely that mechanical treatments will need to be applied on shorter intervals than those for prescribed burns. All mechanical treatments should be applied outside of the breeding season (July-January). As with recently burned habitat, Florida Scrub-Jays will forage in mechanically treated areas almost immediately after treatment, and begin nesting in these tracts within 2-3 years following treatment.

5.4.3.4 Removing exotic species

Intensified land management, beyond burning or mechanical clearing, will be necessary and appropriate in some tracts because of degraded conditions of the scrub habitat. Removal of exotic plants (e.g., Brazilian pepper, Melaleuca trees, cogon grass, etc.) is essential component of any land management plan for tracts containing these species. Exotic plant species will be removed with a combination of cut-stump herbicidal control, bulldozing, mowing, and tree cutting. Monitoring for, and removing, human-associated predators such as domestic and feral cats is essential for all but the most remote tracts. Feral cats must be trapped and removed from all sites where they are known to occur, and cat colonies must be prohibited in all scrub habitat preserves in the County.

5.4.3.5 Habitat restoration

Habitat restoration is absolutely critical to this HCP, because reducing extinction probabilities of Florida Scrub Jays and other scrub organisms in Sarasota County is impossible without increasing the total area of suitable habitat. For purposes of this HCP, we distinguish between “land management” (a continual process requiring sustained efforts and monitoring to maintain a tract of land in natural or near-natural condition over long periods of time) and “restoration” (a discrete activity or series of activities representing the first steps in returning a tract of land to natural or near-natural condition following long-term degradation, later to be followed by appropriate land management measures). In this sense, Florida Scrub-Jay habitat restoration will involve any or all of the following measures:

- (a) Prescribed burning;
- (b) Logging operations to thin pine trees to 5-15% canopy cover;
- (c) Removing or cutting and burning all tree-sized (> 3-inch dbh and/or > 2 m high) scrub oaks and cabbage palms;
- (d) Replanting scrub oak species in areas with sparse oak cover;
- (e) Clearing and removal of debris to create open sandy areas;
- (f) Mowing, mechanically harrowing, and burning or removing (as practical) exotic grasses.

Habitat restoration shall be the highest-priority management activity for every potentially suitable tract of scrub habitat managed by Sarasota County. It is well documented both within the County (Appendix 4) and elsewhere around the state that newly restored habitat located near existing FSJ populations quickly becomes occupied by dispersing jays. Therefore, habitat restoration is especially high priority in those tracts currently occupied by Florida Scrub-Jays or adjacent to existing jays (as most of

these are also overgrown). The urgent goal is to convert unoccupied scrub as soon as possible to a condition suitable for FSJ occupancy and reproduction.

Expected consequence of aggressive restoration measures are: (1) jays currently occupying suboptimal or overgrown scrub, and jays dispersing from poor habitats throughout the County, will settle in the restored habitat; (2) reproductive success and survival of jays occupying restored scrub will increase compared to these demographic parameters in less aggressively managed tracts; and, (3) the County's overall FSJ population will increase. Success of restoration activities will be measured by the monitoring regimes described above, and analyzed in the context of the adaptive management regime outlined below.

The urgent need to institute large scale habitat restoration cannot be overstated. The single most important influence causing the decline of Florida Scrub-Jays in Sarasota County is habitat degradation owing to fire suppression. Jays already have winked out in some sites around Sarasota County, and even where still present their numbers are approaching the critical point where local stochastic extinctions may prohibit recovery even in restored habitat. Finally, translocation of demographically "doomed" jays from residential areas cannot occur until high-quality unoccupied habitat is restored (see below), but these potential source individuals are disappearing fast.

Prioritization of restoration activities is essential because the County-wide need is so huge. Moreover, it is important to note that habitat restoration carries uncertainty, so those areas where success is most likely should be addressed first. Restoration will accomplish the most good, and will be expected to succeed the fastest, in sites where the tract of potentially suitable scrub

- (a) is large,
- (b) contains or is adjacent to currently occupied by FSJs,
- (c) contains the full diversity of native scrub species,
- (d) lacks exotic species and human-subsidized predators (house cats).

Re-creating scrub on tracts where the soil is appropriate but most scrub vegetation has been removed (e.g., pastures, old pine plantations) is of lower priority, as it is expensive and difficult, especially in the absence of nearby sources of both plants and animals. The highest priority for such intensive effort will be to restore portions of habitat tracts that border excellent native habitat already occupied by jays. In Sarasota County, the best example of such an area is the immediate vicinity of the Venice Airport.

Restoration is most worthy of investment if it is implemented with long-term goals in mind. Thus, restoration activity should be directed first to those tracts already permanently dedicated by the County for conservation management.

5.4.3.5 Translocation

Translocation of Florida Scrub-Jays is a potentially useful tool for restoring key populations, but it must be strictly associated with habitat restoration and long-term management. Translocation will decrease long-term extinction probability only in cases where it provides artificial colonization of restored habitat that is permanently dedicated to conservation management. Jays from neighboring habitat (especially low-quality habitat) will immediately investigate and perhaps occupy newly restored habitat. Therefore, translocation is most necessary and most likely to increase overall population size in restored habitat patches that are beyond normal dispersal distance of existing jay populations.

Two experimental translocations of Florida Scrub-Jays have occurred to date. The pioneering effort by Mumme and Below (1999) eventually failed, apparently for two reasons. First, the population was constrained to a tiny, isolated habitat patch capable of supporting a maximum of four pairs, and stochastically drifted to zero twice. Second, the habitat was not aggressively managed to remain in low, recently-burned condition.

More recently, Reed Bowman (unpubl. MS) translocated 17 jays over a four-year period (2000 to 2004) to a large (1,000 acre), restored patch of scrub in central Manatee County. Most jays remained alive for at least several months, but many eventually disappeared or dispersed off-site and only 4 jays eventually paired and bred on the restored tract. Aided by natural immigration of dispersing jays from surrounding areas, the FSJ population on this restored tract has varied between 4 and 8 pairs since 2003. Bowman's ongoing experiment demonstrates important lessons pertinent to any translocations contemplated for Sarasota County. (1) Only about one in four translocated jays can be expected to survive and remain on site after one year, hence successful translocations require an ample source population, and significant losses are to be expected after the jays are moved; (2) restored habitat also attracts local immigrants from any locally occupied habitat; these immigrants may even be attracted to the site by the translocated jays, and can augment the breeding population, thereby making up for some of the losses of translocated jays; (3) translocation is not a "silver bullet" but rather is costly and risky, and should be viewed as a last resort that at best can augment other strategies for restoring a local FSJ population.

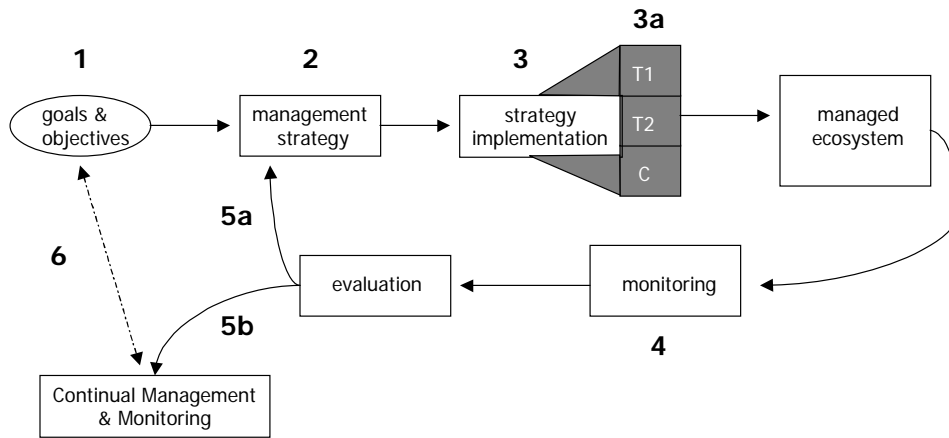
Any attempt to translocate Florida Scrub-Jays in Sarasota County will be governed by the following principles:

- (a) Translocation is a restoration technique, not a mitigation strategy. No jay will be translocated strictly as a procedure for avoiding take.
- (b) Translocation shall be restricted to target sites involving active habitat restoration and committed long-term management, and where adding individuals to the scrub patch (whether or not it is already occupied) can be reasonably expected to increase the number of territories that will persist in the population at that site over the long term.
- (c) Translocating Florida Scrub-Jays in order to repopulate formerly occupied habitat tracts that are of significant size and have been restored through prescribed burning is of higher priority than to augment existing populations or to populate areas that have been cleared only mechanically.
- (d) Translocations will be limited to target sites having relatively large areas of restored, unoccupied or under-occupied scrub or to clusters of smaller unoccupied or under-occupied tracts that collectively serve as a larger one.
- (e) Every translocation represents an experiment, and its results (movements, territory establishment, pairing, survival, and reproduction) will be closely monitored for a minimum of ten years after the procedure via color-banding study.
- (f) Source individuals will be drawn exclusively from areas where continued residential or commercial development by humans prohibits effective habitat restoration and management, thereby “dooming” any remnant Florida Scrub-Jay population to decline and eventual extinction over the long run. The best example of such an area in Sarasota County is residential South Venice.
- (g) Source individuals will be drawn exclusively from Sarasota, Manatee, or Charlotte counties, in order to avoid introducing genetically divergent individuals.
- (h) Translocations will be performed under the direct supervision of one or more experienced biologist(s) licensed to trap, handle, and color-band the species.
- (i) Selection, capture, and release of translocated birds will follow the procedures detailed by Mumme and Below (1999) and Bowman (unpubl. MS). Candidate birds will be captured in baited traps, measured, weighed, and banded or re-banded. They will be housed in holding cages and when possible, they will be caged together in male-female pairs. Before being released at the destination site, the birds will be transferred to large, pre-release cages scattered throughout the site, where they will remain for several days prior to release.

