Charlotte County

County-wide Florida Scrub-Jay (*Aphelocoma coerulescens*) Habitat Conservation Plan

Prepared for:
United States Fish and Wildlife Service
1339 20th Street
Vero Beach, FL 32960

Prepared by:
Charlotte County Parks & Natural Resources Division
2050 Forrest Nelson Boulevard
Port Charlotte, FL 33952

Quest Ecology
735 Lake View Drive
Wimauma, FL 33598

Cardno/ENTRIX
22 Sarasota Center Boulevard
Sarasota, FL 34240

March 2013

Charlotte County Scrub-Jay Habitat Conservation Plan

List of Figures

Appendices

Executive Summary

The Charlotte County Scrub-jay Habitat Conservation Plan is being developed to address impacts to the state and federally threatened Florida Scrub-Jay (*Aphelocoma coerulescens*) and Eastern indigo snake (*Drymarchon corais couperi*), as they relate to construction and development throughout Charlotte County over a thirty-year period. The thirty-year time frame should provide Charlotte County sufficient time for land acquisition, conservation easement development, habitat restoration, habitat management, and possible translocation of scrub-jays. The Charlotte County Board of County Commissioners is initiating this effort in accordance with the Natural Resources Element of the Smart Charlotte 2050 Comprehensive Plan and recognizes that development in occupied scrub-jay habitat requires developing an HCP and obtaining an ITP from the USFWS, as well as consultation and approval from the Florida Fish and Wildlife Conservation Commission.

A comprehensive countywide HCP will reduce the need, time, and cost associated with the development of individual HCPs for parcels on a project by project basis while ensuring the persistence of the scrub-jays in Charlotte County. The principal objectives of the Charlotte County Scrub-Jay HCP are to ensure compliance with the Endangered Species Act, provide greater regulatory certainty for development, and enhance the recovery and long term viability of the scrub-jay within Charlotte County.

A Reserve, totaling approximately 4,500 acres, was designed for implementation under this HCP to serve as compensation for loss of occupied scrub-jay habitat. Mitigation and compensation will take place in the form of the acquisition, restoration and long-term management of the Reserve. The Reserve will be managed in perpetuity according to the habitat requirements of scrub-jay.

Charlotte County will be the implementing agency responsible to ensure the conditions of the HCP are followed, and will provide for all of the necessary funding for implementation of the HCP, including long-term management, monitoring and reporting.

1.0 Introduction

1.1 Overview

The Charlotte County Scrub-Jay Habitat Conservation Plan (HCP) is being developed as part of an application for an Incidental Take Permit (ITP) from the U.S. Fish and Wildlife Service (USFWS) pursuant to Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973, as amended. This HCP was developed as a result of countywide efforts to resolve conflict between development and conservation of federally and state listed species. The Charlotte County Board of County Commissioners (Applicant) is initiating this effort in accordance with Policy 2.3.4 of the Natural Resources Element of the Smart Charlotte 2050 Comprehensive Plan. This HCP will also help address many of the Goals, Objectives, and Policies of the Smart Charlotte 2050 Comprehensive Plan by preserving, restoring and managing Florida scrub-jay (*Aphelocoma coerulescens*) (scrub-jay) habitat per the conservation measures proposed herein. The state and federally threatened Eastern indigo snake (*Drymarchon corais couperi*) (indigo snake) will also be covered under the HCP for the HCP Plan Area. The Applicant is not requesting that the state listed and federal listing candidate gopher tortoise be covered under this HCP, due to the uncertainty of policies, procedures and requirements that may arise if the species is federally listed; however the Applicant recognizes that the gopher tortoise should at a minimum be addressed within this HCP (see Section 4.7 Adaptive Management). The Applicant is requesting that the ITP authorize, for a period of 30 years, take of the scrub-jay and indigo snake incidental to development of properties within Charlotte County.

The Applicant recognizes that development in occupied scrub-jay habitat requires developing an HCP and obtaining an ITP from the USFWS, and consultation and approval from the Florida Fish and Wildlife Conservation Commission (FWC). The Charlotte County HCP includes compensatory mitigation measures for compliance with the conservation requirements of section 10(a)(2) of the ESA, as detailed in Section 4.0 of this document.

1.2 Background

In early 2007, Charlotte County entered into an agreement with the FWC for development of a Habitat Conservation Plan in an effort to resolve conflicts between commercial and residential development and conservation of the federally and State threatened scrub-jay under an ESA Section 6 Planning Grant from the USFWS for $260,390. This grant was to assist Charlotte County with the initiation of development of an HCP to address potential impacts to the scrub-jay and indigo snake related to Charlotte County's permitting activities. This includes all forms of private residential and commercial development such as single and multi-family homes, commercial projects, capital improvement projects, and associated road and utility infrastructure improvements related to these development activities. Currently it is estimated that over 14,000 quarter acre parcels exist within scrub habitat that may be occupied by the scrub-jay. A comprehensive countywide HCP would reduce the need, time, and cost associated with the development of individual HCPs for these and other parcels on a project by project basis while ensuring the persistence of the scrub-jay in Charlotte County for the benefit of future generations.

1.2.1 Technical Advisory Committee

A Technical Advisory Committee (TAC) was formed to provide local expertise and technical guidance during the Phase 1 process. TAC members included representatives from the FWC, Charlotte County,

and Quest Ecology, Cardeno/Entrix Consulting, and a Technical Advisor from Archbold Biological Station; as well as representatives from the USFWS to provide technical knowledge with respect to the ESA. Multiple TAC meetings were held from 2008 to 2012, and input from the TAC was sought as part of each major step of project development. The final TAC meeting/conference call was conducted on September 5, 2012, to discuss the finalization of the HCP.

1.2.2 Public Involvement

Two public meetings were held in the early stages of HCP development to provide background information on the HCP development. The purpose of these meetings was to inform the public and potential stakeholders of the process, benefits of the HCP, proposed project schedule, and goals.

An Interagency Task Force was also assembled to provide recommendations and input with regards to Scrub-Jay Reserve (Reserve) concepts and habitat management and restoration options. This group consisted of public land managers and representatives from Charlotte County, Sarasota County, the Department of Environmental Protection, FWC, local environmental non-profits, the building industry, and Edison College. Two meetings were held with this group during the development of the Reserve Alternatives, on November 2nd and 3rd, 2009.

1.3 Proposed Action

The proposed action consists of the development of occupied scrub-jay habitat throughout Charlotte County. Much of the remaining scrub in Charlotte County is privately owned and occurs as platted 0.1 hectare (0.25 acre) residentially zoned lots, particularly within scrub-jay Metapopulations M5, M6W and M6E (Charlotte County Natural Resources Division data). Other privately owned areas, particularly within M7, are located outside the urban service area, and are zoned as agricultural and agriculture estates designations. Occupied scrub habitat also occurs on privately owned commercially zoned property throughout the County. Clearing of scrub habitat for residential and commercial development or for conversion to agricultural uses will result in the take of an estimated 3,056 acres of occupied scrub-jay habitat. Measures will be taken to minimize impacts, to include conducting all clearing for construction outside of the nesting season within occupied habitat. In all areas where native vegetation will be altered, construction crews will be advised of the potential presence of the indigo snake and gopher tortoise. Standard Protection Measures for the indigo snake will be implemented and adherence to current State of Florida permitting and relocation guidelines for the gopher tortoise will be adhered to. Mitigation will take place in the form of the acquisition, restoration and long-term management of scrub-jay habitat throughout the Reserve, as defined in Section 4.2.

Charlotte County will provide for the funding of the acquisition of Reserve parcels, restoration activities and long-term management and monitoring. Details of the mitigation plan, reserve design, and long-term management and monitoring plans are provided in Section 4 of this document.

1.4 Purpose and Need

The purpose of the Charlotte County Scrub-Jay HCP is to:

a. *Ensure compliance with the ESA as Charlotte County implements regulatory permitting programs for building and development.*

b. *Provide the Applicant greater regulatory certainty during currently planned development in Charlotte County.*
c. *Enhance the recovery and long term viability of the scrub-jay within Charlotte County.*
d. *Protect indigenous species characteristic of Florida scrub (including xeric oak scrub and scrubby flatwoods).*
e. *Follow current standard protection measures for indigo snakes in existing scrub-jay habitats.*

Occupied scrub habitat occurs on parcels zoned as residential, agricultural, agriculture estate and privately owned commercially zoned property throughout the County. In addition, approval of the County-wide HCP will preclude the need each for landowner to seek individual ITPs for each of the many parcels in occupied scrub-jay habitat as they are developed.

In 1991, Charlotte County received a letter from the USFWS stating that Charlotte County contains scrub habitat that may be occupied by the federally threatened scrub-jay. The letter stated "As a governmental entity which issues permits allowing private landowners to develop their property, you are responsible for ensuring that activities authorized by the county will not be harmful to the scrub-jay or any other listed species" (USFWS 1991). It continued to explain the legal mechanisms through which development activities could be authorized within occupied scrub-jay habitat.

The principal factors negatively affecting the long-term persistence of scrub-jays in Charlotte County are habitat loss and fragmentation related to commercial and residential development activities, and degradation of habitat quality as a result of fire suppression. This HCP is designed to address these factors within portions of the four metapopulations described by Stith (1999) located within the County.

The implementation of the HCP will address the above issues as well as long-term conservation needs of the scrub-jay while also coordinating and streamlining federal, state, county, and local regulatory requirements. Current guidelines to protect the indigo snake during construction will be followed to avoid and minimize take of the species on scrub parcels, thus eliminating the need for additional consultation with USFWS on this species.

1.5 Regulatory Framework for the HCP

The scrub-jay was federally listed as a threatened species in 1987, and the indigo snake was federally listed as threatened in 1978. The federal listings granted protection to the scrub-Jay and indigo snake according to Sections 4(d) and 9 of the ESA. These regulations prohibit the take of a federally listed species. "take" is defined as harass, harm, pursue, hunt, shoot, wound, trap, kill, capture, or collect, or attempt to engage in any such behavior (Section 3(19) of the ESA). "Harm" is interpreted to include significant habitat modification or degradation that results in death or injury to a listed species to such an extent as to significantly disrupt normal behavioral patterns that include, but are not limited to breeding, feeding, or sheltering. "Harass" is defined as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to disrupt normal behavioral patterns which include, but are not limited to breeding, feeding, or sheltering. Any activity as described above may constitute a violation of Section 9 of the ESA. Section 9 prohibitions against "take" apply to actions conducted by "any person subject to the jurisdiction of the United States..." The term "person" was further interpreted in a 1988 amendment to the ESA to include actions carried out by states, counties, or municipalities. This includes the issuance of land clearing and development permits by local governments, including Charlotte County.

The ESA provides two regulatory methods to the "person" who wishes to develop land on which federally listed species occur. The regulatory method used is based on whether the development is a federal or non-federal project. Federal projects include, but are not limited to, the issuance of federal permits, federal authorization, or federal funding. Both types of actions allow "take" if permitted by the USFWS. Incidental take is defined as any take of a listed species that "is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity (Section 10(a)(1)(B), ESA).

Federal activities, as defined above, require an "incidental take statement" authorized by Section 7 of the ESA, Interagency Cooperation. Section 7(a)(2) of the ESA requires all federal agencies to consult with the USFWS to ensure that any action that it authorizes, funds, or carries out, is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse impact to habitat determined to be critical to such species.

Non-federal activities, such as the developments included within this HCP, require an "incidental take permit" according to Section 10(a)(1)(B) of the ESA, should a person wish to ensure compliance with the ESA. This method requires the applicant to develop an HCP as part of the application process for an ITP. The goal of the HCP program is to ensure that the effects of authorized incidental take will be adequately avoided, minimized, and mitigated to the maximum extent practicable (USFWS and National Marine Fisheries Service (NMFS) 1996). The intent of the program is to institute "... a process that, at its best, would integrate non-federal development and land use activities with conservation goals, resolve conflicts with endangered species protection and economic activities on non-Federal lands, and create a climate of partnership and cooperation" (USFWS and NMFS 1996). This HCP is designed to comply with the USFWS goals and intent.

The scrub-jay and indigo snake are also listed as threatened species by the FWC and protected by the Wildlife Code of the State of Florida (Chapter 39, Florida Administrative Code (FAC)).

Policy 2.3.4 of the Natural Resources Element of the Smart Charlotte 2050 Comprehensive Plan identifies HCPs as a tool to expedite the local development review process while ensuring the long-term viability of listed species. The policy further directs Charlotte County to develop species specific HCPs and supports the effort to create a county-wide scrub-jay HCP. Policy 2.3.7 of the Natural Resources Element of the Smart Charlotte 2050 Comprehensive Plan directs Charlotte County to work for the establishment of mitigation parks and banks within the County to ensure that local impacts to listed wildlife and native communities are mitigated locally (Charlotte County 2011).

In accordance with the Section 10(a)(2)(A) of the ESA, this document assesses the effects of the proposed take on all scrub-jay metapopulations in Charlotte County and provides conservation strategies that minimize and mitigate these potential adverse effects.

1.6 Permit Duration

The Applicant requests an ITP duration of thirty (30) years based on projected time frames for future development. The thirty-year time frame should provide Charlotte County sufficient time for land acquisition, conservation easement development, habitat restoration, habitat management, and possible translocation of scrub-jays from take areas to parcels within the Reserve.

The potential need for a permit extension will be evaluated at year 25 and discussed with the USFWS at that time. A permit extension for up to an additional 25 years may then be requested as needed. A

collaborative evaluation with USFWS staff of the status of the acquisition of parcels within the Reserve will be conducted at years 2, 4, 6 and every five years thereafter in an effort to determine whether acquisition, development, and fee collection are on track to meet the goal of an additional 1300 acres by the end of the 30 year permit.

1.7 Plan Area

The Plan Area encompasses the entire 2011 USFWS scrub-jay regulated and occupied scrub-jay habitats throughout Charlotte County, as well as the occupied and unoccupied parcels that make up the Reserve.

1.8 Species to be Covered by HCP

Two federally and state listed species are covered under this HCP: the scrub-jay and indigo snake. Take is being requested for the scrub-jay and the indigo snake as discussed in Section 3 of this HCP.

2.0 Project Description

2.1 General Environmental Setting

Charlotte County is located in Southwest Florida on the Gulf Coast and is bordered to the north by Sarasota County, to the northeast by DeSoto County, to the east by Glades County, to the south by Lee County, and the west by the Gulf of Mexico (Figure 2.1). The County encompasses approximately 2,154 square kilometers (832 square miles); 334 square kilometers (129 square miles) of which are inland surface waters including Charlotte Harbor, and the Peace and Myakka Rivers. Approximately 40% of the available land within the urban service area boundary has been developed (D. Murphy, Manager of Charlotte County GIS Division; pers. comm.).