5.4.4 Feedback

Key to the success of this HCP will be developing appropriate land-management responses to critical changes in FSJ population size or its demographic stability. The adaptive approach requires that systematic acquisition and application of reliable information are used to improve the management of Florida Scrub-Jays over time (Wilhere 2002). This approach will operate on a site-by-site basis, as each habitat tract has its own, context-specific management objectives and plan (see above). For each site, the responsible land manager will follow the following steps (see Figure 5-1).

Figure 5-1. Block diagram of the proposed adaptive management strategy (modified from Wilhere 2002). Numbers represent each step.



5.4.4.1 Biological goals and objectives

Adaptive management at the scale of the individual habitat tract begins with clearly stated biological goals and objectives. For this HCP these will include target attributes of habitat (plant species composition, tree canopy cover, stature and structure of scrub oaks, for population sizes, measures of reproductive success, measures of demographic stability, and time frames for evaluation. These general benchmarks for each of the four Florida Scrub-Jay Priority Zones in Sarasota County are summarized in Table XX.

5.4.4.2 Management strategy

The management strategy deemed most appropriate will be established (given current population/habitat characteristics and the biological goals/objectives stated above). This strategy will detail the list of land management activities to be pursued, the time frame under which each activity (or repeated activities, such as prescribed burns) will occur, anticipated milestone dates for evaluation of the results, and a statement of anticipated outcomes (in this case, targeted habitat attributes and FSJ population characteristics). Uncertainties shall be explicitly identified and listed here, as these may dictate the desirability of experimentation once management actions are initiated.

5.4.4.3 Initial implementation and experimentation

The basic management strategy will be implemented for the duration of time projected by the management plan. However, because it is desirable to establish direct cause-and-effect relationships between management actions and responses by the ecosystem target (habitat attributes and FSJ population characteristics), at least two alternative management strategies (treatments T1 and T2 in Figure 5-1) and a control treatment (C in Figure 5-1) might be established and evaluated separately. In the present case, these experiments may involve different burn cycles or direct, site-specific comparisons between the outcomes of prescribed burning and mechanical clearing.

5.4.4.4 Data summaries

At regular intervals (e.g., annually) the data collected through ongoing population and habitat monitoring (see above) shall be summarized in “report card” format. This permits regular discussion among engaged personnel, and facilitates apple-to-apple comparisons among sites across the County as time goes on. Regular data summaries also allow biologists to spot alarming trends as they develop, perhaps triggering immediate management responses.

5.4.4.5 Evaluation and strategic revision

Periodic formal evaluation of the data is necessary for determining whether or not the stated goals and objectives of the management strategy are being achieved. If the population benchmarks have not been achieved within the timeframe designated in the original strategy (e.g., FSJ population continuing to decline, or demographic parameters suggest instability in the absence of immigration), a revised or wholly new strategy must be devised. In this case, the process returns to step 5.4.4.2 (above). On the other hand, if the population benchmarks have been achieved, an ongoing land management

strategy and baseline monitoring program – perhaps designed to be simpler and less expensive to implement -- will be set in place for the longer term.

5.4.4.6 Periodic assessment

Even after the goals, objectives, and population targets set forth in the site-specific management plan have been achieved, and ongoing management and monitoring programs have been established, periodic assessment is warranted. Long-term maintenance of a stable Florida Scrub-Jay populations in good habitat warrant comprehensive review about every 5 to 10 years to (1) reexamine the initial goals and objectives, (2) investigate opportunities for further refinement through new experimentation, (3) verify that the local objectives are being achieved, and (4) verify that the County-wide or region-wide objectives of the HCP are being achieved.

5.5 Summary of Biological Targets and Measures of Success

The long-term, minimum target for management of Florida Scrub-Jays in Sarasota County is no-net-loss compared to the 2004 comprehensive survey (132 breeding pairs). This requires designing and implementing a management regime whereby a relatively small number of protected areas eventually harbor more jays than they do now, because further loss (and eventual extinction) of jays from residential and developing areas in the County is inevitable. Moreover, continuing active management of these preserves will be required to maintain demographic stability (survival and reproduction offset mortality).

We mapped availability and dispersion of habitat patches capable of being managed long-term, and projected their capacity to support a demographically stable population of Florida Scrub-Jays at no-net-loss levels (Appendix 3). The recommended configuration and target population sizes (Table 5-2) represents the overarching target for this HCP. Put another way, Table 5-2 constitutes the yardstick against which success or failure of this County-wide HCP will be measured. As described above, it is the responsibility of the County to establish management plans and procedures for each of these regions in order to achieve stable Florida Scrub-Jay populations having these minimum numbers.

priority zone	type of subpopulation	patches included	minimum # of territories
NORTHEAST	Connector	Verna Well Field, Whidden & Jomar, Myakka River State Park, Fruitville & Utopia	10
CENTRAL	Core	Oscar Scherer State Park, Fox Creek, Knight's Trail Park	30
CENTRAL	Corridor	Myakka River Corridor	8
CENTRAL	Stepping Stone	Bayonne, Little Sarasota Bay, Curry Creek	3
SOUTHWEST	Core	Shamrock/Caspersen Park, Service Club Park, Venice Airport/Golf Course/W.C.I.N.D, Lemon Bay Preserve	30
SOUTHWEST	Corridor/Connector	Englewood Refuge, Winchester Boulevard	8
SOUTHWEST	Stepping Stone	Lemon Bay Park/Buchan Airport, Manasota Scrub	5
EAST	Core	Deer Prairie Creek, North Port West	30
EAST	Corridor/Connector	Myakka River State Forest, southern portion of North Port East	5
EAST	Stepping Stone	North Port East	3

Table 5-2. Minimum population benchmarks for each of the four FSJ Priority Zones in Sarasota County.

5.6 Measures to Minimize Impacts

Based on scientific information pertinent to the species in question, HCPs aim to balance long-term conservation of protected species with properly planned economic development (Bean et al. 1991). Inherent in this process is the explicit allowance of habitat alteration that results in incidental taking of protected species in certain areas. For the purposes of this HCP, any action that eliminates “available” habitat (as defined in Section 4.2.1) constitutes take. In cases where this is deemed permissible, minimization measures will be employed in order to reduce the impacts on FSJs and their habitat:

- When possible, development projects will occur outside of the FSJ nesting season in order to avoid nest disturbance.

- On-site protection to preserve existing FSJ individuals present at the project site.
- Scrub oaks will be left intact at project sites whenever possible.
- In accordance with Objective 5.6 of Sarasota County’s Comprehensive Plan, scrub oaks will be planted and maintained to simulate a scrub corridor alongside roads that are built within the average dispersal distance of a subpopulation of FSJs.
- Private landowners will be encouraged to xeriscape with native vegetation in all residential developments located in “available” FSJ habitat.
- At project sites that are currently occupied by FSJs, speed bumps and/or “Scrub-Jay X-ing” signs will be installed at strategic locations.
- A brochure detailing the countywide effort to maintain scrub habitats for FSJ protection will be distributed to all residents living at or near project sites and all project workers.

5.7 Measures to Mitigate Unavoidable Impacts

As stated elsewhere, conflict exists between the demands of a growing human population in Sarasota County and the biological requirements of Florida Scrub-Jays. Recognizing that there will be instances when single or cumulative project activities will cause unavoidable impacts on FSJs and their habitat, Sarasota County will apply the following measures to ensure that these activities will not increase FSJ extinction probabilities across the county:

(1) Implementation of a countywide habitat management and restoration strategy. As previously stated, the establishment of an aggressive habitat management and restoration strategy will be absolutely critical to the success of this HCP. Therefore, using the adaptive approach proposed in Section 5.1.2 (Adaptive management strategy) as a “roadmap,” the county will develop a regional plan that integrates all site-specific adaptive management strategies. To further this vital implementation strategy, the County will convene a new ***Interagency Florida Scrub-Jay Habitat Management Task Force*** consisting of land management representatives from the County, FL Division of State Parks, FL Division of Forestry, and the Southwest Florida Water Management District (see below, section 8.1).