Charlotte County is composed of four physiographic provinces: Gulf Barrier Chain, Gulf Coastal Lowlands, Caloosahatchee Incline, and DeSoto Plain. The climate is described as humid, subtropical, with a mean annual temperature of 23.3 degrees Celsius (74 degrees Fahrenheit). Annual rainfall is approximately 127 cm (50 in), the majority of which occurs during the summer (Charlotte County 1997).

Vegetation communities within Charlotte County are typical of those found in Southwest Florida including, but not limited to, pine flatwoods, dry prairies, oak-palm hammocks, depressional marshes, forested wetlands, freshwater tidal swamps, tidal marsh, coastal strand, scrubby flatwoods, and scrub.

2.1.1 Land Use / Vegetation Communities

Significant development in the County began in the 1950s and ‘60s, beginning with the rapid development and platting of the Rotonda, Port Charlotte, Deep Creek, and Harbor Heights areas in the western County. Unlike the majority of Florida, which was initially developed as agriculture, residential and commercial development have dominated the County west of the Peace River, while the area east of the Peace River has remained relatively rural with interspersed agriculture. Webb Wildlife Management Area and Babcock Ranch Preserve are large public lands located in the eastern portion of the County composed of flatwoods and wetland systems equating to 140,613 acres, 134,996 acres of which are located within Charlotte County.

Due to extensive platting of subdivisions and communities in the 1950s and '60s there are a number of vacant lots found within a network of roadways. Where clearing of native habitats occurred in platted areas, exotic and invasive species such as Brazilian pepper (*Schinus terebinthifolius*) and Australian pine (*Casuarina equisetifolia*) are abundant. Where the native habitats were not cleared in platted communities, those habitats have become overgrown with tall and dense native vegetation due to fire suppression. Commercial and industrial development has occurred predominantly along major roadways and along the coast and barrier islands.

In addition to residential and commercial development, Charlotte County also contains recreational areas, mangrove swamps, coastal wetlands, and some open land, mostly represented by cleared, undeveloped lots. The Charlotte Harbor National Estuary exists along the majority of the Harbor shoreline and consists of native habitats such as pine flatwoods, mangrove swamps and estuarine marsh.

Occupied scrub-jay habitat is found throughout the County in both suburban and rural areas. Within the suburban areas, scrub-jays are found in Rotonda, Gulf Shores, Port Charlotte, Murdock, Deep Creek, and Harbor Heights. The native habitats within platted areas have, for the most part, become overgrown, but the developed portions have provided the temporary openness that scrub-jays require and, as a result, scrub-jays have been able to persist in these areas. However, the annual death rate of adults typically surpasses the annual recruitment of juveniles, thus the number of scrub-jays typically decline annually in these highly disturbed suburbanized areas.

Hogan (1994) observed that common nest predators were high within an urban barrier island in Brevard County, Florida, which resulted in an unusually low fledgling production. Additionally, Breininger (1999) measured reproductive success at the same study sites over six years and found that mean production of juveniles was lower than in un-fragmented habitats at Archbold Biological Station (ABS) and Kennedy Space Center (KSC). One-year-olds were more likely to breed in this urban area than in natural landscapes at ABS and KSC and further, all of the two-year-olds within the urban study site bred, while only 50% of the same aged birds bred in the un-fragmented landscapes. Scrub-jays in smaller clusters within these sites experienced higher mortality rates than reproductive rates. Similarly, Bowman (1998) found that annual recruitment of juveniles was 50% lower in a suburban population than in a rural population at ABS 8 km to the south. Although scrub-jay populations in these fragmented habitats will likely go extinct, they can provide important temporary sources of immigrants to nearby sub- or metapopulations or to colonize restored areas.

Within rural areas, scrub-jays are typically found in open pine flatwoods with a scrubby component, scrubby flatwoods, or xeric oak.

2.2 Wildlife Species of Concern in the Plan Area

Additional state and federally listed wildlife species that have been documented within Charlotte County include: indigo snakes, red-cockaded woodpecker (*Picoides borealis*), wood stork (*Mycteria americana*), crested caracara (*Caracara cheriway*), piping plover (*Charadrius melodus*), roseate tern (*Sterna dougallii*), American crocodile (*Crocodylus acutus*), green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), Florida panther (*Puma concolor coryi*), and Florida manatee (*Trichecus manatus latirostris*). The Florida bonneted bat (*Eumops floridanus*) is proposed for federal listing.

Wildlife listed only by the FWC which have been documented within Charlotte County include: white ibis (*Eudocimus albus*), roseate spoonbill (*Platalea ajaja*), little blue heron (*Egretta caerulea*), tricolored heron (*Egretta tricolor*), reddish egret (*Egretta rufescens*), Florida sandhill crane (*Grus canadensis pratensis*), American oystercatcher (*Haematopus palliatus*), least tern (*Sterna antillarum*), black skimmer (*Rynchops niger*), Florida burrowing owl (*Athene cunicularia*), gopher frog (*Rano capito*), Florida mouse (*Podomys floridanus*), Sherman's fox squirrel (*Sciurus niger shermani*), Florida black bear (*Ursus americanus floridanus*), and gopher tortoise (*Gopherus polyphemus*). The gopher tortoise is also a federal candidate species.

The species that were preliminarily discussed and noted in the HCP Planning Grant Application as possibilities to include in the HCP included: scrub-jay, bald eagle (*Haliaeetus leucocephalus*), gopher tortoise, and indigo snake. The County chose not to pursue coverage for other federally-listed species due to the capacity needs for the larger mammals, the lack of development pressure for most of the species and the vastly different habitat types that would need to be acquired. It is likely that these species will be positively affected by the mitigation provided under the Charlotte County HCP; however, incidental take coverage is being requested for only the scrub-jay and indigo snake. The County is also currently not seeking coverage for the Florida bonneted bat because no natural roost sites are known, and the only documented roost site for this species outside of public lands in Charlotte County was eliminated in 1979. Limited information on the species' ecology and habitat use and preferences in Charlotte County make determination of impacts to this species uncertain at this time. The County realizes that this HCP may need to be amended in the future as more information about this species is gained.

Bald Eagle

The bald eagle was de-listed from the federal Endangered Species List in 2007 due to its recovery from near extinction. Although it is no longer protected by the ESA, it remains protected by the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), and the Lacey Act. It is estimated that the County is home to 66 pairs of nesting bald eagles (FWC 2011).

The Applicant determined that migrating bald eagles, resident bald eagles, and bald eagle nesting habitat are not likely to be affected by the Proposed Action because sufficient protections exist via other regulations. This determination, combined with the species' apparent recovery as evinced by its recent removal from the Endangered Species List, led the Applicant to believe it was not appropriate to address this species under this HCP.

Gopher Tortoise

The gopher tortoise is currently a candidate species for federal listing, is listed as threatened by the State of Florida, and receives protection via state laws. There is currently no mechanism for take in place, in that land owners planning to clear or develop their land must obtain a state permit to relocate gopher tortoises from harm's way to approved mitigation or recipient sites. Coverage under the HCP was therefore deemed unnecessary. If gopher tortoises within the County are affected by proposed development, the appropriate permits will be obtained by the affected property owner, and the tortoises will be moved to recipient sites per State of Florida requirements. Understanding that the gopher tortoise is a candidate for federal listing, the HCP may be amended in the future to include coverage for this species as appropriate (see Section 4.7, Adaptive Management).

Bonneted Bat

The Florida bonneted bat is proposed for federal listing. Originally listed by the State of Florida as the Florida mastiff bat (*Eumops glaucinus floridanus*), the species is now "State-designated Threatened" with the original protective measures remaining in place (68A-27.003, amended). The State now also recognizes the species as *Eumops floridanus* (FWC 2011).

Relatively little is known of the ecology of the Florida bonneted bat, and long-term habitat requirements are poorly understood (Robson 1989; Robson et al. 1989; Belwood 1992; Timm and Genoways 2003). Habitat for the Florida bonneted bat mainly consists of foraging areas and roosting sites, including artificial structures. At present, no active natural roost sites are known, and only limited information on historical sites is available. Data from acoustical surveys and other methods suggests that the species uses a wide variety of habitats (Marks and Marks 2008a, 2008b, 2012; see also 77 FR 60750).

Bonneted bats are closely associated with forested areas because of their tree-roosting habits (Robson 1989; Belwood 1992; Eger 1999), but specific information is limited. Belwood (1981) found a small colony of Florida bonneted bats (seven females and one male, all adults) roosting in a longleaf pine (*Pinus palustris*) in a pine flatwoods community near Punta Gorda in 1979. The bats were roosting in a cavity 4.5 meters (15.1 feet) high, which had been excavated by a red-cockaded woodpecker (*Picoides borealis*) and later enlarged by a pileated woodpecker (*Dryocopus pileatus*) (Belwood 1981). Belwood (1992) suggested that the bats were permanent residents of the tree due to the considerable accumulation of fecal material, approximately 1 meter (3.3 feet) in depth. Eger (1999) noted that in forested areas, old, mature trees are essential roosting sites for this species. The species also uses foliage of palm trees. Based on information from G.T. Hubbell, specimens have been found in shafts of royal palms (*Roystonea regia*) (Belwood 1992).

The Florida bonneted bat uses human structures and other non-natural environments. In Coral Gables (Miami area), specimens have been found in the shafts of royal palm leaves (Belwood 1992). Based upon observations from G.G. Hubbell, past sightings in Miami suggest that preferred diurnal roosts may be the shingles under Spanish tile roofs (Belwood 1992). The species also roosts in buildings (e.g., in attics, rock or brick chimneys of fireplaces, and especially buildings dating from about 1920 to 1930) (Timm and Arroyo-Cabrales 2008). It also uses artificial structures, such as bat houses (Marks and Marks 2008a).

In Charlotte County, a highway construction project in Punta Gorda in 1979 destroyed a roost tree (Belwood 1981, 1992). The roost was located in a longleaf pine tree cavity that had been excavated by a red-cockaded woodpecker and later enlarged by a pileated woodpecker (Belwood 1981). In 2006, the species was found at Fred C. Babcock/Cecil M. Webb Wildlife Management Area in the general vicinity of the colony found by Belwood (1981); this was the first documentation of the Florida bonneted bat at this location since 1979 (Marks and Marks 2008a). Florida bonneted bats have consistently used the Fred C. Babcock/Cecil M. Webb Wildlife Management Area since 2008 (J. Myers, personal communication 2013). The species has also been recorded at Babcock Ranch Preserve (Marks and Marks 2008a). It may also occur at Charlotte Harbor Preserve State Park (P. Small, personal communication 2012).

At this time, it is unclear to what extent Florida bonneted bats in Charlotte County use areas outside of the Fred C. Babcock/Cecil M. Webb Wildlife Management Area and the Babcock Ranch Preserve. Due to a current lack of data regarding habitat use within the project area, it is unclear if the activities covered under this HCP could potentially impact the Florida bonneted bat. It is also not known at this time how

take could be determined or measured, if it were to occur (see Sections 4.7, Adaptive Management, and 7.2, Changed circumstances).

2.3 Covered Species in the Plan Area

There are two species requested to be covered under this HCP, the scrub-jay and the indigo snake. The scrub-jay and the indigo snake are listed as threatened by the USFWS under 50 CFR 17 listed in 10(a)(1)(B), and by the FWC under Chapter 68A-27.004, F.A.C.

2.3.1 Eastern Indigo Snake

Description

The indigo snake is a large, iridescent black, non-venomous snake with a variably-colored throat, which is typically red, coral, or white. The indigo snake was historically distributed throughout the coastal plain region in the southeastern United States but now occurs only in southeastern Georgia and throughout Florida. It is the longest snake in North America with a maximum recorded length of 2.63 m (8.6 ft) (Moler 1992, Dodd and Barichivich 2007).

General Habitat Requirements

Indigo snakes need a mosaic of habitats for reproduction, foraging, and seeking thermal refuge. Their diet is variable because they will eat any vertebrate small enough to be overpowered, such as other snakes, including other indigo snakes, small mammals, gopher tortoises, and anurans (Stevenson et. al 2010). Indigo snakes use gopher tortoise burrows for thermal regulation, protection prior to shedding, foraging, nesting, and mating. Indigo snakes in peninsular Florida rely less on gopher tortoise burrows and are found in a wider variety of habitats than in other parts of their range, but they are still strongly associated with tortoise burrows when present.

Range and Status

Indigo snakes have a broad distribution and large territory sizes (USFWS 2008). In Florida, this species has been mapped at approximately 400 locations; however, many of these are represented by only one individual each (NatureServe 2007). Since 2001, there have been records of indigo snakes at over 80 public lands in Florida (email from Enge 2007 cited in USFWS 2008). Over most of its range, the indigo snake frequents several habitat types, including pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats. In central and coastal Florida, indigo snakes are mainly found within many of the state's high, sandy ridges where gopher tortoises also occur.

On these ridges, indigo snakes favor mature oak scrub, turkey oak sandhill, and abandoned citrus grove habitats, whereas snakes found off of the sandy ridges use flatwoods, seasonal ponds, improved pasture, and active and inactive agricultural lands. A matrix of upland xeric habitats interspersed with wetlands improves habitat quality for this species (USFWS 1999). If available, they will use abandoned citrus groves and other modified habitats for foraging (B. Rothermel, Archbold Biological Station, pers. comm.).

Various studies in peninsular Florida have calculated home ranges from 1.6 ha - 327 ha (3 ac – 800 ac) for males and 1.9 ha - 150 ha (4 ac – 370 ac) for females (see USFWS 2008). The USFWS (1999) assumed an average home range to be about 75 ha (185 ac) for males and 19 ha (46 ac) for females, therefore preserves of at least 4,000 ha (9,880 ac) may be able to support about 53 males and 210 females. These estimates assume total overlap of home ranges between males and females and that all of the preserve area would be suitable habitat (USFWS 1999). Layne and Steiner (1996) calculated a density of 2.6 snakes per 100 ha (247 ac) from radiotracking of 11 indigo snakes at Archbold for one year. Furthermore, their home range estimates tend to be low compared to estimates from other studies of indigo snakes in Florida. As with most snakes, capture-mark-recapture efforts are of limited value due to very low recapture rates of individual snakes. Trapping and scoping of burrows with cameras are also relatively ineffective techniques (Layne and Steiner 1996, Stevenson et al. 2003). In northern parts of the range where indigo snakes are highly dependent on gopher tortoise burrows as winter refugia, searching near tortoise burrows from November to April is an effective way to locate adults (Stevenson et al. 2003). However, in south-central Florida, cruising roads or firelanes in areas of suitable habitat may be equally or more effective, even in wintertime when snakes may be found basking or active on the surface on relatively warm (> 18° C/> 64° F) days. Home ranges tend to be much smaller in the winter time (USFWS 2008) so although individuals may be somewhat easier to locate, data on home range sizes during the winter should not be extrapolated for the entire annual cycle.