(2) Establishment of a Florida Scrub-Jay habitat mitigation fund. Sarasota County shall establish a Florida Scrub-Jay Habitat Conservation Mitigation Fund, to be used exclusively for acquisition and management of priority habitat tracts intended to support Florida Scrub-Jays. Mitigation funds will be directed toward protecting tracts of scrub that meet the following criteria: large size; highest quality in terms of native plant cover and plant species composition; important in a landscape context (e.g. function as stepping stones between other larger units); amenable to permanent conservation

management.

(3) *Protection of new habitat.* Acquisition and subsequent management of otherwise unprotected “available” habitat can increase net jay numbers over the long term, even where a permitted activity causes a short-term loss. To ensure the success of a land acquisition strategy, higher priority must be given to:

- (a) Occupied sites;
- (b) Sites adjacent to occupied sites;
- (c) Sites experiencing (or expected to experience) relatively low development pressures;
- (d) Sites in optimal or near-optimal condition (i.e. those requiring baseline or focused management measures);
- (e) Large sites that can increase local subpopulations by the highest margin.

Sites in areas of expanding residential or commercial development where ecosystem management has already become impractical are given low priority. Table 5-3 lists potential acquisition sites in Sarasota County ranked according the above criteria.

site name	region	priority category
North Port West Addition	East	1
Deer Prairie Creek Addition	East	1
Pinelands Addition	Central	1
Lemon Bay Park Addition	Southwest	1
Manasota Scrub North Addition	Southwest	1
Fox Creek Addition	Central	1
Bayonne Addition	Central	1
Oscar Scherer - Pineland Bridge	Central	2
Alligator Creek Addition	Southwest	2
Little Sarasota Bay Addition	Central	2
Lemon Bay Suburbs South Addition	Southwest	2
Whidden & Jomar Addition	Northeast	2
Manasota Scrub South Addition	Southwest	2
MR State Forest Addition	East	2
Rosemary Preserve Addition	Southwest	2
Knight's Trail South Addition	Central	2
North Port Central North Addition	East	2
North Port East Addition	East	2
Pinetree Park/Taylor Ranch Addition	Southwest	2
Knight's Trail North Addition	Central	3
North Port Central South Addition	East	3
Taylor Ranch North Addition	Southwest	3
Fruitville & Utopia North Addition	Northeast	3
Taylor Ranch Central Addition	Southwest	3
Fruitville & Utopia South Addition	Northeast	3
Lemon Bay Suburbs North Addition	Southwest	4
Venice Far South Addition	Southwest	4
Venice Suburbs South Addition	Southwest	4
Venice Suburbs North Addition	Southwest	4

Table 5-3 Priority ranking for additional protection of sites in Sarasota County, based on criteria discussed in section 5.7. Sites range from highest priority (Category 1) to lowest priority (Category 4). Within each priority category, sites are arranged in descending order of priority (for example: within Category 2, Oscar Scherer-Pineland Bridge is ranked higher in priority than any other Category 2 sites below it). Note that the priority ranking for site management and aggressive restoration is detailed elsewhere (Table 5-1).

5.8 Monitoring and Reports

5.8.1 Monitoring Measures

A crucial element underscoring the success of this HCP in general and the Adaptive Management Strategy (Section 5.2.1) in particular is the implementation of a monitoring program. Refer to Section 5.2.1.2 of the Adaptive Management Strategy outlined above for details on the monitoring measures to be implemented.

5.8.2 Reports

Sarasota County will prepare and provide the following HCP Reports to the FWS and FWC for the duration of the forty-six year ITP permit:

(1) *Annual Report*. The Annual Report will provide a review of all activities that have taken place within Sarasota County related to Florida Scrub-Jays. It will specifically address the four FSJ Priority Zones. This report should include:

- (a) Summaries of all *baseline* population monitoring efforts, including estimates of total group numbers, family sizes, number of brown-headed juveniles, and approximate territory locations/boundaries. In addition, data collected from any *focused* monitoring efforts will be presented here. Refer to Section 5.2.1.2 for specifics on the type of data to be collected.
- (b) Summaries of all habitat monitoring efforts, including data collected on habitat types, species composition, habitat structure, and successional stages (See Section 5.2.1.2 for details).
- (c) Summary assessing all take that occurred that year.

The Annual Report will be supplied by 1 February.

(2) *Biennial Report*. The Biennial Report is meant to provide a countywide assessment of the success of management and restoration efforts throughout the County. As with the Annual Report, it will address all four FSJ Priority Zones and should include:

- (a) Results from an exhaustive countywide inventory (See Section 5.2.1.2 for details), including population totals and estimates of group sizes.
- (b) Summaries of all management/restoration efforts that took place and data collected on population/habitat responses.
- (c) Assessment of management/restoration efforts, including decisions to maintain current strategies or adjust them.

The Biennial Report will be supplied by 1 February.

In addition, it is strongly recommended that County land managers provide the Sarasota County Division of Environmental Services with monthly FSJ occurrence reports for each site under County management.

6.0 FUNDING

TEXT TO BE PROVIDED BY SARASOTA COUNTY

7.0 ALTERNATIVES

TEXT TO BE PROVIDED BY SARASOTA COUNTY

8.0 PLAN IMPLEMENTATION

Sarasota County already has the infrastructure to implement all key elements of this HCP, and already has accomplished significant steps identified in this document. Most important, the County has been prioritizing, acquiring, and managing high-priority environmental property for two decades, and the pace of acquisition has increased over the past five years. Land acquisition pertinent to this HCP is accomplished by Sarasota County through its Environmentally Sensitive Lands Protection Program (ESLPP). This is a voter-approved, taxpayer-funded program protecting natural lands that are ranked on a series of environmental criteria, including many that are named in this HCP as directly relevant to Florida Scrub-Jays. Most County-purchased land provides for public access featuring nature-based recreation, but the most environmentally sensitive tracts are protected from public impact. The County partners with The Nature Conservancy to assist with acquisitions, and the process is overseen by a nine-member oversight committee comprised of community representatives from several stakeholder constituencies.

The intent of the County's ESLPP is primarily to protect habitat for native species typical of the County, especially those that are Threatened or Endangered. The Florida Scrub-Jay is among the County's highest priority species for protection. Others include Bald Eagle, other migratory birds, gopher tortoise, Sherman's fox squirrel, and bobcat. To date, the committee has identified 24 sites throughout the county for acquisition, including most of the tracts identified as highest priority in this HCP.

Management of the County's environmental lands is coordinated and accomplished by the County's Environmental Services unit, which includes staff familiar with adaptive

management and prescribed burning. Adoption of the explicit adaptive management protocols identified in this HCP, on a site-by-site basis, will represent a major priority upon approval of the present HCP.

A crucial incremental effect of this HCP will be generation of new funding for land acquisition and management dedicated to Florida Scrub-Jay habitat. This funding will accrue via impact fees associated with permitting residential and commercial real estate development, especially where such development affects available Florida Scrub-Jay habitat.

8.1 Interagency Florida Scrub-Jay Habitat Management Task Force

A key natural resource feature of Sarasota County is the predominance of land already held in the public interest and managed for open space, water recharge, and conservation purposes. Besides current and future County-owned preserves, excellent or potentially restorable habitat will persist within the County on land managed by FL Division of State Parks, FL Division of Forestry, and the Southwest Florida Water Management District. All these agencies are crucial to the full implementation of this HCP, as they own and manage many scrub parcels deemed urgently in need of restoration.

To further the biological and implementation strategies of this HCP, the County will convene and coordinate a new Interagency Florida Scrub-Jay Habitat Management Task Force consisting of land management representatives from all public agencies that manage conservation land containing occupied or potentially occupied Florida Scrub-Jay habitat within the County. Through this task force, the County will (1) promote preparation of adaptive management plans for the individual scrub tracts discussed in this HCP, and (2) hasten interagency cooperation and sharing of resources and duties in active restoration of the highest priority tracts as identified above (section 5.3).

8.2 Changed Circumstances

Changes in circumstances are likely to be faced by Sarasota County over the period covered by this HCP. The most foreseeable of these are (1) weather-related natural catastrophes, especially hurricanes and prolonged droughts; (2) accelerated habitat loss owing to continued human population growth within the County; and (3) failure to manage scrub habitat properly.

If habitat loss were to accelerate before significant new management efforts take place, wholesale loss of FSJs could occur rapidly across the entire county through the “winking

out” of small, currently unsustainable local populations. A number of existing preserves clearly can support more family groups than are currently present at these sites. The County needs to act fast to ensure that these potential numbers can be achieved.

In addition, it must be foreseen that 20-30 FSJ families will be sacrificed in the Venice Suburbs owing to ongoing residential and commercial development on private holdings. Jays still occupying these suburban tracts represent primary candidates for translocation into well managed preserves following habitat restoration.

8.2.1 Hurricanes

Recent hurricane seasons, especially those of 2004 and 2005, have produced five violent storms that affected natural habitats in or near Sarasota County:

- Hurricane Charley. 13 August 2004. Category 4.
- Hurricane Frances. 5 September 2004. Category 4.
- Hurricane Jeanne. 25 September 2004. Category 3.
- Hurricane Katrina. 25 August 2005. Category 1 (Florida).
- Hurricane Wilma. 24 October 2005. Category 3.