This species is difficult to observe even in locations where it is known to occur and thus difficult to survey or monitor and the viability of existing populations is unknown (USFWS 2008). Current protection efforts are being focused primarily on public lands or sites where federally-funded activities occur in Florida and Georgia (USFWS 2008). Occasional sightings have been reported in Charlotte County, but only one mortality has been recorded in FWC's database. Lack of observations combined with survey data indicate limited occurrence of this species within the County.

The indigo snake has been listed as a threatened species by the State of Florida and by the USFWS under the ESA since 1978. It is also recognized as globally vulnerable by NatureServe. Habitat loss and fragmentation are two of the biggest threats to the viability of the eastern indigo snake. Preserving and managing remaining large tract of lands, and preventing further fragmentation are important to the recovery of this species. This is a highly mobile species with potentially large home ranges and so habitat connectivity is essential.

2.3.2 Biological Overview of the Scrub-Jay

Description

The scrub-jay is a blue and gray bird, of 25-30 cm (9 ¾ - 11 7/10 in) in length and weighs 60-80 grams (2.68 ounces) (USFWS 1999). The head, neck, nape, and tail are blue while the back and breast are pale gray. They are similar in appearance to the non-listed blue jay (*Cyanocitta cristata*), but lack the crest, white-tipped feathers and black bars. For the first five months, juveniles lack the blue on the crown and nape; these areas are instead gray or brown. Immature scrub-jays molt in the late summer or early fall, losing all of their juvenile plumage except their secondary covert feathers (Bancroft and Woolfenden 1982), thus becoming almost indistinguishable from the adults (Woolfenden and Fitzpatrick 1996) unless their feathers are examined in hand. Scrub-jays are a long-lived species; the longest lived was documented at 15.5 years (Woolfenden and Fitzpatrick 1996, USFWS 1999).

General Habitat Requirements

The scrub-jay is endemic to Florida with a range restricted to frequently-burned xeric communities in peninsular Florida. The scrub-jay evolved in pyrogenic scrub communities maintained by the frequent fires caused by lightning strikes. Fire maintained a low and open growth form in scrub and many of the social and behavioral adaptations of the scrub-jay are well-suited to this habitat structure. Scrub includes xeric oak scrub, scrubby flatwoods, sand pine scrub, rosemary scrub, turkey oak scrub, sandhill, and palmetto scrub. These vegetation communities are characterized by well-drained, often nutrient poor, sandy soils with an abundance of low growing scrub oaks, including sand live oak (*Quercus geminata*), Chapman oak (*Q. chapmanii*), myrtle oak (*Q. myrtifolia*), and scrub oak (*Q. inopina*). The overstory varies depending on the vegetation community, but may include slash pine (*Pinus elliottii*), longleaf pine (*P. palustris*), sand pine (*P. clausa*), and turkey oak (*Q. laevis*). The midstory also varies with the vegetation community, but often includes saw palmetto (*Serenoa repens*), rosemary (*Ceratiola ericoides*), rusty lyonia (*Lyonia ferruginea*), tarflower (*Beiaria racemosa*), wax myrtle (*Myrica cerifera*), and gallberry (*Ilex glabra*). The ground cover is usually sparse, but often includes runner oak (*Q. pumila*), gopher apple (*Licania michauxii*), milk peas (*Galactia* spp.), lichens (*Cladonia* spp.), scrub St. John's wort (*Hypericum reductum*), pennyroyal (*Piloblephis rigida*), beak rush (*Rhynchospora* spp.), and a variety of grasses (Poaceae) (Meyers and Ewel 1990; Fitzpatrick et al. 1991; USFWS 1999).

Florida scrub is one of the oldest ecosystems in the state. It developed when most of what is now Florida was inundated; but isolated upland habitats persisted, allowing a unique suite of flora and fauna to develop adaptations to what is now called scrub. Because of these adaptations and the harsh environment, many of the inhabitants of scrub are rare or even endemic to Florida. In addition to the species listed above, Florida scrub hosts numerous rare, threatened, and endangered plant species including Florida bonamia (*Bonamia grandiflora*), Highland's scrub St. John's wort (*Hypericum cumulicola*), scrub blazing-star (*Liatris ohlingerae*), Britton's beargrass (*Nolina brittoniana*), Florida jointweed (*Polygonella basiramia*), and Florida ziziphus (*Ziziphus celata*).

Range and Status

The scrub-jay is the only avian species endemic to peninsular Florida. Historically, scrub-jays occurred in 39 of the 40 peninsular counties south of and including Levy, Gilchrist, Alachua, Clay, and Duval, with the exception of Monroe County (Woolfenden and Fitzpatrick 1996). They have since been extirpated from nine counties including Gilchrist, Alachua, Clay, Duval, St. Johns, Pinellas, Hendry, Broward, and Dade (Stith 1999). By 1993, 10 or fewer pairs were reported in six additional counties, including Levy, Putnam, Flagler, Orange, Hernando, and Hardee (Woolfenden and Fitzpatrick 1996; Pranty et al. 1997; Stith 1999). Woolfenden (1996) asserts that scrub-jay populations along the Gulf Coast (Levy south through Collier County) are perilously close to extirpation due to extensive clearing. Scrub-jays were listed as threatened in 1975 by the Florida Game and Freshwater Commission, now FWC, and in 1987 by the USFWS (Woolfenden and Fitzpatrick 1996; USFWS 1999).

The first attempt at a statewide population inventory of the scrub-jay was conducted by Jeffrey Cox in 1987 (Cox 1987). Subsequent to that survey, a more thorough state-wide population inventory was undertaken between 1992 and 1993 by Fitzpatrick et al. (1994). Cox (1987) estimated the extent of population decline of scrub-jays from historical numbers at 50%. Fitzpatrick et al. (1994) determined that a decline of about 90% of the historical population had occurred; to about 10,000 birds and that a 25% decline had occurred just since Cox's previous surveys. The overall population decline can be attributed to habitat loss, modification, fragmentation, and degradation. Habitat loss results primarily

because of conversion to agriculture or urban-suburban development. Scrub-jay populations within suburban areas are expected to decline further as residential build-out continues (Bowman 1998, Bowman and Woolfenden 2001, Fleischer et al. 2003, Shawkey et al. 2004). Fire suppression and invasive and exotic plant encroachment have further contributed to habitat degradation and modification, and thus population declines (Woolfenden and Fitzpatrick 1996, Breininger 1999).

Metapopulations

Scrub-jays are believed to occur within 21 distinct metapopulations separated from one another by at least 12 km (7.4 miles) or hard boundaries, such as the Myakka River, not typically crossed by scrub-jays (Stith et al. 1996, Stith 1999). Each metapopulation is composed of a group of interbreeding subpopulations that occur within 3.5 km (2.2 miles) of each other (Stith et al. 1996). Interbreeding among metapopulations is not believed to occur, except in rare situations. Within the 21 demographic metapopulations there are 10 genetically defined metapopulations established by gene flow; 2 populations are found in Charlotte County E and F (Coulon et al. 2008)(Section 2.4.1).

Social System

Scrub-jays are non-migratory, territorial birds that generally live in groups varying in size from two to twelve individuals. Large groups, however, are not common; the average group size is three. Groups generally consist of a mated pair plus non-breeding adults, called helpers, and juveniles that are usually related to the dominant breeders. A well-defined dominance hierarchy exists within the group. The breeding male is the most dominant followed by non-breeding adult males, the breeding female, non-breeding females, and lastly the juveniles (Woolfenden and Fitzpatrick 1984, USFWS 1999).

Scrub-jays are cooperative breeders, where young birds delay dispersal, remain at their natal territory for often one or more years, and assist with many aspects of daily life, such as assisting with the rearing of young, territory defense, and mobbing. This social system likely evolved because scrub is suitable for jays during a narrow successional window following fire. Scrub is also patchily distributed, thus if scrub is suitable, it is likely occupied by scrub-jays. Limited opportunities for dispersing caused young to opt to delay dispersal, and subsequently develop the habit of helping. Groups engage in many coordinated social behaviors, such as an active sentinel system in which birds coordinate switching between the sentinel position and other activities, usually foraging, to help the group remain safe by detecting and alerting other group members to the presence of predators (McGowan and Woolfenden 1989, Koenig et al. 1992, Bednekoff and Woolfenden 2003, Bednekoff et al. 2008). Jays defend year-round territories, on which occur all the resources needed throughout the year.

Scrub-jays occupy territories year-round, although the boundaries are less vigorously defended in the fall and early winter, after the jays have completed their annual caching of acorns and well prior to the onset of the next breeding season. Territories are maintained over many years, although slight boundary shifts occur seasonally and over time. Once the adults become breeders they usually spend the rest of their life within their territory (Fitzpatrick et al. 1991, Breininger et al. 1996). Territories in well-maintained, native habitats average 9-10 hectares (22-25 acres) in size, with a minimum size of 5 hectares (12 acres) (Woolfenden and Fitzpatrick 1996, USFWS 1999) with much smaller territory sizes in urban habitats, likely due to access to supplemental foods (Bowman 1998). The size of the territory varies with the quality and patchiness of the habitat and how saturated the area is with other scrub-jay groups (Woolfenden and Fitzpatrick 1984, Woolfenden and Fitzpatrick 1991).

Sentinel System and Predators

Predators of scrub-jays include eastern coachwhip (*Masticophis flagellum*), indigo snake, rat snake (*Elaphe obsoleta*), corn snake (*E. guttata*), bobcat (*Lynx rufus*), raccoon (*Procyon lotor*), domestic cat (*Felis catus*), cotton rat (*Sigmodon hispidus*), gray fox (*Urocyon cinereoargenteus*), red fox (*Vulpes vulpes*), swallow-tailed kite (*Elanoides forficatus*), great horned owl (*Bubo virginianus*), eastern screech-owl (*Otus asio*), red-tailed hawk (*Buteo jamaicensis*), Northern harrier (*Circus cyaneus*), sharp-shinned hawk (Accipiter striatus), Cooper's hawk (*A. cooperii*), merlin (*Falco columbarius*), American crow (*Corvus brachyrhynchos*), fish crow (*C. ossifragus*), and blue jay (Fitzpatrick et al. 1991, Woolfenden and Fitzpatrick 1996, USFWS 1999).

Predation accounts for 67% of the egg loss and 85% of the nestling loss (Woolfenden and Fitzpatrick 1984). Diurnal snakes and birds are the most common nest predators, although nocturnal mammals may take eggs and nestlings occasionally (Schaub et al. 1992). Helpers may decrease predation on eggs and nestlings by mobbing potential predators (Woolfenden and Fitzpatrick 1984, Schaub et al. 1992, Mumme 1992).

Scrub-jays have a well-developed sentinel system, which is believed to be an adaptation to reduce predation (McGowan and Woolfenden 1989). Most scrub–jays die from predation (Woolfenden and Fitzpatrick 1984). One member of the group usually sits on an exposed perch while the other members forage. If an aerial predator is observed, the sentinel sounds an alarm cry and cover is sought within dense vegetation. If a terrestrial predator or perched raptor is observed, a scolding alarm is given and the group responds to mob the predator (McGowan and Woolfenden 1989).

Helpers

Helpers are the adult non-breeding scrub-jays within the territorial group. Helpers are at least yearlings who help the group in territorial defense, sentinel duties, predator and intruder mobbing, and the feeding of nestlings and fledglings (McGowan and Woolfenden 1989, McGowan and Woolfenden 1990, Woolfenden and Fitzpatrick 1991, Schaub et al. 1992). Helpers may be the offspring of the breeding pair, or may be non-breeders who have immigrated into a new family group. Helpers may benefit from delaying dispersal and helping directly, by learning behaviors that will benefit them when they eventually become breeders, and indirectly, because their help increases the reproductive output of their parents and those siblings share their genes, thus increasing the representation of shared genes in subsequent generations (Lack 1968, Woolfenden and Fitzpatrick 1991, Koenig et al. 1992).

Reproduction

Scrub-jays are both behaviorally and genetically monogamous (Quinn et al 1999, Townsend et al. 2011). The dominant male and female are the only breeders within the group. Typically, scrub-jays breed for the first time when they are between 2 and 4 years of age, but it ranges from 1 - 7 years (Woolfenden and Fitzpatrick 1991). Breeding occurs in the spring, usually between 1 March and the end of June (USFWS 1999), although suburban scrub-jays often breed earlier (Bowman 1998, Bowman and Woolfenden 2001, Fleischer et al. 2003, K. Miller, FWC, pers. comm.). Three or four eggs (range 1-6) are laid in an open cup nest, usually built at a height of 1-2 meters (3-6 ½ feet) in scrub oaks (Fitzpatrick et al. 1991). Successful nests are generally in trees adjacent to openings (Fitzpatrick et al. 1991, Breininger et al. 1996, Toland 1999).

Incubation occurs for 17-18 days, and is only done by the dominant female. The parent birds and the helpers feed the nestlings. Young are fledged 16-21 days post hatching. Fledglings are dependent on the breeding pair and helpers for food for about 10 weeks (Woolfenden and Fitzpatrick 1984).

An average of two fledglings is produced annually in stable populations (Woolfenden and Fitzpatrick 1990). Mortality of fledglings is high; 65% of the fledglings do not survive one year (Woolfenden and Fitzpatrick 1991). Helpers may increase hatching success and nestling survival (Schaub et al. 1992, Mumme 1992), as well as fledgling survival (Mumme 1992).

Nest success and fledgling survivability are correlated with optimal habitat (Schaub et al. 1992, Stith et al. 1996, Breininger et al. 1996, USFWS 1999). Successful nesting attempts and number of young fledged are higher in regularly burned scrub than in overgrown, unburned scrub, suburban areas, or suboptimal habitat (i.e. edges adjacent to scrub) (Schaub et al. 1992, Thaxton and Hingtgen 1996, Breininger et al. 1996). For a population to remain viable over the long term, recruitment must exceed mortality. A twenty-year study at Archbold Biological Station, in central Florida, revealed that half of the breeding pairs had helpers within optimal habitat (Woolfenden and Fitzpatrick 1984). Breininger et al. (1999) found similar results in a ten-year study at the Kennedy Space Center, on the Atlantic Coast. However, in moderately suitable and unburned habitat, scrub-jays bred at younger ages and fewer than half the pairs had helpers (Breininger et al. 1999). The absence of helpers and inexperienced breeders in suboptimal and poor habitats may decrease the demographic success enough so that production is less than mortality, potentially leading to localized extirpation.

Territories

The average scrub-jay territory is 9-10 hectares (22-25 acres). Suburban scrub-jays however, often have smaller territories (Bowman 1998) tend to be smaller than territories with helpers (Fitzpatrick et al. 1991, Breininger et al. 1996). Territories are generally larger in high quality habitat and also tend to be larger when family groups have helpers (Woolfenden and Fitzpatrick 1984, Woolfenden and Fitzpatrick 1991).

All suitable habitat within the landscape is usually saturated with scrub-jay territories; few territorial vacancies occur within suitable habitat. This habitat saturation is believed to have led to the cooperative breeding system that scrub-jays utilize (Woolfenden and Fitzpatrick 1984). This social system creates an excess of birds that could become breeders, if territories become available. It allows the non-breeding adults, without territories of their own, to live within and help defend the territories of breeding adult birds (Woolfenden and Fitzpatrick 1984, Fitzpatrick et al. 1991).

New territories may be established through territorial budding when a helper male becomes a breeder in a segment of its natal territory, breeder replacement on the natal or neighboring territory following a death or divorce, or establishing new territories between existing territories (uncommon) or in unoccupied restored habitat (Woolfenden 1977, Woolfenden and Fitzpatrick 1984, Thaxton and Hingtgen 1996, Bowman 1998, USFWS 1999). As family groups increase in size the territory size generally increases since more birds are better able to defend the territory against and usurp territory from neighboring family groups. After the territory is expanded, the dominant son usually acquires both a mate and a portion of his expanded natal territory. This territorial budding is almost exclusively a male behavior, as is inheritance of the natal territory if the male breeder should die (Woolfenden and Fitzpatrick 1984, Fitzpatrick et al. 1991)

Dispersal

Scrub-jays are extremely sedentary. Dispersal for both sexes generally occurs within one to four territories of their natal territory (Woolfenden and Fitzpatrick 1984, Breininger et al. 1996, Coulon et al. 2010). Dispersals farther than five territories are rare (Coulon et al. 2008). However, geographical distance is significantly greater in suburban dispersals than wildland dispersals due to fragmentation and separation of territories (Thaxton and Hingtgen 1996). Both sexes monitor neighboring scrub-jay territories for vacancies among the breeders. Female scrub-jays generally leave the family group after having been helpers for one or two years. Males generally stay within the family group as helpers for up to five years before dispersing (Breininger et al. 1991, Thaxton and Hingtgen 1996). In general, mean dispersal distance for males is shorter than for females; typically 300 meters (984 feet) for males and 1000 meters (3280 feet) for females in optimal habitat (Woolfenden and Fitzpatrick 1984, Breininger et al. 1995). Mortality during dispersal is generally higher among female scrub-jays than males; most likely because of the increased distances (Woolfenden and Fitzpatrick 1984, Thaxton and Hingtgen 1996).

Scrub-jays are reluctant to disperse through large habitat gaps, large expanses of open water, closed canopy forests, or through cities (Stith et al. 1996, Root 1998) although genetic evidence does show that scrub-jays will cross large rivers (Coulon et al. 2008). Dispersing scrub-jays are thought to cue on other resident scrub-jays more strongly than habitat, so suitable unoccupied scrub may not be reoccupied. Measured in actual distance, scrub-jays living in naturally fragmented habitat dispersed significantly farther than those in continuous habitat. In continuous habitat at Archbold Biological Station mean dispersal distance was 1.59 km (0.98 miles), and the median was only 0.68km (0.42 miles). In naturally fragmented habitat at Avon Park Air Force Range (APAFR), the mean was 2.95km (1.83 miles), and the median was 0.9km (0.55 miles). This difference disappeared, however, when we measured dispersal distance in terms of home-range diameters, or territory widths, rather than as a metric distance. The strikingly similar distributions of dispersal distances when measured in territories traversed show that even in a fragmented landscape, Florida Scrub-Jays exhibit pronounced natal philopatry. Most jays recruit as breeders within the immediate neighborhood (within 2 territories) of their birth (Fitzpatrick et al. 1999).Suburban Florida scrub-jay dispersals, however, can be much longer than the distance in natural, undeveloped areas because suitable habitat is not continuous (Fitzpatrick et al. 1999). Re-colonization of scrub beyond 12 km (7.4 miles) from occupied scrub is believed to be a rare event (Stith et al. 1996).

In a Gulf Coast scrub-jay dispersal study Thaxton and Hingtgen (1996) showed that both male and female dispersal distances are significantly longer in suburban areas than they are in undeveloped, natural areas. Female suburban scrub-jays dispersed an average of 8.1 km (5 miles) while suburban males dispersed an average of 1.9 km (1.2 miles). Breininger (1999) found similar results in urban areas in Brevard County. Long distance dispersals tend to occur when individuals must cross through a suburban or agricultural landscape without patches of suitable scrub. These longer dispersal distances in fragmented landscapes may increase mortality (Thaxton and Hingten 1996, Stith 1999).

More recently, in Charlotte County, color-banded scrub-jays have dispersed from a suburban population in Deep Creek (M6E) to M6W, and across the Peace River to M7 (Karl Miller, FWC, pers. comm.). The dispersal from Deep Creek (M6E) to Tippecanoe II (M6W) is interesting in that the distance across unsuitable habitat was great, supporting Thaxton and Hingten's (1996) research. The dispersal is also noteworthy since the dispersing individual flew to proposed compensation land (this HCP) that was already occupied by scrub-jays. The dispersals across the river are also of interest since Jim Beever, formerly of FWC, has asserted for years that he believes that scrub-jays disperse across the narrower

portion of the Peace River (J. Beever, FWC, pers. comm.). Coulon et al. (2008) determined through a genetic study that although for the most part large rivers act as barriers to dispersal, some areas occupied by distinct genetic groups may encompass large rivers and thus gene flow is possible in spite of them.

Food and Foraging Habits

Scrub-jays are omnivorous, feeding on a wide range of animals and plants (DeGange et al. 1989, McGowan and Woolfenden 1990). Insects and other arthropods comprise the majority of the animal matter throughout the year, especially orthopterans (grasshoppers and crickets) and lepidopteran larvae (butterflies and moths) (Fitzpatrick et al. 1991, Woolfenden and Fitzpatirck 1996, USFWS 1999). Small vertebrates weighing up to 25 grams (0.9 ounces) including anoles (*Anolis* spp.), treefrogs (*Hyla* spp.), Florida scrub lizard (*Sceloporous woodi*), six-lined racerunner (*Cnemidophorus sexlineatus*), black racer (*Coluber constrictor*), peninsula crowned snake (*Tantilla relicta relicta*), rough green snake (*Opheodrys aestivus*), house mouse (*Mus musculus*), Florida mouse, cotton mouse (*Peromyscus gossypinus*), and oldfield mouse (*P. polionotus*) have been identified, but are eaten infrequently (USFWS 1999).

Acorns are the most important vegetative item in their diet. In the fall, thousands of acorns are collected and cached 1-2 cm (0.33-0.75 inches) beneath the sand. DeGange et al. (1989) estimated that each scrub-jay caches 6000 - 8000 acorns per year. These cached acorns are retrieved and eaten throughout the year. The cached acorns are especially important in the winter and early spring, when arthropod and vertebrate prey are less abundant. Other vegetative items occasionally eaten by scrub-jays include seeds, nuts, and berries from slash pine, sand pine, saw and scrub palmetto, blueberries (*Vaccinium* spp.), hickories (*Carya* spp.), greenbrier (*Smilax* spp.), and rosemary.

Suburban areas contain many more easily attainable foods that scrub-jays can exploit (Fleischer et al. 2003, Sauter et al. 2006). Scrub-jays will forage at bird feeders and will accept peanuts, corn, sunflower seeds, mealworms, and other food items provided by humans. However, Fleischer et al. (2003) determined that the net energy gain of suburban female scrub-jays is slightly less than that of wildland females. So while suburban scrub-jays can forage more efficiently (Fleischer et al. 2003), the types of food items may contain less energy than natural food items that wildland scrub-jays feed on. Nestlings in suburban habitats have reduced growth and survival compared to those in wildland habitats (Shawkey et al. 2004) and subsequently, parents prefer feeding natural foods when available (Sauter et al. 2006).

Scrub-jays forage on or near the ground in openings within the vegetation, or along edges. They visually search for food by hopping or running on the ground or hopping among the shrubs (McGowan and Fitzpatrick 1990, USFWS 1999). Prey is taken from the leaves of shrubs or from the leaf litter. Scrub-jays do not dig extensively or catch many flying insects and tend to avoid heavy leaf litter and dense herbaceous cover (Woolfenden and Fitzpatrick 1984).

Specific Habitat Requirements

Scrub-jays are early successional specialists. Scrub-jays forage on or near the ground in openings within the vegetation, or along edges. The optimal habitat for scrub-jays is scrub that contains early successional scrub oaks that are between 1-3 meters (3 – 10 feet) in height, where the oak canopy cover exceeds 50%, and open sandy patches cover at least 10 % of the area (Wollfenden and Fitzpatrick 1984,

Cox 1987, Fitzpatrick et al. 1991, Breininger et al. 2006). Canopy trees are scattered and in quality habitat rarely represent more than 15-20% of the cover and the herbaceous layer is sparse (Cox 1987, Woolfenden and Fitzpatrick 1996). This optimal scrub is often surrounded by secondary habitat which may not be characterized as scrub or scrubby flatwoods. This secondary habitat is often within a scrub-jay family group's territory (Breininger et al. 1991). The optimal habitat occurs in scrub that burns every 10 to 20 years (Fitzpatrick et al. 1991, Woolfenden and Fitzpatrick 1996).

Overgrown scrub is often the result of the lack of fire. Without fire, the scrub oaks grow too tall and dense for optimal use by scrub-jays. Unburned scrub does not support viable scrub-jay populations and can even impede dispersal (Breininger and Schmalzer 1990, Breininger 1999, Breininger et al. 1999). The tall dense oaks tend to decrease the scrub-jay's ability to nest and to adequately survey territory for intruders and predators. Nest predation is more common in shrubby pastures and overgrown scrub than in recently burned scrub (i.e. burned within twenty years) (Fitzpatrick et al. 1991, Schaub et al. 1992). The bare sandy patches shrink as the understory and leaf litter continue to grow and accumulate, thus reducing the areas available for foraging and acorn caching.

Historically, scrub burned every 10-100 years (Meyers and Ewel 1990). Optimal scrub-jay habitat on the Lake Wales Ridge occurs with burning cycles averaging every 10-20 years. In more mesic scrub, such as the scrubby flatwoods on the Gulf Coast, fire intervals between 6-12 years are required to maintain suitable scrub-jay habitat (USFWS 1999).

Scrub Loss and Population Decline

The primary reason for the scrub-jay's threatened status is loss of habitat. The scrub-jay, for all practical purposes, is restricted to scrub communities, which are now often fragmented, isolated, and overgrown (Duncan et al. 1999). These communities contain the upland soils that humans prefer for citrus production, housing, and commercial development. It has been estimated that 70-80% of Florida's scrub (Woolfenden 1996) has been converted from its natural state.

Scrub that is not allowed to burn at regular intervals becomes too overgrown for the scrub-jay to persist. The overgrown scrub makes it difficult for the birds to carry out their typical behaviors. Acorn caching areas become covered in vegetation and the scrub gets too thick for scrub-jays to detect predators. These factors lead to a lowered demographic success and may reduce productivity below the replacement threshold. Dispersal may also be hindered by overgrown scrub although groups may persist there for decades (Breininger et al. 1999). The overgrown scrub is also more suitable for the blue jay, an avian competitor and predator.

Nonindigenous species such as Brazilian pepper and cogon grass (*Imperata cylindrica*) out-compete native plants and can cause fire cycles to occur at times of the year when they are not natural within the system, and at high fire intensities (Lippincott 1997).

Scrub-Jays in Residential Landscapes

The habitat structure and landscape matrix utilized by suburban scrub-jays differs from native scrub landscapes. Scrub within suburban areas is often fragmented and isolated by houses and the associated infrastructure. The patches of scrub are also frequently overgrown because of fire suppression and may host a high percentage of nonindigenous vegetation. The overgrown scrub inhibits the scrub-jay's ability to detect hawks, increasing predation and lowering reproductive success (Breininger et al. 1991). This

decrease in size and suitability of the habitat frequently leads to a decrease in demographic success in suburban areas (Breininger et al. 1995, Breininger et al. 1996, Breininger 1999, Mumme et al. 2000, Bowman and Woolfenden 2001).

Other threats within suburban areas include predation by free-ranging cats, competition and predation by blue jays, collisions with cars, and the consumption of pesticide-laden insects (Breininger et al. 1991, Fitzpatrick et al. 1991, Breininger 1999, USFWS 1999, Stith 1999, Mumme et al. 2000).

Suburban scrub-jays often occupy smaller territories than scrub-jays in more natural landscapes (Bowman 1998). The highest densities of scrub-jays in Central Florida, occurred in suburban areas where less than 33% of the area was developed (USFWS 1999). This initial increase in density may be due in part to supplemental feedings. However, populations generally decline after the initial increase in density as residential buildout occurs. These suburban populations generally have lower adult and juvenile survivability than populations in more natural landscapes, which may lead to higher mortality than recruitment and eventual extirpation (USFWS 1999, Stith 1999, Bowman and Woolfenden 2001).

Population Modeling

Several population viability analysis models have been designed to investigate extinction probabilities based on demographic information within varying habitats, population size, population isolation, and with various stochastic events (Duncan et al. 1995, Breininger et al. 1995, Root 1998, Breininger 1999, Stith 1999). In general, extinction probabilities increase over time and are especially pronounced in small populations. Predictions vary with the robustness of the model. In one of the first scrub-jay models Fitzpatrick et al. (1991) concluded that populations with 1-5 breeding pairs are highly subject to extirpation; those with 15-30 breeding pairs are marginally protected, barring stochastic events such as epizootics that all populations are subject to, and may exhibit a 90% probability of surviving 100 years; and populations with 30 or more breeding pairs located within 2.5 km (1 mile) of another (average dispersal distance) have a 90% probability of surviving beyond 100 years. Fitzpatrick et al. (1991) cautioned that populations with only 15-30 breeding pairs may be influenced by reductions in genetic variability.

Breininger et al. (1999) models determined that in optimal habitat without catastrophes, populations of 20-50 breeding pairs had great persistence probabilities. Few populations, however, are in optimal habitat and catastrophes cannot be predicted, nor eliminated as a potential threat. Woolfenden and Fitzpatrick (1991) were in agreement, stating that a population with 20-40 breeding pairs had a 90% probability of lasting 100 years, but think that a population of at least 30 breeding pairs is more realistic for lasting persistence. Fitzpatrick et al. 1991 and Stith (1996) concluded that populations with fewer than 10 pairs have a 50% probability of extinction within 100 years.