More such storms are inevitable over the period covered by this HCP. Quantitative data on responses of avian species to hurricanes are scarce (White et al. 2005), and the effects of even the most violent storm events on Florida Scrub-Jays and their habitat in Sarasota County are difficult to measure. Hurricane-force winds might cause direct mortality of a few individual Florida Scrub-Jays, but in the best-censused populations there is no evidence that hurricane-related mortality ever is excessive. Scrub habitat is resilient to high-velocity winds, even though such storms may temporarily defoliate the taller oak shrubs. Because hurricane-force winds also regularly break or topple overstory pine trees, their long-term effect on native scrub tracts would be to reduce tree cover, thereby actually improving the habitat for FSJs. Overall, we suspect that gale-force winds and hurricanes will have no long-term detrimental effects on FSJ populations in Sarasota County. Indeed, this suspicion is borne out by anecdotal reports from around the County following the major storm seasons of 2004 and 2005.

8.2.2 Acceleration of Habitat Loss

Over the past fifteen years, a number of small, local FSJ populations have disappeared throughout Florida, and Sarasota County is no exception. Our documentation of this trend of demographic ‘winking out’ (Appendix 1) indicates more than a 20% loss between 2000 and 2005 alone. These data, combined with the alarmingly low reproductive success in the County’s best habitat preserve (Appendix 4), confirm that under recent

management regimes, FSJ populations in Sarasota County are unsustainable. If this rate of loss were to accelerate, all evidence suggests that wholesale loss of FSJs could occur rapidly across the entire county. Active and aggressive habitat restoration, coupled with diligent monitoring, is essential in order to reverse this trend.

8.2.3 Inadequate Management of Existing Scrub Habitat

We conducted a review of the viability of the existing Florida scrub protected under public ownership in Sarasota County, lands that are presently being managed as conservation, open space, or environmentally sensitive lands (Appendix 3). From this analysis we developed a set of conclusions regarding the capacity of these tracts to support Florida Scrub-Jay family groups. We have little doubt that a number of existing preserve locations could support more family groups than are currently occupying the tracts today. The most important of these locations, and their projected potential FSJ populations, are:

Preserve	Current families	Total # preserve could support
Deer Prairie Creek	5	up to 21 families
Englewood Refuge	4	up to 13 families
Manasota Scrub	0	up to 8 families
Myakka River Corridor	0	up to 12 families
Myakka River SP	1	up to 7 families
Oscar Scherer SP	21	up to 28 families
Venice Airport Area	2	up to 16 families

Given the high likelihood that 20-30 FSJ families will be sacrificed in the Venice Suburbs alone, owing to ongoing residential and commercial development on private holdings, restoration of the above tracts toward their maximum potential is an essential step for achieving the “no net loss” goal within the County as a whole. Jays still occupying these suburban tracts today represent primary candidates for translocation into well managed preserves following restoration of their native, open character.

8.3 Unforeseen Circumstances

Procedures for addressing unforeseen circumstances affecting survival and persistence of FSJs will be developed on an ad hoc basis. The most important circumstances to monitor for unexpected surprises are: (1) annual survival of juveniles, (2) new mandates in the upcoming Florida Statewide Florida Scrub-Jay Recovery Plan, (3) possible negative effects of prolonged drought, (4) budget shortfalls that force downsizing or curtailing of management efforts, (5) new introductions of exotic animals, plants, diseases, or

pesticides that affect Florida Scrub-Jay survival. In order to provide the necessary flexibility needed given these risks, the Sarasota County Division of Natural Resources will task specific staff members to develop alternative strategies (with associated budget impacts) for long-term management should any of the following contingencies arise:

8.3.1 Persistently Low Juvenile Survival

The survival of Florida Scrub-Jays in Sarasota County depends upon recruitment of new breeding birds every year, which in turn depends upon survival of juveniles. Juvenile survival is known to be poor in human-modified habitats all over Florida (Appendix 4; Mumme et al. 2000). Drastic measures will need to be taken if monitoring reveals that FSJs in County-managed lands remain below replacement level as a result of juvenile mortality for five consecutive years.

8.3.2 Statewide Florida Scrub-Jay Recovery Plan

The latest version of the Florida Statewide Florida Scrub-Jay Recovery Plan is being drafted by the U.S. Fish and Wildlife Service staff in Jacksonville and Vero Beach, Florida. New rules associated with the restoration of existing habitat and conservation of FSJs may emerge from that document. Some changes to the current HCP may be required, although we do not expect these to be major.

8.3.3 Prolonged Drought

Prolonged drought can lower FSJ reproductive success somewhat (Woolfenden and Fitzpatrick 1984). More important, drought tends to increase the frequency, severity, and extent of wildfires. Because so much of Sarasota County is severely overgrown, the latter result would actually be beneficial in opening oak scrub previously unsuitable for FSJs.

8.3.4 Long-term Maintenance/Management

Successful execution of the acquisition and management steps outlined in this HCP depends upon the continued availability of County funds for its Natural Resources unit, plus a steady contribution of new funds specifically committed to the Florida Scrub-Jay habitat protection, generated by new development projects. The historical pattern is that these funds have been growing, but communities are always subject to unforeseen budget shortfalls. Indeed, the economic climate in 2006-2007 suggests that such a circumstance may be imminent. The County will need to develop contingency plans should a prolonged economic downturn result in dramatic funding shortfalls for land management. It will be especially vital that the County remain committed to continue carrying out

necessary management activities such as prescribed burning during such periods. To this end, budgetary efficiencies may be achieved by modifying the County's implementation strategy to forge creative partnerships with surrounding Counties, with Florida Division of Forestry and/or State Parks, and with conservation NGOs having land management expertise (e.g. The Nature Conservancy).

8.3.5 New Environmental Issues

The Florida oak scrub is remarkably resilient to introductions, primarily because its nutrient-poor, xeric soils are inhospitable to most organisms except those with evolutionary histories in the habitat. However, introduction of exotic animals or plants always has the potential to alter radically the environmental conditions affecting Florida Scrub-Jay survival and reproduction. County personnel will remain vigilant in monitoring all scrub preserves for such introductions, will continue to keep abreast of the ever-changing landscape of exotic introductions across the Florida peninsula, and will institute control measures if any such introduction threatens to alter the demographic outlook for jays in the County.

Global exchange of disease-bearing organisms by humans has become a major conservation issue in virtually all ecosystems. The recent arrival of West Nile Virus (WNV) in Florida represents a case in point. Fortunately, no evidence yet exists that the Florida Scrub-Jay succumbs to WNV, but this is another issue about which County personnel need to remain vigilant. Introduced vectors and insect-borne diseases are likely to continue being a problem throughout the Florida peninsula, necessitating constant attention on the part of conservation managers.

The use of new pesticides by residential, commercial, and recreational landowners represents another category requiring vigilance and ongoing education. Recently, for example, an ant poison manufactured by Garden Tech of Lexington, Kentucky (called *Over'n Out Fire Ant Killer*) has been identified as a major problem in southwest Florida. This little known pesticide is toxic to birds, fish and aquatic invertebrates, but its use has been widespread to control outbreaks of fire ants in the past several years. Scientists recommend that this product not be used within a one-mile radius of scrub oak habitat because of the potential for its negatively affecting Florida Scrub-Jays and other scrub endemics.

8.4 Actions of Neighboring Counties

The fate of Florida Scrub-Jays in Sarasota County depends in part on conservation actions in neighboring counties, especially Charlotte, Manatee, and DeSoto. Each of these counties contains significant remaining acreage of scrub and populations of FSJs

within dispersal distance of jays in Sarasota County. The jays of Charlotte County occupy mainly suburban and rural habitats in areas with rapidly growing human density. Those of Manatee and DeSoto counties are in more agricultural settings, perhaps making these more amenable to large-scale protection and management than those of Charlotte County. In any case, it is highly advisable that all adjoining counties develop their own HCPs for long-term protection of their Florida Scrub-Jays. Sarasota County would be helping its own cause by aiding the other counties in doing so. Failure to act will inevitably result in population decreases within most or all of southwest Florida's FSJ metapopulations. Sarasota County should, therefore, initiate conversations and cooperation with its neighboring Counties in order to foster a regional approach to FSJ conservation.

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Appendix 1. 2004-2005 Population Survey of Florida Scrub-Jays in Sarasota County

In 2004 and 2005 we conducted a comprehensive, countywide survey to document Florida Scrub-Jays (FSJs) on all currently, formerly, or potentially occupied habitat in Sarasota County. Our objectives were to verify the current occupancy status of all FSJ territories that had been documented in Sarasota County since 1993, and to inventory all additional locations in the County deemed to be suitable habitat for the species. Results of this survey are presented in this Appendix, and were incorporated as “status quo” occupancy figures in the simulations reported in Appendix 2.