The five Reserve Design Alternatives developed under this HCP were tested using a spatially explicit, individually-based Population Viability Analysis (PVA) for the scrub-jay. This PVA was conducted to identify the best biological alternative based on predicted long-term viability, and is discussed in further detail in Section 6. The PVA criteria and results are included in Appendix 1.

Conservation Implications

Scrub-jay reserves must be based on the demographic, habitat, and connectivity requirements of the species. Reserves within each of the metapopulations should be planned so that the subpopulations are as large as possible and connected with the other subpopulations within the metapopulation.

Planning for the long-term persistence of scrub-jays will require protection of extant scrub and management so that potential habitat is of optimal quality for scrub-jays. Preservation priority should be given to occupied scrub with experienced breeding pairs (Root 1998). Restorable unoccupied scrub adjacent to existing preserves or within easy dispersal distance should be given a second priority. Connectivity between subpopulations should be addressed in reserve design as well.

Whenever possible, existing preserves should be expanded so that there is a larger contiguous parcel. Larger contiguous parcels can be better maintained (i.e. prescribed burning) and allow the scrub-jays to function in a more ideal situation (i.e. neighboring territories, ability to have territorial budding, etc.). Preserve sites should be sited as far as possible from roads, to reduce the potential for collisions with vehicles (Mumme et al. 2000).

Although considered net population sinks, scrub-jay populations in suburban areas affect the metapopulation in two ways. These subpopulations can provide emigrants that serve as potential colonists of new, regenerating habitat. However, suburban areas can also serve as "ecological traps", siphoning scrub-jays away from native areas that have become overgrown and no longer suitable. The problem with this scenario is the typically small probability for suburban scrub-jays to replace themselves through successful breeding. Although replacement also tends to be equally low or lower in overgrown natural sites, native habitats at least maintain the potential for restoration to take place (Bowman 1998).

Acquisition of high quality scrub habitats currently occupied by scrub-jays should remain a conservation priority, however based on the above, the acquisition and restoration of overgrown scrub habitats should remain an important conservation tool. This applies even if scrub-jay populations at these sites are below carrying capacity or even extirpated, because immigration should occur upon appropriate management. This is particularly true if acquisition and restoration can be prioritized and implemented before suburban populations go extinct, as these areas provide a ready source of colonists. Acquisition and restoration of overgrown scrub where scrub-jays have been extirpated, but are located within dispersal distance of scrub-jay populations in suburban habitats may present one of the best available ways to recover what is considered the inevitable loss of suburban scrub-jay populations (Bowman 1998). Translocation could assist to expedite the colonization of the larger restored scrub patches located beyond typical dispersal distances from suburban population, but that ideally, are within dispersal distance to other nearby scrub-jay populations.

Because population sizes within most genetic groups have declined, and scrub habitat is increasingly fragmented, conservation priorities should focus on the core population(s) within each genetic group. These cores will be those populations that have the greatest potential carrying capacity, where extant populations are large enough so that they are not at immediate risk of extirpation and can colonize habitat as it is restored, and occur within a connected network of other scrub patches that have the potential to support scrub-jay populations. Habitat conditions within these cores must be immediately optimized to increase the probability of population growth (Boughton and Bowman 2011).

In Charlotte County, within the scrub-jay Genetic Group F, the largest non-suburban region with the greatest potential to serve as a core is the Washington Loop, Shell Creek, and Prairie Creek regions. These eastern regions of Genetic Group F in Charlotte County have lower residential development and larger parcels on which some scrub habitat has been retained, as opposed to the suburban ¼ - ½ acre lots found in the western portion of Genetic Group F in Central Charlotte County, and in Genetic Group E in West Charlotte County.

To maintain connectivity and expand existing public lands, acquisition or conservation and management of non-suburban scrub parcels in the Washington Loop, Prairie Creek and Shell Creek regions will provide a higher likelihood of sustaining scrub-jays in the long term than any other region of Charlotte County. Acquisition and management of existing natural areas is preferable to creating scrub reserves in suburbia (Bowman 1998).

According to Boughton and Bowman (2011), as scrub becomes increasingly fragmented, as extant (scrub) patches become smaller and more isolated, and as scrub-jay populations within metapopulations (or genetic groups) are extirpated, the probability that vacant (scrub) patches can be re-colonized greatly decreases and entire metapopulations being extirpated greatly increases. This citation supports the need to conserve and manage those strategic scrub habitats identified in eastern Charlotte County within the Reserve.

2.4 Field Surveys

Charlotte County has been included in two statewide scrub-jay surveys. The first survey was conducted in 1981 by Jeffery A. Cox (Cox 1987). The Cox survey, which was based on the investigation of previous reports (e.g. literature review, museum collections, Breeding Bird Survey, USFWS data, Florida Ornithological Society data and select field reviews), only identified 16 scrub-jays at 5 sites in Charlotte County. An additional two sites were reported, but were not investigated (Cox 1987). In Charlotte County, the 1991-1992 statewide mapping project (SMP), the second statewide population estimate, identified 296 scrub-jays in 128 groups, in 18 populations. The mean group size was 2.31 (Fitzpatrick et al. 1994). The SMP was an effort to inventory scrub-jays and scrub-jay habitat on large parcels throughout the state. Eight compilers surveyed the state. Mr. Jon Thaxton surveyed Charlotte, Collier, DeSoto, Hardee, Lee, Manatee and Sarasota Counties. From 1992-1996, Bill Pranty updated the SMP, identifying 303 scrub-jays in 134 groups (from Miller and Stith 2002).

A countywide survey was conducted in 2001-2002 by Drs. Karl Miller and Bradley Stith, Center for Avian Conservation, Inc. They identified 419 scrub-jays, in 135 family groups, in 15 populations. The mean group size within Charlotte County was 3.1 with a mode of 2 and a range of 1-8 (Miller and Stith 2002).

The increase in the total number of scrub-jays over time is due to an increase in survey efforts and does not reflect an actual increase in scrub-jays. In fact, individual populations of scrub-jays decreased within all three metapopulations. The initial survey by Cox in the 1980s was an attempt by one person to document scrub-jays throughout the state. The SMP in the early 1990s increased the number of surveyors to eight, but individuals had multiple counties to survey. The 2001 survey was conducted by two surveyors in a single county. Similar results were found in the scrub-jay survey in Sarasota County in 2000, where 466 scrub-jays were observed in 180 groups (Christman 2000). This represents an increase from 41 birds in twelve groups during the 1981 Cox survey (Cox 1987) to 413 birds, in 145 groups in the 1991-1992 SMP (Fitzpatrick et al. 1994). The Sarasota County survey is similar to the Charlotte County survey in that the numbers of populations and subpopulations declined over time. Similar decreases

have been documented in Indian River and Brevard Counties. Boughton and Bowman (2011) compared data from the 1992-1993 surveys to 2009-2010 surveys on 178 managed sites where scrub-jays occur. Overall, they found that scrub-jay populations declined by at least 1 group at 95 sites, populations remained the same at 37 sites, and increased by at least 1 group at 46 sites, with an estimate of 1,116 groups compared to 1,495 groups in 1992-1993 (Boughton and Bowman 2011). This represents a 25% decrease in scrub-jay populations and decreases on un-managed private lands are expected to be much greater (Boughton and Bowman 2011).

2.4.1 Project Specific Surveys

The following scrub-jay metapopulation boundary descriptions for M5, M6 and M7 were established by the Florida Scrub-Jay Recovery Team. The team divided populations of scrub-jays into 21 metapopulations (Figure 2-5) believed to be demographically separated from one another. It was the team's metapopulation boundaries that were utilized for the spatially explicit scrub-jay population viability model.

However, Coulon et al. (2008) completed and published a genetic analysis, and determined that these 21 metapopulations fall within 10 distinct genetic groups. Based on the Coulon et al. findings, metapopulations M6 and M7 were found to be genetically similar and are identified by Coulon et al. as Genetic Group F. The boundaries of Genetic Group F extend from the Myakka River to the west, to the east through the expansive mesic and pine forests virtually devoid of scrub east of Washington Loop, the Caloosahatchee River to the south, and the Alafia River to the north. Coulon's Genetic Group E boundary was found to be very similar to Metapopulation M5.

Coulon et al. (2008) also found that some genetic units encompass "water gaps that do not always act as barriers to scrub-jay gene flow", such as the Peace River. In addition, TAC member and FWC biologist Karl Miller provided scrub-jay dispersal data indicating five scrub-jays from Deep Creek/Harbour Heights have dispersed across the Peace River and have been found in Washington Loop, and similarly, Miller's data indicate five scrub-jays have dispersed west from Deep Creek/Harbour Heights to the Eleanor Avenue area, Tippecanoe, and North Port in Sarasota County.

<u>Sarasota –West Charlotte (M5)</u>

This metapopulation is located along the Gulf Coast of Charlotte County and extends north into central Sarasota. The Myakka River is a natural boundary that separates M5 from M6 to the east. Within the Charlotte County portion of M5, scrub-jays are found on public lands that include Charlotte Harbor State Buffer Preserve and Amberjack Slough. Private areas where scrub-jays were found include Rotonda, Englewood, and North and South Gulf Cove (Figure 2.2).

Land use in this area, outside of existing public lands, consists primarily of platted commercial or residential; however, some properties contain natural communities, but are commonly overgrown. Public lands for the most part are natural upland and wetland communities that are being managed.

<u>North West Charlotte (M6)</u>

M6 is located west of the Myakka River and east of the Peace River. Public lands within M6 that currently support scrub-jays are Charlotte County's Tippecanoe and Charlotte Harbor State Buffer Preserve, located between Tippecanoe Scrub and the Myakka River. Other public lands that do not

support scrub-jay, but have the potential include Charlotte County's Water Treatment Plant and the Deep Creek Conservation Area. The Myakka River State Forest historically supported scrub-jays, but has not been occupied in recent years, and limited scrub habitat exists within this parcel. Private lands where scrub-jays were present include the Eleanor Avenue area, Deep Creek and Harbour Heights. The above occupied areas are depicted in Figure 2.3.

Land use in this area, other than existing public lands with natural communities, consists primarily of platted commercial or residential properties that have been completely or partially cleared of native vegetation, but may be overgrown with exotic vegetation providing surrogate habitat. A few lots that have not been cleared can be found, but typically they are overgrown natural communities such as scrub and pine flatwoods.

Central Charlotte (M7)

The Central Charlotte scrub-jay metapopulation includes those areas east of the Peace River. Public lands within M7 include, Prairie Creek and Shell Creek Preserves, and the Southwest Florida Water Management District's Burcher's Tract Property. The Biscayne Trust Easement is located in Washington Loop and is managed by Charlotte County. Other private conservation easements, held by the USFWS, are scattered in Washington Loop and Prairie Creek Estates. Private lands where scrub-jays were found include Peace River Estates, Washington Loop, Prairie Creek Estates, and the Jones Loop area. These areas are depicted in Figure 2.4.

Land uses east of the Peace River consist primarily of agriculture or platted ≥ 5-acre residential lots that support natural habitat such as scrub and flatwoods, or have been completely or partially cleared of native vegetation.

2.5 Activities Covered by Permit

Covered activities include any type of development that may occur within the Plan Area. This includes any residential, commercial or agricultural development that may occur on public or privately owned parcels that could result in a take of occupied scrub-jay habitat within the County. Such activities necessitate an Incidental Take Permit from the USFWS. Clearing will only be conducted outside the nesting season (March 1 – June 30).

3.0 Biological Impacts and Take Assessment

Proposed activities covered by this HCP include all forms of residential and commercial development, including construction of single-family homes, multiple-unit residential dwellings, commercial properties, public works projects, and all associated improvements of road and utility infrastructure that may be needed to service this development, as well as land management activities within the Reserve for long term habitat improvements. The ITP will apply throughout the County wherever these activities may impact habitat that is currently occupied by the scrub-jay.

3.1 Direct Impacts

Direct impacts to the species ability to breed, feed or shelter will occur by the permanent alteration of occupied habitat during otherwise lawful activities associated with residential, commercial, or County

development projects. Permanent alteration of scrub-jay habitat will include clearing of lots for development, installation of infrastructure, impervious surfaces, construction of buildings and ancillary structures. It is estimated that 46 groups in M5, 14 groups in M6, and 76 groups in M7 will be directly affected. The total estimate of currently occupied scrub-jay habitat has the potential to be impacted by development is 3,056 acres.

Additional direct impacts may occur during translocation and routine land management activities, such as prescribed burning. The weather conditions necessary for prescribed burns in scrub habitat typically occurs during the growing season which coincides with scrub-jay nesting season. This may result in potential direct impacts to existing nests; however adult and juvenile scrub-jays can avoid flames and smoke.

3.2 Indirect Impacts

In addition to the direct take of occupied scrub-jay habitat, indirect impacts may occur as a result of development. These may include: degraded, overgrown, or unmanaged habitat, increased habitat fragmentation, increased 'edge effect', introduction of exotic flora and predatory fauna, introduction of non-native food items, reduction of native food sources, reduction of breeding, feeding, and sheltering habitats, impacts with motor vehicles, and becoming more exposed to natural predators due to habitat conversion and fragmentation. Additionally, should scrub-jays disperse from areas of take, dispersal will be more difficult due to the above indirect impacts associated with urban and suburban habitats. Overall, Fitzpatrick *et al.* (1991) noted that individual encounters between humans and scrub-jays are likely to result in increased mortality rates of both juvenile and adult birds.

3.3 Estimate of Take

The anticipated take associated with the requested ITP is estimated at 136 family groups from within scrub-jay Metapopulations M5, M6, and M7. The proposed take of occupied habitat through future development is estimated at 3,056 acres. This acreage was calculated using a 25-foot buffer for each scrub-jay group that is currently documented outside of the proposed Reserve parcels. This is similar to the USFWS methods used during the annual review process for Charlotte County. Undeveloped parcels that fall wholly or partially within the 25-foot buffer, excluding road rights-of-way (ROW), are included in the total acreage of take calculation. These include parcels such as the common areas in Deep Creek and some larger agricultural lands that have been mostly developed or converted to agriculture, but still have some small pockets of natural vegetation. These areas were included to provide additional suitable habitat acreage and serves to compensate for the exclusion of ROW in the calculation.

The estimate of take being provided for the indigo snake is 81 individuals. This estimate was calculated based on the total area of impact for the scrub-jay and the estimated number of indigo snakes that could occupy that area.