SUMMARY

We documented a total of 132 FSJ groups in Sarasota County, representing a 23% decrease since the previous countywide survey effort in 2000. An additional 15 individual, apparently unpaired jays were observed, representing a 40% decline over the comparable number documented in 2000. Scrub patches not currently under conservation management experienced the highest rates of decline since 2000, with losses ranging from 26% to 67% across the four regions of Sarasota County. Protected scrubs also experienced declines, but less dramatically. Altogether, losses occurred in 71% of the County’s 21 individual scrub patches. Even Oscar Scherer State Park, the County’s largest and best-managed patch of native scrub habitat, experienced a substantial decline in FSJ groups. The few patches in which FSJ numbers increased since 2000 were those in which active management and restoration efforts had taken place during the intervening years.

INTRODUCTION

Our countywide survey was divided into two parts: (1) from 1 February through 30 April 2004 we systematically visited and revisited all previously documented FSJ territories in Sarasota County; (2) during several periods during this HCP study (1 – 15 December 2003, 1 – 30 May 2004, and 15 – 20 January 2005) we visited locations deemed as potential habitat, but where historical occupancy status was uncertain. In all cases, current occupancy status was determined through personal field observations plus input from reliable sources having relevant field expertise, including County staff, local biologists, park employees, and local government officials.

METHODS

Re-assessment of previously documented Florida Scrub-Jay territories

We mapped all FSJ territories documented since 1993 (Figure A1-1) by merging existing Geographic Information Systems (GIS) shapefiles from 2 sources: The 1992-1993 Statewide Mapping Project (Fitzpatrick et al. 1994a) and the 2000 Sarasota County Survey (Christman 2000). All locations documented as occupied by groups or single individual FSJs during either of the two previous surveys were visited and surveyed on foot and assessed as to current occupancy and habitat suitability using established FSJ survey protocols (Fitzpatrick et al. 1991). Visual searches were supplemented with extensive playbacks of pre-recorded FSJ territorial scold vocalizations (obtained from the Macaulay Library at the Cornell Laboratory of Ornithology) broadcast via a hand-held tape player. In general, when FSJs were present at a site, they responded to the scold calls within a few minutes of the initial broadcast. Presence of jays was recorded, group size was counted or estimated, and any color-bands of marked jays were logged. At many sites, the first visit resulted in no observations of FSJs. In all such cases we visited the site multiple times, on different days and at

different times of day, repeating our survey protocol in an effort to confirm occupancy status. Jays were considered absent from the site if no sightings occurred after five visits.

Figure A1-1. Composite map of potentially usable Florida Scrub-Jay habitat in Sarasota County, as determined by soil type and vegetation composition (see text for sources).

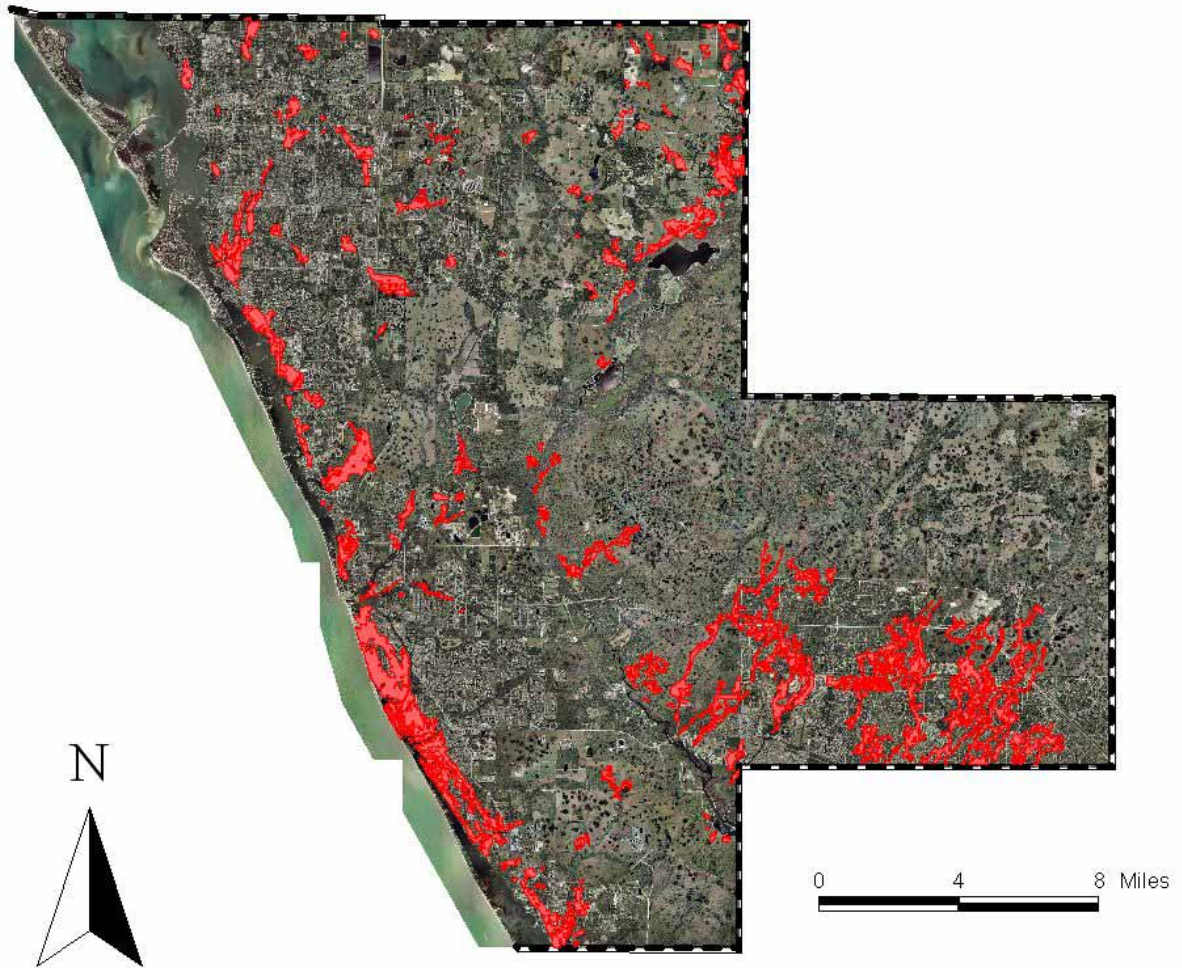
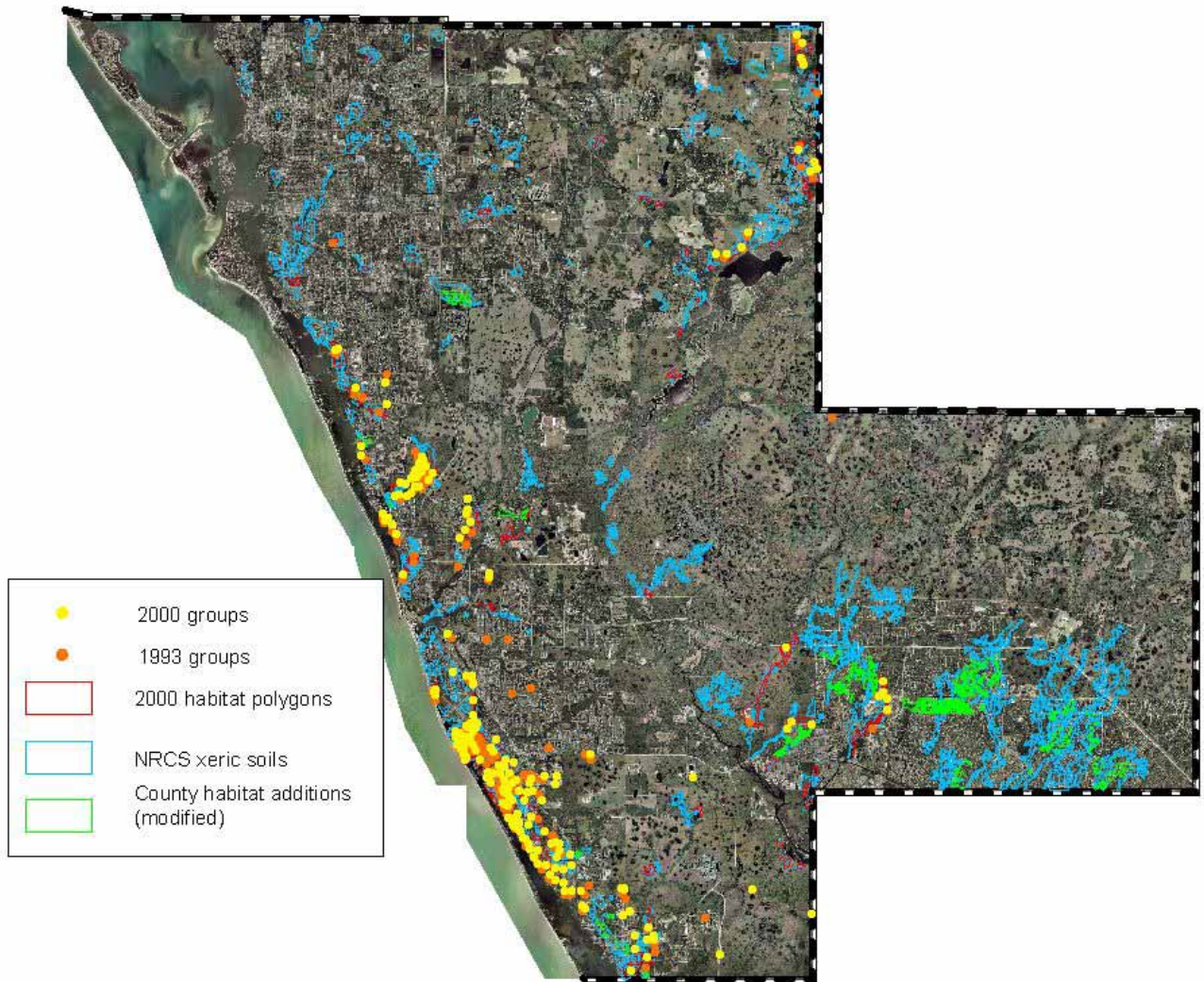


Figure A1-2. Previously documented Florida Scrub-Jay localities overlaid on the map of potential Florida Scrub-Jay habitat; the 2004-2005 survey concentrated on previously known localities, but also included search effort in most of the other patches of potential habitat in the County.



Presence/Absence of Florida Scrub-Jays in potential habitat

We mapped potential FSJ habitat (Figures A1-1 and A1-2) by overlaying 3 existing GIS habitat coverages: soil-defined habitat polygons as designated by Christman (2000); xeric soil classifications as designated by the Natural Resources Conservation Service (NRCS); habitat polygons deemed potentially suitable for FSJs, as delineated by County staff (Brouse 2004) and modified by physical review and assessment by us. All potentially suitable oak scrub or scrubby flatwoods habitat patches were verified by ground visits and by comparing our composite map with the Florida Fish and Wildlife Conservation Commission 2003 land cover shapefiles and the Florida Natural Areas Inventory (FNAI) habitat classifications. For the few cases in which ground access to potential habitat patches was not permitted by the landowner, we conducted a low-altitude aerial survey with the assistance of a local pilot (Jones Aviation Service). In these cases, patches appearing from the air to contain xeric soils and scrub oaks were delineated by hand on an aerial photograph. All accessible potential habitat areas where FSJs were not previously documented were visited and systematically searched in the same manner as described above. Any newly documented jays or groups were noted and group sizes were estimated where possible.

Spatial Analyses and Estimates of Population Change

Our base maps for habitat polygons and FSJ locations were created as overlays on aerial photographs of Sarasota County (2002 Orthophotos, 1 meter = 1 pixel resolution). All spatial analyses were conducted using ArcView 3.3 software (produced and distributed by ESRI). Because Christman’s countywide survey (Christman 2000) was a more exhaustive effort than the 1993 Statewide Mapping Project, our analyses of change in FSJ populations within Sarasota County are limited to comparisons between our survey and Christman’s.

RESULTS

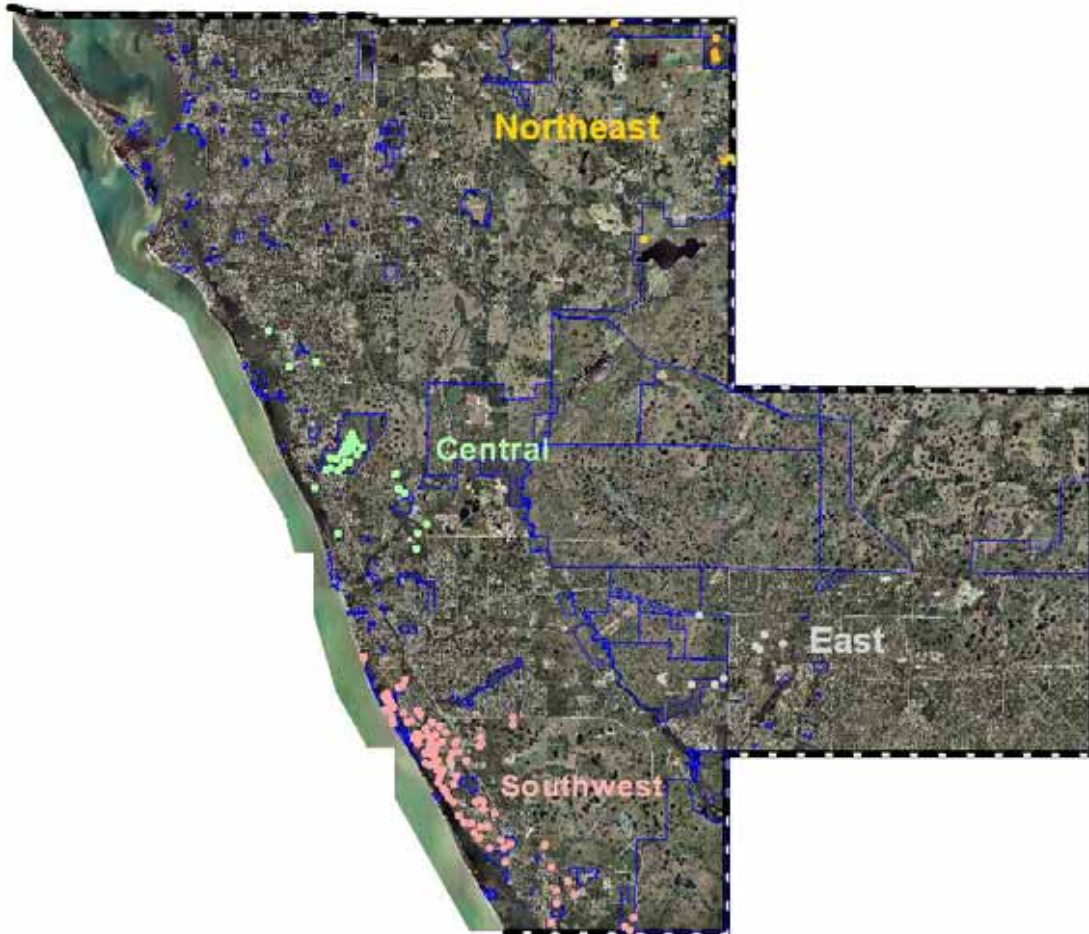
We documented a total of 132 Florida Scrub-Jay groups and an additional 15 jays believed to be unpaired birds (Table A1-1). These results represent declines of 23% and 40%, respectively, compared to the countywide survey conducted in 2000.

Table A1-1. Results of two Florida Scrub-Jay population surveys in Sarasota County. Percentage changes are noted in parentheses.

Survey	Totals	
	Groups	Individuals
Christman 2000	171	25
Davison 2005	132 (-23%)	15 (-40%)

To examine regional and local trends within the County, we divided FSJ populations into 4 regions (Figure A1-3) and 21 local patch designations (see main text). Jay groups were tallied in two categories (protected and unprotected) according to the protection status of each locality at the time of surveying. Therefore, 2000 Survey groups were categorized as protected only in localities that were in fact protected in 2000, whereas the categorization for 2005 Survey groups reflected additions to the county’s portfolio of protected sites by including localities that have been protected after 2000.

Figure A1-3. Overview of 2005 Florida Scrub-Jay distributions and region locations.



Protected areas in the Southwest and East regions experienced slight increases in jay groups (Table A1-2). This observed increase is likely due to changes in management activities (including restoration) in the Southwest region and the recent acquisition and new management of habitat in the East region. For example, jays have apparently moved from surrounding suburban areas into the Lemon Bay Preserve system and Winchester Boulevard following active management and restoration efforts at these sites; a similar trend appears to be occurring at Deer Prairie Creek following the acquisition of the LOR property and restoration efforts on the Lykes property (Table A1-3). Protected areas in the Northeast and Central populations experienced moderate declines (Table A1-2), with even Oscar Scherer State Park – largely considered the county’s most “optimal” scrub preserve – apparently emerging as a “sink” population (see Appendix 4 for more details). Unprotected areas in all regions experienced dramatic declines in jay groups, ranging roughly from 26-67% (Table A1-2).

Table A1-2. Total number of Florida Scrub-Jay groups in 4 general regions (unpaired jays are excluded). Percentage changes are noted in parentheses.

Region	2000 Occupancy		2005 Occupancy	
	Protected	Unprotected	Protected	Unprotected
Northeast	7	6	5 (-28.6%)	2 (-66.7%)
Central	26	18	22 (-15.4%)	9 (-50%)
Southwest	19	87	22 (+15.8%)	64 (-26.4%)
East	2	6	4*	4 (-33.3%)

*Note: Protected jays in the East region are believed to have moved into sites that were protected after 2000, with additional jay groups being discovered in unprotected areas.