3.4 Effects of Management and Translocation

<u>Management</u>

Land management techniques including, herbicide treatment, mechanical reductions and prescribed burning may have the potential to result in harm, harassment, or direct mortality of covered species. To limit the potential impact to scrub-jays during land management activities, mechanical vegetation

reduction events will occur outside of scrub-jay nesting season. Weather conditions necessary for optimal prescribed burns in scrub typically occur during the growing season and coincide with scrub-jay nesting season. Adult and juvenile scrub-jays can avoid flames and smoke, but prescribed burns may impact existing nests. The prescribed burn and associated preparations may temporarily disrupt the birds' daily behavior patterns and ability to forage for a short period. However, since overgrown scrub is typically uninhabited, it unlikely that burns will impact nesting sites. Additionally, the long term benefits of appropriate land management activities outweigh the short-term detrimental impacts to scrub-jay nesting success that may occasionally occur.

Though scrub-jays may be harassed by management activities, these management events will be planned to minimize the possibility of take of this species and Best Management Practices will minimize the risk of losing nests.

To reduce the potential impact to indigo snakes, whenever possible, equipment used to for mechanical vegetation reduction, maintenance of fire breaks, and conducting prescribed burns will have rubber tires. Though it is possible that prescribed burns could conceivably kill or injure snakes, indigo snakes have evolved in pyrogenic habitats and are expected to be able to respond to fire by seeking refuge in gopher tortoise burrows or fleeing the area. Overall, prescribed fires and related activities are expected to improve habitat and the availability of prey species. Indigo snakes within a burn unit may incur a brief period of disturbance to its patterns of feeding, breeding, or sheltering. Due to the wide-ranging activity and use of a variety of habitat types by the indigo snake, as well as the available habitat not being treated during a management event it is difficult to determine if any snakes will be taken, and what that number of snakes would be.

Translocation

Translocation activities may have the potential to result in harm, harassment, or direct mortality of scrub-jays during capture, banding, transport, conditioning and release. The scrub-jays targeted for translocation under the HCP will be from urban areas (Section 4.3) where upon issuance of the Countywide ITP take will have already been accounted for. Long-term, these scrub-jays will have little habitat remaining and being in suburban areas will be demographically doomed, as demonstrated by the PVA analysis.

Impacts of translocation activities may result in disruption of social behaviors during capture and captivity, but the effects on individual birds will vary depending on their response to the relocation site. However, since scrub-jays targeted for translocation are within areas of declining populations and habitat availability, these translocation activities will supplement the baseline population within the Reserve and possibly reduce mortality of suburban scrub-jay groups thus enhancing the survival of affected scrub-jays.

Though scrub-jays may be harassed by translocation activities, these activities will be planned to minimize take of the species.

3.5 Cumulative Impacts

This HCP is being prepared in order to minimize the cumulative impact to scrub-jays in Charlotte County by including measures to minimize and mitigate for loss of occupied habitat. The prospect for long-term persistence of scrub-jays in Charlotte County's suburban setting is not positive. Population modeling has

shown that even if habitat conditions remain constant, scrub-jay populations are expected to undergo a slow decline and become extirpated in suburbanized areas. Consequently, although scrub-jays may persist for some time in the suburban setting, the long-term demographic value to the species as a whole is uncertain. Moreover, many residential areas that still contain scrub-jays will become increasingly unsuitable for this species as "build-out" progresses and/or the remaining scrub habitat becomes overgrown. The direct and indirect impacts associated with continuing suburban and urban development likely will accelerate the declining population trend observed in suburban scrub-jays.

The cumulative impacts that accompany future development within suburban areas will continue to occur regardless of whether this HCP is pursued, and is likely to affect the overall long-term viability of scrub-jays in Charlotte County. The conservation measures proposed by this HCP, however, will serve to minimize and mitigate for impacts related to habitat loss by focusing preservation and management efforts on areas of the County most likely to support sustainable scrub-jay populations.

4.0 Conservation Program

4.1 Biological Goals and Objectives

4.1.1 Biological Goals

The biological goals of this HCP as listed below will serve to guide the successful implementation of the Plan, and will be accomplished via a dedicated funding source, as identified in Section 5.0.

1. Reduce extinction risk, increase population persistence probability, and enhance the long-term viability of the M7 scrub-jay population of Charlotte County by acquiring, restoring, and permanently managing scrub-jay habitat as identified within the Reserve.

2. Minimize impacts to remaining scrub-jay populations outside the Reserve by expanding, restoring and maintaining existing public lands and implementing avoidance and minimization efforts within these areas, as outlined in Section 4.4.

3. Provide long-term protection of the biological integrity and species diversity that is characteristic of the scrub systems in Charlotte County by acquiring, restoring, and permanently managing the scrub habitats identified within the Reserve.

4.1.2 Biological Objectives

The following objectives are the specific, measurable actions that will be implemented to ensure the above stated biological goals are achieved.

Objective #1: Maintain and manage existing County owned scrub

All County-owned scrub lands will be restored and managed in the long-term to ensure the optimum scrub habitat structure for scrub-jays is achieved and maintained. This will be carried out through the use of mechanical management where necessary, but with prescribed fire as the primary management tool.

Objective #2: Acquire a minimum of 1300 acres as identified in the Reserve

The scrub habitats that have been identified in the Reserve were arrived at based on a spatial configuration that optimizes population viability within the County. These properties will be acquired through fee simple and/or less than fee simple methods, restored, and managed in perpetuity. Alternative methods may include conservation easements on private lands or participation in private conservation bank efforts. Acquisition of Reserve parcels will be prioritized based on current scrub-jay occupation, habitat condition, location, and willingness of landowners to sell or have conservation easements placed upon their lands. Charlotte County will also seek partnering opportunities or grants for land acquisition within the Reserve. The status of acquisition will be reviewed will be conducted at years 2, 4, 6 and every five years thereafter to determine compliance with this objective and to allow for implementation of adaptive management measures to ensure success.

Objective #3: Coordinate with other public lands

Implement a plan for working with other public conservation entities (FDOF, FFWCC, SWFWMD, FDEP, etc.) to ensure proper management, monitoring, and communications will occur to assist in maintaining optimum scrub structure to sustain or increase scrub-jay populations and/or encourage dispersal to/from those properties within or in proximity to the Reserve and Charlotte County.

Objective #4: Increase the baseline population of scrub-jays within the Reserve

The population of scrub-jays on Reserve habitats will be expanded through a combination of habitat acquisition, restoration, management, and scrub-jay translocation. The target will be to maintain at least 30 scrub-jay groups within the Reserve by year 15 of HCP implementation, and maintain 60 scrub-jay groups by year 30 of the HCP.

Objective #5: Conduct scrub-jay translocations as appropriate

When and where sufficient acreage of unoccupied scrub-jay habitat in optimal condition is available within the Reserve, translocation to these areas will take place, following USFWS Florida Scrub-Jay Translocation Guidelines. The source population of scrub-jays for translocations will come from the appropriate take areas within the M5 (Genetic Group E), and M6 and M7 (Genetic Group F). Deep Creek/Harbour Heights subdivisions hold the largest populations of scrub-jays outside of the Reserve, but within Genetic Group F. Translocation of scrub-jays will not absolve the landowners of their responsibility to pay required mitigation monies as outlined in Section 5.0. Coordination with USFWS will be required prior to submitting an application to USFWS for scrub-jay translocation. At the time when Charlotte County is ready for scrub-jay translocations, coordination with USFWS will take place and the specific locations of donor scrub-jays and recipient sites will be identified at that time.

Objective #6: Conduct scrub-jay population monitoring

USFWS-approved scrub-jay survey guidelines will be used to conduct annual scrub-jay censuses on the parcels identified within the Reserve and areas targeted for potential translocation sources, according to methods described in Section 4.4.

Objective #7: Implement vegetation monitoring program

A program to monitor the structure and composition of vegetation within the Reserve will be developed and implemented. This will be a combination of qualitative and quantitative assessments to measure restoration and management success, and to implement adaptive management techniques.

Objective #8: Implement Long-Term Management Plan

The long-term management plan, described in Section 4.5, will be implemented for all lands existing and acquired within the Reserve to ensure vegetation structure and composition is maintained in perpetuity such that optimal conditions for scrub-jay persistence is achieved.

4.2 Scrub-Jay Reserve

A Reserve was designed for implementation under this HCP to serve as mitigation for loss of occupied scrub-jay habitat to be authorized under the ITP. The Reserve consists of a collection of patches of suitable, potentially connected habitat across the County. This Reserve method is preferred over a site by site approach, as single sites or disconnected patches tend to be insufficient for long-term sustainability (Noss 1997). Acquisition, restoration, and long-term management of the parcels that make up the Reserve will provide the required mitigation for loss of occupied habitat in areas where development has likely precluded the long-term viability of FSJ populations.

A system of Reserve Alternatives was designed using basic principles of conservation biology and island biogeography and applying existing habitat and scrub-jay data to develop the specific configurations of each. The intent was develop a series of reserve designs that reflected different advantages, such as maximizing size of population versus maximizing connectivity, each of which was comprised of slightly different, but overlapping collections of individual scrub parcels. The contributions of each design to the long-term viability of scrub-jays in individual regions (i.e. Prairie Creek, Deep Creek, Mid-County, and West-County), as well as different metapopulations was then evaluated. Having a variety of reserve options also offered flexibility in meeting economic and planning priorities.

4.2.1 Reserve Alternatives

Four Reserve Design Alternatives were developed, and in February 2011 were presented to the HCP Technical Advisory Committee (TAC). The four designs varied in the amount of potentially suitable habitat that would need to be protected and managed to sustain populations of scrub-jays in Charlotte County. The decision criteria for designing these were primarily biological in nature and did not take into account social, economic, or political issues. These criteria were used to select specific polygons of scrub-jay habitat within the County to make up each of the four Alternatives. Details regarding the decision criteria and methods are provided in Section 6 of this document.

Each of the Reserve Design Alternatives was tested using a spatially-explicit, individually-based Population Viability Analysis (PVA) in order to identify the best biological alternative based on predicted long-term viability. This analysis considered whether each alternative protected enough scrub habitat in an appropriate spatial structure to minimize the risk of extinction for scrub-jays and used the best available data on scrub-jay demography and movement patterns in similar landscapes. Dr. Reed Bowman presented the results of the PVAs to the TAC in May 2011. Due to the relatively high extinction

rates predicted under the PVA for Alternatives 1 through 4, the TAC agreed that a fifth Reserve Design Alternative would be created. The PVA criteria and results can be found in Appendix 1.

Based on input from the TAC, Reserve Design Alternative 5 included the addition of privately owned scrub-jay habitat in suburban areas throughout the County where ≥ 25 acre 'blocks' of habitat existed free of residential or commercial development. The PVA was then applied to Alternative 5, and results suggested that the addition of privately owned scrub habitat patches in Mid and West County still resulted in the relatively high extinction rates as was found for Alternatives 1-4. In addition, the TAC considered the blocks of habitat within a suburban matrix of Mid and West County too difficult to acquire and manage such that optimum scrub-jay demographics would be met. As a result, Mid and West County private suburban parcels, as originally depicted in Reserve Design Alternative 5, were not included in the chosen Reserve (Preferred Alternative). The TAC believed there was a higher likelihood of acquiring and/or managing the private lands in the eastern portion of Charlotte County east of the Peace River, where the PVA model results predicted lower rates of extinction risk (although still relatively high). However, the TAC agreed that where potential scrub-jay habitat exists adjacent to existing public lands throughout the county, consideration of acquisition of these habitat patches should be included as part of the Reserve. Appendix 2 provides details on the final recommendations from the TAC on the Reserve.

4.2.2 Preferred Alternative

The preferred alternative chosen for the Reserve consists of the restoration and management of all public lands on which potential exists to achieve both carrying capacity and optimal demographic performance for scrub-jays; and focuses acquisition efforts in East County, with the goal of acquiring an additional 1,336 acres of prioritized habitat over the life of the permit (Figure 4-1), totaling 4,496 acres. These suitable private scrub habitats would provide breeding, feeding and sheltering habitat, and serve as dispersal corridors between public lands east of the Peace River in the Prairie/Shell Creek area. Additionally, private lands that would provide scrub habitat and are adjacent to public lands west of the Peace River will be also be given consideration for acquisition or conservation easement. This approach is intended to maximize scrub-jay population viability and habitat connectivity. The primary function of much of the proposed acquisition in East County is to maintain connectivity between existing public lands (Prairie and Shell Creek, and SWFWMD properties). Developed rural lots, typically 5 acres or larger, with remnant native structure may serve as scrub-jay habitat and 'stepping stones' between large public tracts. Stepping stones can minimize the size of the gaps between occupied patches and thereby increase connectivity, dispersal and gene flow (Coulon et al. 2012) and, presumably, lower extinction risks in fragmented habitat, which justifies inclusion in the Reserve. Where appropriate, conservation easements may be pursued to allow for the management of these native 'islands' to benefit scrub-jay dispersal and occupation. The opportunity to pursue conservation easements of this description in the suburban setting are far less feasible due to the removal of the majority of native structure during development of smaller lots and the difficulty in managing such small patches of habitat. Habitat management implementation and costs are typically more expensive in the suburban/urban matrix than rural areas due to high smoke sensitivities, the increased need for coordination and support, and higher potential liability for fire management. Rural areas generally have less sensitivity to scrub management activities, allowing the full potential of management options to be implemented for appropriate restoration and management. In addition, the implication for scrub-jay persistence in rural residential areas is much weaker, since all long-term demographic research in human-dominated landscapes has been done in true suburban areas with ¼ acre lots, indicating a consistent downward trend in populations.

Suburban tracts of native habitat, like those found in Mid and West County, are more likely to be susceptible to edge effects, high traffic densities, consistent property development, effects of pesticides on native arthropods (a critical food source), herbicides, fungicides, inadequate/introduced food sources, and changes in both the natural and domesticated predator community. As human density increases around remnant habitat patches in Mid and West County, the pressures associated with this development will create a situation in which optimal scrub-jay demographics are difficult, if not impossible, to achieve. Larger rural tracts such as the areas in East County, however, are less likely to be influenced by these development effects and more conducive to scrub habitat management and scrub-jay persistence.

Platted megaparcel acquisition, typically consisting of ¼ acre lots, in other parts of the state have not been successful (i.e. less than 100% of the targeted parcels have been acquired) and scrub-jay populations in these areas have declined (Boughton and Bowman 2011) due to the extreme difficulties of appropriate habitat management associated with a matrix of public and private properties (high costs, liability, smoke sensitivities, etc). Focusing on larger properties in rural areas will allow the County to acquire larger parcels from fewer land owners than in suburban areas, which will help maintain the acquisition goals outlined in this HCP.