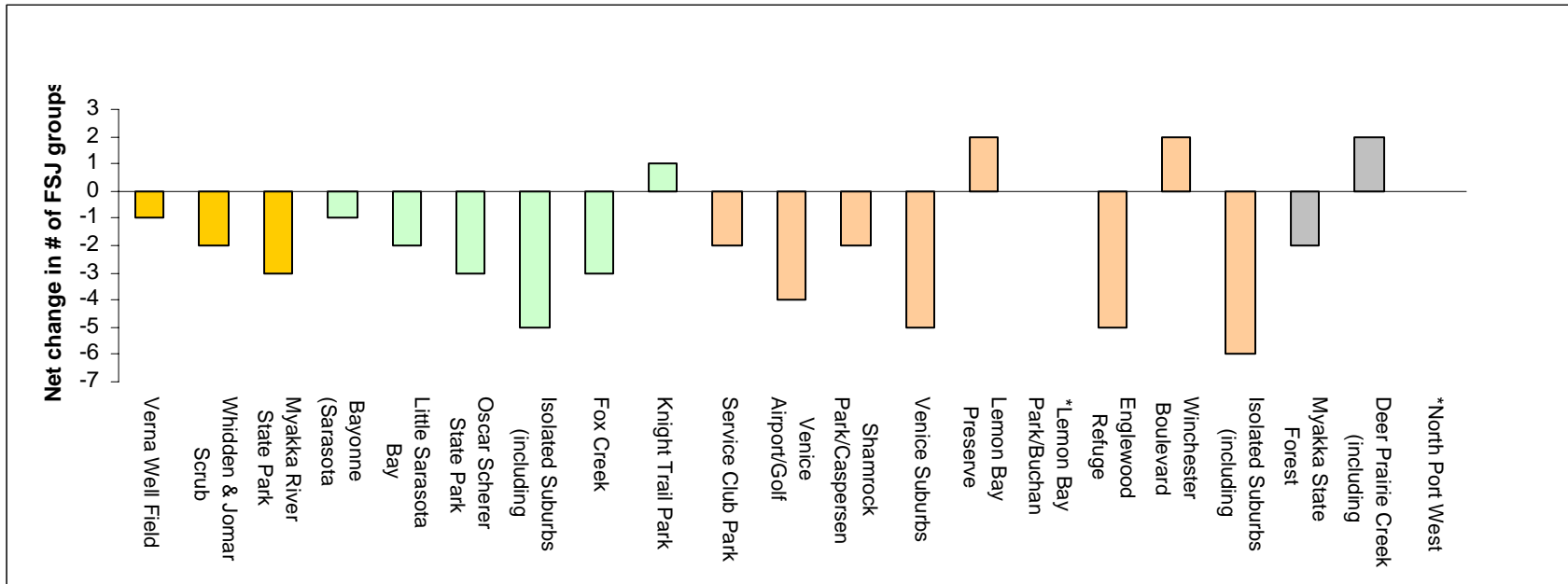
Table A1-3 summarizes the findings for the 2000 and 2005 surveys for each of the 21 patches located within Sarasota County. Most protected and managed areas experienced declines in FSJ groups (most notably Oscar Scherer State Park and Myakka River State Park). A few protected areas such as Lemon Bay Preserve, Deer Prairie Creek and Winchester Boulevard experienced increases in FSJ groups, following active management and restoration efforts.

Table A1-3. Total number of Florida Scrub-Jay groups in 21 patches (unpaired jays are excluded). Percentage changes are noted in parentheses. Cells marked with a (*) denote instances where no jays were found in either survey. Patches in bold denote areas where management activities changed after 2000.

Patch Name	Region	2000 Occupancy			2005 Occupancy		
		protected	unprotected	TOTAL	protected	unprotected	TOTAL
Verna Well Field	Northeast	4	1	5	4(0)	0(-100)	4
Whidden & Jomar Scrub	Northeast	*0	4	4	*0	2(-50)	2
Myakka River State Park	Northeast	3	1	4	1(-66.7)	0(-100)	1
Bayonne (Sarasota Square)	Central	2	*0	2	1(-50)	*0	1
Little Sarasota Bay	Central	*0	3	3	*0	1(-66.7)	1
Oscar Scherer State Park	Central	24	*0	24	21(-12.5)	*0	21
Isolated Suburbs (including Sorrento Shores)	Central	*0	7	7	*0	2(-71.4)	2
Fox Creek	Central	*0	6	6	*0	3(-50)	3
Knight Trail Park	Central	*0	2	2	*0	3(+50)	3
Service Club Park	Southwest	3	0	3	0(-100)	1(+100)	1
Venice Airport/Golf Course/W.C.I.N.D.	Southwest	3	3	6	2(-33.3)	0(-100)	2
Shamrock Park/Caspersen Beach Park	Southwest	13	*0	13	11(-15.4)	*0	11
Venice Suburbs	Southwest	0	56	56	*0	51(-8.9)	51
Lemon Bay Preserve (including Diocese of Venice & LB Estates Preserve)	Southwest	0	4	4	4(+100)	2(-50)	6
Lemon Bay Park/Buchan Airport	Southwest	0	4	4	2(+100)	2(-50)	4
Englewood Refuge	Southwest	*0	12	12	*0	7(-41.7)	7
Winchester Boulevard	Southwest	0	1	1	3(+100)	0(-100)	3
Isolated Suburbs (including Taylor/Thomas Ranch)	Southwest	*0	7	7	*0	1(-85.7)	1
Myakka State Forest	East	2	*0	2	0(-100)	*0	0
Deer Prairie Creek (including Lykes & Schewe)	East	0	2	2	4(+100)	0(-100)	4
North Port West	East	*0	4	4	*0	4(0)	4

Overall, 15 of the 21 patches in Sarasota County are experiencing declines, with net losses ranging from 1 to 6 Florida Scrub-Jay groups (Figure A1-3). Suburban areas experienced the greatest net declines during the period 2000-2005, and only 2 patches exhibited no net change.

Figure A1-3. Overall net changes of Florida Scrub-Jay groups (protected + unprotected) in 21 patches. Patches marked with a (*) denote areas where no net change occurred. Histogram colors denote Sarasota County's four geographic regions (see Table A1-3).



CONCLUSIONS

The Federally threatened Florida Scrub-Jay population has been declining across its entire range, and Sarasota County is no exception. Between 2000 and 2005, the County's Florida Scrub-Jay population declined by 23%. More than two thirds (71%) of the occupied scrub patches within the County experienced population declines during this period, and several are nearly extirpated. Statewide, the greatest threats to Florida Scrub-Jay persistence are outright habitat loss, habitat degradation owing to absence of fire management, and poor reproductive success as a consequence of proximity to human habitation (Cox 1987, Woolfenden and Fitzpatrick 1996, Fitzpatrick et al. 1994b). The same patterns hold true for Sarasota County: jays in unprotected habitat patches are experiencing precipitous declines, and even the most "optimally" managed scrub preserve appears to function as a "catching basin" for displaced and dispersing jays, but demonstrates survival and reproductive success characteristic of a "sink" population. A few jays appear to have moved into patches that are being aggressively managed/restored by the County. This is a promising trend, but more time and further monitoring is required to determine whether the pattern will be sustained. The findings of this survey underscore the importance not only of protecting suitable habitat for Florida Scrub-Jays within Sarasota County, but also of aggressively managing large areas of potentially suitable habitat to create optimal conditions for recolonization, survival, and successful reproduction.

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APPENDIX 2. Description of Florida Florida Scrub-Jay Simulation Model

The simulation model used for this project is a spatially-explicit, individual-based population model (SEIPM) developed specifically for the Florida Florida Scrub-Jay. The original version of this model was described in detail in Stith (1999). The final model used to generate simulations for this Habitat Conservation Plan was significantly modified and advanced from the original. We believe it to be among the most detailed and biologically defensible landscape model available for any organism.

Our model is spatially-explicit, representing landscape features and animal movement superimposed on real-world digital maps of jays and their habitat throughout Sarasota and adjoining counties. The model is individual-based, simulating dynamic aspects of individuals by tracking birth, dispersal, breeding, and death of each individual jay during the simulations. The model incorporates general aspects common to many population models, including different types of stochasticity (demographic and environmental), as well as a host of details specific to the well-documented biology of Florida Florida Scrub-Jays. By tracking the fates of simulated individuals and aggregating these fates across patches, subregions, or regions, the SEIPM generates measures of population viability that can be used to compare the relative value of different conservation strategies. The SEIPM approach is well suited for studying Florida Florida Scrub-Jays in Sarasota County because jay habitat has been mapped in detail (Christman 2000), and because Florida Florida Scrub-Jays have been intensively studied for over 35 years at several locations around Florida. Data from studies in Highlands county (Archbold Biological Station: Woolfenden and Fitzpatrick 1984, 1996; Placid Lakes subdivision: Bowman and Woolfenden XXXX, R. Bowman unpubl. data), Polk County (Avon Park Air Force Range: Bowman, unpubl. data), Sarasota County (Thaxton and Hington 1996, Hington unpubl. data), and Brevard County (Breininger et al. XXXX) were integrated in the original design of the model, and in validating the model against real-world data in a variety of landscape contexts.