All public land throughout the County where occupied or potentially occupied habitat exists for the scrub-jay will be managed to maximize for optimal habitat. This includes existing and future conservation easements. Private parcels that meet the above definitions for inclusion within the Reserve will be pursued as fee simple acquisitions or as less than fee acquisitions through conservation easements. In cases where potential scrub-jay habitat exists immediately adjacent to existing public lands, consideration of acquisition of these habitat patches will also be made.

Included in the preferred alternative is the restoration and management of Tippecanoe II Mitigation Area and the Rotonda Mitigation Area. These two mitigation areas were established as mitigation for impacts to scrub-jays for four County projects under the Charlotte County Capital Improvement Projects Habitat Conservation Plan (CIP HCP) in 200X. However, these lands are included in the Countywide HCP for two reasons. First, none of the four projects covered under the CIP HCP have begun and no impacts to jays have occurred at this time. Secondly, the properties covered under the CIP HCP were not excluded from the take calculations or the PVA analysis. So even though these areas were already designated as mitigation, the anticipated impacts were included in the analysis for this HCP and therefore the mitigation lands were also included in the Reserve design.

Acquisition will be prioritized based on current scrub-jay occupation, habitat condition, location, and willingness of landowners to sell or have conservation easements placed upon their lands. A total of 1300 acres of scrub habitat will be acquired, restored, and managed in perpetuity. The status of acquisition will be conducted at years 2, 4, 6 and every five years thereafter to determine compliance with this objective, allow for implementation of adaptive management measures to ensure success, and to determine of a permitting suspension is warranted (Section 4.5).

4.2.3 Management and Restoration

All properties currently under public ownership or that become acquired under the Reserve will be managed to benefit the scrub-jay. Immediately following acquisition, each parcel will be evaluated individually in order to specifically address the specific habitat deficiencies or restoration need(s) of

each. Restoration plans will be prepared and implementation will be initiated within one year that will focus on optimizing the habitat for existing or future scrub-jay occupation, and with the goal of increasing and maximizing carrying capacity for scrub-jays.

Habitat restoration will focus on establishing the proper vegetation structure and species composition to provide appropriate habitat conditions for scrub-jays. Optimal scrub-jay habitat includes a shrub structure of 1-3 meters in height; scrub-jays tend to abandon habitat where structure exceeds 3 meters (9.8 feet) (Fitzpatrick et al. 1991). Existing scrub oaks and desirable native shrubs of 9.8 feet in height or less will remain. Areas of higher canopy will be thinned. Saw palmetto or other ground cover may need to thinned and/or mowed in overgrown areas to achieve desired results and to prevent crown fires or intense fires from occurring. Herbicide treatment of all Florida Exotic Pest Plant Council (FLEPPC) 2009 Category 1 listed exotics may take place followed by limited disking where necessary to create bare patches.

The goal will be to create a habitat having a sparse pine canopy, a low shrubby understory, patches of exposed soil, and a prescribed fire regime adapted to the specific conditions of each parcel. Restoration activities may consist of tree thinning, roller chopping, exotic vegetation removal/control, limited disking, prescribed burning, and planting. Additional restoration and management information is provided in the Long-Term Management Plan (Section 4.6). Overgrown areas will be targeted first for the purpose of restoring as much scrub as possible within the shortest time frame.

4.3 Scrub-Jay Translocation

Translocation will be used as a supplemental conservation measure to assist with meeting the goal of increasing the baseline population of scrub-jays within the Reserve. Translocation will serve to augment or populate suitable scrub habitats within the Reserve, and possibly reduce mortality of suburban scrub-jay groups by translocating them from a demographic sinks, such as suburban development. This must be accomplished while scrub-jays are still present in the suburbs of Charlotte County. Translocation methods will be based on the Joint USFWS and FWC Scrub-Jay Translocation Guidelines, and all USFWS Section 10 (a)(1)(A) permits will be obtained prior to implementing translocation activities.

It is expected that the source population of scrub-jays will be from suburban areas in Charlotte County outside of the Reserve, and will consist primarily of scrub-jays in the Deep Creek and Harbour Heights subdivisions. Upon issuance of the ITP, source populations from these areas should be available for translocation as soon as suitable Reserve recipient sites have been identified per criteria outlined in the Guidelines. Recipient sites are anticipated to be acquired sites that are either not occupied or are well below carrying capacity, but where suitable scrub-jay habitat exists. Recipient sites must be fully restored and managed prior to translocations to optimize habitat conditions for scrub-jays.

Justification for implementing translocation early in the HCP timetable is based on the findings that show annual recruitment of scrub-jays in a suburban matrix is inadequate to offset adult mortality rates, thus dooming these populations to extinction. It is not prudent to delay translocations until occupied parcels are permitted for development, as the scrub-jays are likely to shift territory boundaries as development encroaches, or disperse from the area entirely, at which point the scrub-jays will not be available for translocation and mortality rates are likely to increase. Considering that upon issuance of the Countywide ITP take will have already been accounted for and providing that funds are available for translocation, the translocations of scrub-jays in suburban areas outside of the Reserve Design may occur before mitigation monies have been received from the specific parcels. This translocation of scrub

jays will not absolve the landowners of their responsibility to pay required mitigation monies as outlined in Section 5.0. The best option is to translocate family groups as soon as recipient sites are available, and before donor sites become overgrown and survival rates are impacted by the effects of nearby development.

The frequency and timing of translocation events will depend on the timing and condition of parcels to be acquired, as well as the availability of viable translocation candidates. Coordination with USFWS will be maintained throughout the 10(a)(1)(A) application process to obtain concurrence on source scrub-jay populations to be translocated and proposed recipient sites. All translocated scrub-jays will be color banded for the purpose of tracking and monitoring these individuals, and to assist in the assessment of the success of translocation efforts.

4.4 Minimization Measures

Development impact on scrub-jay groups will be minimized by limiting the take of occupied habitat during the breeding season where scrub-jays are nesting. Clearing of occupied scrub habitat will not occur during the scrub-jay nesting season (March 1 – June 30). For parcels of 3 acres or greater in size, where development will occur on 50% or less of the parcel, minimization and avoidance where feasible will take place. The development of parcels 3 acres or greater in size will be reviewed on a case by case basis within the context of the surrounding landscape to determine the level of minimization and potential avoidance measures and may take place in the form of preservation of remaining native habitat, supplemental planting of native scrub oak species where landscaping is required by the County, and the potential for conservation easements on larger parcels (Appendix 3).

Development impact to the indigo snake will be avoided and minimized based on the implementation of the Standard Construction Guidelines for this species (Appendix 4). These guidelines will be enforced on all proposed development parcels throughout the Plan Area, and the County will provide the guidelines to all recipients of land development permits. The County will also ensure these guidelines are implemented on all of the conservation areas for which it is responsible. Protection of burrows and the retention of unburned stumps and occasional debris piles will help improve the habitat for this species.

Development impact to the gopher tortoise will be avoided and minimized through the implementation of the State of Florida's gopher tortoise permitting and guidelines and regulations. These guidelines will be enforced on all proposed development parcels throughout the Plan Area, and the County will not issue development permits until all gopher tortoise permits from FWC are received. Though land management activities are exempted from FWC permitting regulations, the County will ensure that direct impacts will be avoided and minimized to the greatest extent feasible while conducting land management activities that will ultimately improve habitat for the species.

Florida Bonneted bats have not been documented roosting outside of the Fred C. Babcock/ Cecil M. Webb Wildlife Management Area and Babcock Ranch Preserve in Charlotte County since one roost tree was felled in 1979. Because this species can use a variety of habitat types, it may occur elsewhere in the County; however, no one has conducted coordinated surveys throughout the County for the presence of this species. Out of an abundance of caution, the County will implement the minimization measure of surveying for the presence of Florida bonneted bats before conducting any habitat management activities on reserve lands that could result in damage to potential natural roost sites. Potential roost sites could be any trees or snags of 10 inches diameter at breast height (dbh) or greater with cavities or loose bark, or palm trees with dead palm fronds still attached. These sites may be identified as Florida

bonneted bat roosts by using one or more of the following indicators: Florida bonneted bats are observed emerging from a tree cavity or from under the bark, bat vocalizations (chattering) have been heard coming from the tree, large bats (greater than 5 inches in length) have been seen flying or heard vocalizing in the vicinity, echolocation calls have been recorded in the vicinity using acoustical recording devices, the tree/snag exudes an ammonia-like smell, or bat guano has been seen around the base of the tree/snag.

If bonneted bats are discovered, the roost site will be protected by use of one or more of the following methods:

- Small preparation burns. Conduct preparation burns of the cluster or areas surrounding individual roost sites before conducting the larger burn. Preparation burns can be performed immediately before or several weeks ahead of the larger burn. Carefully monitor and extinguish preparation burns to avoid damage to roost sites or unintentional ignition of the larger burn unit. A strong advantage of this method is that it benefits groundcover plants that are harmed by other methods such as raking and mowing (below).

- Raking. Rake fuels far enough from the trunk to prevent roost site ignition. Avoid the formation of mounds or rings of concentrated fuels (such as pine straw); such piles of fuels can cause greater mortality than if no action had been taken. Remove small trees and shrubs by hand prior to raking fuels.

- Mowing. Mowing is effective, but heavy machinery can compact soils and damage tree roots. To reduce these negative impacts, avoid repeated mowing and use of heavy equipment, and minimize use of machinery in wet sites. Weed-whipping is a low impact alternative.

- Light bark scraping. Lightly scraping off the loose bark of living pine trees from ground to breast height can improve the effectiveness of other methods such as raking and mowing.

- Wetting the cavity trees. A solution of water and foaming agent applied to the base of cavity trees is currently being tested as a method for cavity and roost tree protection. This may become available for widespread use in the future. Foam may be especially effective in combination with mowing or raking.

- Removal of dead palm fronds. Dead palm fronds should not be trimmed from palm trees found to have roosting bats.

- Time of year. Conduct controlled burns carefully in areas known or suspected to be occupied by Florida bonneted bats, especially during this species' breeding seasons (January through March and June through October).

4.5 Monitoring and Reporting

Charlotte County will prepare and provide an annual HCP Report to the USFWS and FWC for the duration of the thirty year ITP. Following permit expiration, reports will be provided every five years. Charlotte County staff will be responsible for conducting or coordinating monitoring events. The data collected will allow Charlotte County NRD staff to adjust management and monitoring schedules and activities as conditions change. All acquisition, restoration and management activities will be documented in the annual report.

The report will address both the status of acquisition of Reserve parcels, as well as biological and compliance monitoring as follows:

Habitat Monitoring

The success of restoration efforts on any newly acquired parcels will be tracked through annual quantitative vegetation monitoring within each unit of the site for the first five years following initial restoration activities. Several vegetative parameters will be sampled and reported to determine the condition of the scrub polygons including: percent cover of each strata and species composition within each strata, and average maximum height within each strata. A qualitative assessment of the overall condition of each parcel will also be made including observations of wildlife utilization. Representative photos to track the progress of restoration areas will be included with the annual report. Reports will be submitted by May 15.

After the first five years post-restoration, all Reserve parcels will be monitored on a rotating basis, so that the entire Reserve will be monitored every five years. This continued monitoring will allow Preserve managers to act accordingly when management is needed. Annual reports will continue to be submitted to the USFWS through the life of the permit to document the status of the mitigation and the HCP.

Existing public lands or acquired parcels that do not require restoration will be qualitatively assessed on at least a five year basis, with portions of the Reserve to be inspected annually. This will allow for tracking of site conditions, the success of ongoing management, and the need for any adjustment to management activities.

Scrub-Jay Monitoring

Scrub-jay surveys will be conducted on an annual basis within the Reserve, with each annual survey focusing on a different portion of the Reserve. Annual monitoring will be conducted such that the entire Reserve will be covered on five year intervals. This will allow for timely coverage, with the ability to maintain the flexibility required to focus on the areas where monitoring should be prioritized on an annual basis.

Monitoring will also take place within designated take areas, focusing on areas of development within the past year based on permit issuance, on a periodic basis. This will be conducted to identify potential donor sites for scrub-jay translocations.

Scrub-jay monitoring will follow Fitzpatrick et al. (1991) presence/absence surveys and will be conducted annually starting in late-June with completion prior to the end of July so that surveys coincide

with the period in which dependent or newly independent juveniles are still likely to be with their natal group and prior to their molt of adult plumage. This timing will allow for the determination of annual rates of recruitment and trends in the size of populations and mean group size.

Parcel Acquisition

A collaborative evaluation with USFWS staff of the status of the acquisition of parcels within the Reserve will be conducted at years 2, 4, 6 and every five years thereafter in an effort to determine whether acquisition, development, and fee collection are on track to meet the goal of an additional 1300 acres by the end of the 30 year permit. This effort will include preparing maps depicting the location of acquired parcels and updating the list of parcels prioritized for purchase when additional funds become available. The total acreage of acquired sites will be calculated and reported to USFWS, with contingency plans for addressing shortfalls if it appears there may be difficulties meeting this objective; as well as the total number of acres within the Plan Area where development permits have been issued.

As described in Section 5.4, the funding mechanism for the HCP is a development fee levied on undeveloped properties within the scrub-jay review area. To ensure that acquisition of the Reserve is occurring at an equivalent pace to development, the issuing of permits in the Plan Area will be suspended if acquisition in the Reserve has not kept pace with development within 1 year of reaching 25%, 50% and 75% development of the acreage in the Plan Area.

Building Permit Tracking

The County will track all permits issued within the Plan Area and maintain an account of all scrub habitat cleared on an annual basis. This will be used to track the accuracy of the take estimate and whether the proposed acquisition plan is keeping up with habitat losses; therefore determining if a permitting suspension is warranted. Building permit applications and future development plans will also be tracked to maintain and update funding projections and prioritize acquisition timing to be concurrent with available funding. These ongoing development trends will be included in the annual reports.

4.6 Long-Term Management Plan

The Reserve will include both existing public conservation lands, as well as 1300 acres of future acquisition (Figure 4-1). Existing public conservation lands within the Reserve include:

- Amberjack Environmental Park (264 acres; 102 acres of scrub) is located in western Charlotte County on the Cape Haze Peninsula and is bordered by residential development and portions of the Charlotte Harbor Preserve State Park. Owned by Charlotte County.
- Rotonda Mitigation Area (34 acres; 26 acres of scrub) is located in western Charlotte County in the center of the Rotonda Community; it is bordered by residential development, a community park and portions of the Charlotte Harbor Preserve State Park. Owned by Charlotte County.
- San Casa Environmental Park, also known as Ann Dever Memorial Park on Oyster Creek (119 acres; 66.9 acres scrub) is located in western Charlotte County and is bordered by residential development, a community park and Oyster Creek. Owned by Charlotte County.
- Tippecanoe Environmental Park (354 acres; 200 acres scrub) is located in north central Charlotte County. It is bordered by the Charlotte Sport's Park baseball complex, portions of the Charlotte Harbor Preserve State Park, Tippecanoe II Mitigation Area and a small amount of residential development. Owned by Charlotte County.