Model overview

Simulations of Florida Scrub-Jay population dynamics take place on digital landscapes portraying the locations of jay territories across the region, as well as xeric habitat and other landcover types. Male and female jays live within 10 hectare territory grid cells, each territory having certain attributes such as the type of territory (suburban or native habitat), and habitat condition (optimal or overgrown). The life cycle of jays is simulated in detail. Individual jays of both sexes progress through 5 life stages (juvenile, 1-year helper, older helper, novice breeder, and experienced breeder). Breeder experience and presence of helpers affects breeder success. Helpers monitor neighboring territories and vie for breeding vacancies; the outcome of such competition is determined by simple dominance rules (e.g., older non-breeders dominate younger ones). Helpers that are unable to find breeding vacancies nearby may leave on long distance dispersals, during which time mortality and movement varies depending on the type of landcover being

traversed. During the simulation, graphs of population trajectory, and quasi-extinction probabilities are displayed for different landscape hierarchies (patch, subregion, region). The population statistics generated by the model can be compared among different configurations of territories, providing useful information for assessing the relative value of different conservation strategies.

Input files

Florida Scrub-Jay territory files - Florida Scrub-Jay territories are represented as point locations in Arcview “shape” files (ESRI 1990). The territory shape files are read in by the SEIPM, and a grid cell corresponding to a 10 hectare territory (the average size of a jay territory) is created at each point location. Each territory has various attributes such as occupancy (number of jays present), territory type (native habitat in optimal or suboptimal condition, or suburban), protection status (preserve, private ownership), and associated patch, subregion, region, and county designations. Different shape files were developed for this project to represent different spatial configurations by deleting or adding territories, or changing their status as native or suburban, to reflect different conservation strategies. The primary configurations used to simulate different conservation strategies are described in Appendix 3.

GIS habitat files - Geographic Information System (GIS) files provided the landscape setting upon which the population dynamics and dispersal movements were simulated. These files were created by overlaying the jay habitat patches from Christman (2000) onto a statewide habitat classification map produced by the Florida Game and Freshwater Fish Commission (FGFWFC) based on 1985-1989 Landsat Thematic Mapper data (Kautz et al. 1993). These GIS files represented the landscape in a raster format with grid cells having a spatial resolution of 30 m. The original landcover types coded in the FGFWFC classification were collapsed into 5 general categories with different attractiveness values. Hypothetical corridors were coded into the GIS file to allow simulation of directed dispersal with higher movement between patches (see Figure A2-1, Table A2-1, and dispersal discussion below). In the simulations completed for this project, the landscape was assumed to be static through time.

Life stages

The model simulates 5 stages each jay can progress through:

- Juvenile
- 1-Year Helper
- Experienced Helper
- Novice Breeder
- Experienced Breeder

Helpers can transition temporarily into a sixth stage by departing from their natal territory and becoming a long-distance disperser (“floater”).

Starting population stage structure

At the start of each repetition of each simulation run, all territories are initialized with a pair of inexperienced breeders (both 2 years old) and one inexperienced helper (1 year old; randomly selected sex). The location of each territory is obtained from an Arcview shape file provided to the model. These territories also may start out unoccupied, representing restored habitat that may become occupied during the simulation as dispersers colonize empty territories.

Annual life cycle

The Florida Scrub-Jay annual life cycle is simulated by a series of events scheduled in an event queue, with each event completed for the entire metapopulation before the next event begins. Figure A2-2 shows the 5 life stages and all possible transitions during the annual cycle. The following is a summary of the major events in the annual cycle, which begins with reproduction.

Reproduction - each territory produces a poisson distribution of juveniles (see Burgman et al. 1993) with 3 different mean fecundity rates (see Table A2-1) for: (1) at least one experienced breeder with at least one helper, (2) at least one experienced breeder but no helpers, or (3) both novice breeders. The fecundity parameter values are set to the number of one-year old offspring produced (i.e., the model incorporates fledgling production and juvenile survival into a single value for annual reproduction represented by number of yearlings produced, which varies from zero to four according to their frequency distributions as documented by field studies). Demographic stochasticity of fecundity is implemented by randomly selecting the sex of offspring. Environmental stochasticity of fecundity is not implemented, but would be expected to have a negative effect on population persistence. Field studies have shown that in the Florida Florida Scrub-Jay, environmental stochasticity of fecundity and mortality are positively correlated (Woolfenden and Fitzpatrick 1984).

Annual mortality - breeders and helpers die according to annual mortality rates based on their respective type of territory (suburban or suboptimal vs. optimal; see Table A2-1). All breeder vacancies that become available to dispersers are created in this step. Helpers do not actually die in this step, but instead are considered to have “disappeared.” The “floater frequency” parameter later determines whether they die or become floaters (Stith 1999). Juveniles are not subjected to mortality in this step since their annual mortality is already reflected in the fecundity rate. Variance in mortality is set to mimic the variability measured at Archbold Biological Station over the past 30 years, including several epidemics (Fitzpatrick et al. 1991).

Promotion to next stage – survivors of the mortality step are promoted to the appropriate “experienced” stage: novice breeders to experienced breeders; 1-year helpers to experienced helpers.

Dispersal – Two types of dispersal are modeled: *philopatric dispersal* - forays around the natal territory within an “assessment sphere”, and *floaters dispersal* - long distance searches in which a dispersing helper permanently leaves its area of intimate knowledge and moves through the landscape searching for breeder vacancies or empty territories.

All helpers that survive the mortality step engage in philopatric dispersal. The order in which philopatric dispersal events occur mirrors the dominance hierarchy of jays: males dominate females, older jays dominate younger, jays closer to their natal territory dominate more distant jays. The first dispersal event allows male helpers to inherit their natal territory if both breeders have died. Male helpers then search their assessment sphere for unpaired females, and if successful they become novice breeders. Older males search before younger males (to simulate dominance relations) and jays closer to their natal territory out-compete more distant jays. Male helpers that fail to pair up then search for empty territories within their assessment sphere. Female helpers then search for unpaired males within their assessment sphere. If unsuccessful, females then search for empty territories, also limited to their assessment sphere. Mortality associated with these short distance forays is assumed to be already factored into the mortality rates for each stage.

Floater dispersal commences after philopatric dispersal; this ordering assumes that philopatric dispersers dominate floaters. Helpers of both sexes that were marked-to-disappear in the mortality step either die or leave their natal territory as floaters, depending on whether a random uniform deviate drawn for each helper exceeds the setting for the floater frequency parameter (see Table A2-3). The primary differences between low-dispersal and high-dispersal rate simulations (described in Appendix 3) are accounted for by the parameter settings in Table A2-3. The low-dispersal runs produce fewer female floaters and both sexes suffer higher mortality while dispersing compared to the high-dispersal runs.

Searching behavior of floaters is modeled with several simple rules. Upon leaving the territory, the initial movement direction is random. As dispersers move through the landscape, they see territories or habitat within a user-specified detection radius (set to 1000 m for this project). They process the objects they see in a specific order, first looking for breeder vacancies, then empty territories. If a breeder vacancy or empty territory is detected, the decision to settle is determined by the disperser’s propensity to settle. If the disperser doesn’t settle, it moves on towards the most attractive habitat that has not been visited already. In completely homogeneous habitat dispersers move roughly in a straight line, but in non-homogeneous habitat their movement direction is affected by differences in habitat attractiveness. They move away from habitat with low attractiveness, and towards habitat with high attractiveness (see attractiveness values in Table A2-1). Corridor attractiveness was reduced from 3 to 2 for low-dispersal runs to give it the same attractiveness as the dominant matrix class (compare orange and yellow landcover classes in Figure A2-1). Dispersers remember previously visited locations, which makes it less likely that they will backtrack unless alternative directions are very unattractive.

Long-distance dispersers have two mortality rates: one for dispersers within scrub, another for dispersers outside of scrub. Within scrub, the disperser survival rate is set higher than outside of scrub (Table A2-3). Each disperser moves until it exceeds a

random daily-distance-moved threshold selected for each jay from a distribution of daily move distances. Once the latter distance is exceeded, a daily mortality rate is used to determine if the jay survives to the next day. These steps are repeated for each jay until it dies, finds a mate and settles, or leaves the simulation area. Jays that leave the area are considered dead (i.e., no jay returns, and no immigration occurs from outside the simulation area). In contrast to short-distant dispersers, long-distance dispersers do not ever return to their home territory.

After all floaters have settled or died, the annual cycle is repeated with the reproduction step. Once the last year of the last repetition is reached, the simulation terminates.

Model Output

The primary model output used for this project includes mean ending population size, and estimates of extinction and quasi-extinction risk. The model generates quasi-extinction curves that show the risk of falling below a given population threshold (see example in Figure A2-3). The model also generates a mean population trajectory curve with standard deviations (see example in Figure A2-4). Information from these graphs was used to develop the simulation tables in Appendix 3.