- Tippecanoe II Mitigation Area (182.8 acres; 157 acres of scrub) is located in north central Charlotte County. It is southeast of the Charlotte Sport's Park baseball complex and is bordered by Tippecanoe Environmental Park, residential development and a major road. Owned by Charlotte County.
- Peace River Preserve, also known as Deep Creek (420 acres; 140.3 acres scrub) is located in eastern portion of central Charlotte County, along the western bank of the Peace River, and is bordered on the other three sides by residential development. Owned by Charlotte County.
- Burcher's Tract conservation easement (310.5 acres; 282 acres of scrub) is located in eastern Charlotte County, along the east bank of the Peace River. Some ex-urban residential development occurs to the east and southeast of the property. This preserve is managed and funded by the Southwest Florida Water Management District.
- Biscayne Trust conservation easement (180 acres; 56 acres scrub) is located in eastern Charlotte County, along the north bank of Shell Creek and is bordered by scattered ex-urban development and agricultural lands. This is a privately owned easement granted to Charlotte County, along with all management rights.
- Prairie Creek preserve (1561.8 acres; 286 acres of scrub) is located in eastern Charlotte County, along the north fork of Prairie Creek and is bordered by scattered ex-urban development and agricultural lands. Owned by Charlotte County.
- Hathaway Park (19.5 acres; 8.2 acres of scrub) is located in eastern Charlotte County, along the south fork of Shell Creek and is bordered by a community park, limited development and agricultural lands. Owned by Charlotte County.
- Shell Creek Preserve (366.9 acres; 78 acres of scrub) is located in eastern Charlotte County, along the south fork of Shell Creek and is bordered by agricultural lands. Owned by Charlotte County.

Lands in the acquisition focus area are situated in eastern Charlotte County and will serve as connections to existing public lands.

4.6.1 Land Management Plan Purpose

This Management Plan outlines the monitoring and management activities for the Reserve with the purpose of outlining the actions necessary to implement the biological goals and objectives of the HCP.

Portions of the Reserve will be open to the public, primarily the existing public conservation lands. Limited passive recreational opportunities will be available on the designated lands, such as hiking trails, canoe/kayak launch sites, horse trails and guided nature walks. Ordinances prohibiting destructive uses such as ATV use, camping, illegal dumping, creating new trails, and others are already in existence.

The biological goals of the Charlotte County Scrub-Jay HCP listed below serve to guide the successful implementation of the plan.

1. Reduce extinction risk, increase population persistence probability, and maintain the long-term viability of the M7 scrub-jay population of Charlotte County by acquiring, restoring, and permanently managing scrub-jay habitat as identified within the Reserve.

2. Minimize impacts to remaining scrub-jay populations outside the Reserve by restoring and maintaining existing public lands and implementing avoidance and minimization efforts within these areas.

3. Provide long-term protection of the biological integrity and species diversity that is characteristic of the scrub systems in Charlotte County by acquiring, restoring, and permanently managing the scrub habitats identified within the Reserve.

4.6.1.1 Land Use

The future land use and zoning designations have been changed on all currently owned public conservation lands in the Reserve as shown below. As new properties are acquired in the acquisition focus areas land use and zoning designations will be changed to environmentally sensitive, preservation or resource conservation.

Land Use Designations

Property	Zoning	Future Land Use
Amberjack Environmental Park	Environmentally Sensitive	Preservation
Rotonda Mitigation Area	Environmentally Sensitive	Preservation
San Casa Environmental Park	Environmentally Sensitive	Preservation
Tippecanoe Environmental Park	Environmentally Sensitive	Resource Conservation
Tippecanoe II Mitigation Area	Environmentally Sensitive	Preservation
Deep Creek aka Peace River Preserve	Residential Single Family 3.5	Preservation
Burcher's Tract Conservation Easement	Environmentally Sensitive	Preservation
Biscayne Trust Conservation Easement	Environmentally Sensitive	Preservation
Prairie Creek Preserve	Agricultural Estates	Preservation
Hathaway Park	Agricultural Estates	Parks & Rec
Shell Creek Preserve	Agricultural Estates	Preservation

4.6.1.2 Comprehensive Plan Policies

Objectives of the Recreation and Open Space Element, of the Charlotte County, Smart Charlotte 2050 Plan that would be furthered by managing the Reserve include:

- ***REC Objective 1.2 Park and Recreation Maintenance and Management***
  To protect and maintain existing parks and assets to preserve physical, environmental, functional, recreational and aesthetic values.
- ***REC Policy 1.2.1 Public Awareness***
  The County shall protect, restore, and manage natural resources in parks and provide interpretive information regarding environmental resources, conservation easements and ecosystems within parks. The County shall consider the proper long-term ecological functions and recreational value of the land and will work to increase public awareness and understanding of ecological systems.
- ***REC Policy 1.2.3 Invasive Species Removal***

The County shall develop and pursue invasive, exotic plant and animal eradication programs for parks and open space by 2012.

Objectives of the Natural Resources Element, of the Charlotte County, Smart Charlotte 2050 Plan that would be furthered by managing the Reserve include:

- ***ENV Policy 1.3.5 Prescriptive Burning***
  The County shall allow for and support the use of prescriptive burning in appropriate land cover types, as permitted by the Florida Division of Forestry (DOF), in order to prevent catastrophic wildfires, which greatly reduce air quality, and to mimic the natural cycle of regeneration.
- ***ENV Objective 2.2 Regional Conservation Strategy***
  To protect plant and animal diversity and distribution by protecting listed and imperiled plant and wildlife habitats, providing for habitat corridors, and preventing habitat degradation, isolation or fragmentation through a regional conservation strategy.
- ***ENV Policy 2.2.2 Allow Proper Land Management***
  The County shall help ensure that land use activities on adjacent properties do not prevent the use of land management activities (such as prescribed burns) necessary to maintaining the natural functions and values of public wildlife management areas, parks, preserves, and reserves, or private conservation lands and agricultural properties.
- ***ENV Policy 2.2.6 Environmental Land Protection***
  The County shall protect environmental lands using all available methods, including: land acquisition; incentives; land development requirements for the provision of conservation and preservation areas; and denial of increases in density and intensity.
- ***ENV Policy 2.2.7 Environmental Acquisition and Management***
  The County shall acquire and manage environmental lands using all available opportunities including, but not be limited to: levying an ad valorem tax; obtaining State, Federal and non-profit grant funding; land swaps; public/private partnerships; public/public partnerships (such as Florida Communities Trust); community land trusts; and conservation easements. All lands acquired by the County for preservation shall be managed to retain their environmental value.
- ***ENV Policy 2.2.8 Promoting Connectivity***
  In its efforts to protect natural resources, the County shall promote linkages between existing public parks, preserves, and similar areas serving to provide for the conservation of natural resources in order to develop a system of interconnected greenways and blueways providing for public recreation while protecting the natural environment. These areas may consist of woodlands, water bodies, and other open spaces. These areas may be used for hiking, bicycling, horseback riding, developed as resource-based parks or low-impact educational facilities and nature centers. Linkages can be made to lands internal to the County or to lands in adjacent counties. The County shall utilize all means identified in ENV Policy 2.2.6 and 2.2.7 to promote this connectivity.
- ***ENV Policy 2.2.11 Land Management***
  The County, or duly authorized management agencies, shall develop and implement long range management plans for preservation or conservation lands consistent with the natural resources found on these properties.
- ***ENV Policy 2.2.12 Public Awareness of Environmental Lands***
  In cooperation with other government agencies and non-profit groups, the County shall work to increase public awareness, appreciation, and (consistent with the resources found at each site) access to the publicly owned preserves and environmental parks within the County's borders.

- ***ENV Policy 2.2.13 Donation Policy***
  The County may accept lands offered for donation as nature preserves or other resource conservation uses when at least one of the following apply: such lands contain ecologically valuable habitat; public ownership of such lands would expand existing preservation or resource conservation areas; public ownership of such lands would provide increased protection for existing preservation or resource conservation areas; or such lands are a commodity that shall be traded for ecologically valuable habitat.
- ***ENV Objective 2.3 Protect Listed Flora and Fauna***
  To protect wildlife and plant species listed by the USFWS [U.S. Fish and Wildlife Service] or FFWCC [Florida Fish and Wildlife Conservation Commission] and conserve the habitats upon which they depend in order to maintain balanced, biologically productive ecosystems and natural communities for the use and benefit of future generations.
- ***ENV Policy 2.3.4 Habitat Conservation Plans (HCPs)***
  To expedite the development review process while ensuring the long-term viability of populations of listed and protected species, the County shall develop species-specific and project specific HCPs as directed by the Board of County Commissioners, and as authorized by the Endangered Species Act and as approved by the US USFWS. Until such time as species-specific HCPs are developed, the County's review and approval of development proposals shall be consistent with the provisions of listed species guidelines promulgated by the FFWCC and USFWS.
- ***ENV Policy 2.3.5 Scrub-Jay Habitat Conservation Plan***
  The County shall administer the species specific Florida scrub-jay (Aphelocoma coerulescens) HCP, which was developed for four Capital Improvement Projects, when approved by the USFWS. The County supports the effort to create a county-wide scrub-jay Habitat Conservation Plan.
- ***ENV Policy 2.3.6 Exotic Plant Removal***
  The County shall continue to enforce the removal of invasive exotic plants. The County shall also prohibit the planting of species listed as noxious weeds by 5B 57.007, Florida Administrative Code, and listed as invasive species on the Florida Exotic Pest Plant Council Invasive Plant Lists.
- ***ENV Policy 2.3.8 Environmental Education***
  The County shall support efforts to increase the public's understanding and stewardship of wildlife, natural communities, and other natural resources through partnerships with non-profit organizations such as the Florida Master Naturalist Program, the Florida Yards and Neighborhoods Program, and the University of Florida Food and Agricultural Sciences program.

4.6.2 Natural and Cultural Resources

Both existing public conservation lands and land in the acquisition focus areas of the Reserve have or will likely have more than scrub based habitats throughout. Though the land management strategy for these lands will be a single species focus on the scrub-jay; secondarily, the other habitats will be managed for floral and faunal biodiversity within their habitat structures when feasible and when funding is available. The natural communities in each conservation property are delineated within their site specific land management plans (Appendix 5).

4.6.2.1 Natural Communities

The primary management for the Reserve will be the single species management for the scrub-jay, management activities will focus on the following scrub-based habitats which are generally characterized by well-drained, often nutrient poor, sandy soils with an abundance of low growing scrub oaks

Xeric Oak Scrub

FNAI ranks scrub habitat as imperiled both in-state and globally (FNAI 2010). Scrub communities tend to be dominated by an understory of scrub oak species and shrubs with or without a closed to open canopy of sand pines (*Pinus clausa*). The most common form is oak scrub is dominated by three species of shrubby oaks – myrtle oak (*Quercus myrtifolia*), sand live oak (*Q*. *geminata*), and Chapman's oak (*Q*. *chapmanii)*. Groundcover, where present, consists of lichens, herbs and subshrubs such as pinweeds (*Lechea* spp.) and jointweeds (*Polygonella* spp.) (FNAI 2010). Common vegetation includes rusty staggerbush (*Lyonia ferruginea*), saw palmetto (*Serenoa repens*), hog plum (*Ximenia Americana*), beak rush (*Rhyncospora* spp.), and milk peas (*Galactica* spp.).

Scrub is a fire-maintained community, but is not easily ignited. Support for the natural fire return intervals in scrub have been inferred from life history traits of the dominant plants and species (FNAI 2010). Oak scrub typically burned naturally at intervals from 3 to 20 years based on the habitat requirements of the scrub-jay.

Sand Pine Scrub

Sand Pine scrub is a variation on Oak Scrub that is dominated by a canopy of sand pine are usually found on the high sandy ridgelines or areas somewhat protected from fire. The canopy can range from short scattered trees to a dense canopy of tall thin trees uniform height (FNAI 2010). The understory is typically composed of the three shrubby oaks and in some areas Florida rosemary.

Sand pine scrub in the peninsula may have naturally burned at intervals of more than 10 years based on the life history of the sand pine and is estimated to burn at intervals from 5 to 40 years.

Rosemary Scrub

Rosemary scrub is a variation on Oak Scrub and is by Florida rosemary. Rosemary-dominated scrubs typically have large areas of bare sand openings between the shrubs, even long after fire and tend not to fill in openings like the oak-dominated scrubs. Herbs favor the sandy openings that are more frequent in rosemary scrub.

Rosemary scrub likely burned at intervals from 10 to 40 years, based on the life history of Florida rosemary, suggested prescribed burn intervals are between 15 and 30 years.

Scrubby Flatwoods

FNAI ranks scrubby flatwoods habitat as imperiled both in-state and globally (FNAI 2010). Scrub
Scrubby flatwoods are generally characterized by an open widely spaced canopy comprised of longleaf pine (*Pinus palustris*) and South Florida slash pine (*Pinus elliottii* var. *densa*). The understory is short and

shrubby consisting of understory of saw palmetto, scrub oaks, rusty staggerbush, fetterbush (*Lyonia lucida*), and tarflower (*Bejaria racemosa*) (FNAI 2010). The shrub layer is also comprised of grasses and dwarf shrubs, along with interspersed areas of bare sand. Vegetation commonly found in this habitat includes: wiregrass (*Aristida stricta* var. *beyrichiana*), broomsedge bluestem (*Andropogon virginicus*), runner oak (*Q. elliottii*), dwarf huckleberry (*Gaylussacia dumosa*), and shiny blueberry (*Vaccinium myrsinites*).

Scrubby flatwoods burns more readily than scrub, as it has more ground cover. Fire intervals greater than 5 years, but less than 15 years are recommended, dependent upon fuel accumulation rates, for maximum acorn production for scrub-jays.

Sandhill

Sandhill is ranked by FNAI as rare globally and imperiled in Florida (FNAI 2010). Sandhill is made up of widely spaced pine trees, an open mid-story and fairly dense ground cover. The canopy is typically longleaf pine or South Florida slash pine; whereas the mid-story is comprised of turkey oak, sand live oak, sand post oak, saw palmetto, dwarf huckleberry, and prickly pear (*Opuntia humifusa*). The herbaceous groundcover includes wiregrass, three-awns (*Aristida* spp.), lopsided indiangrass (*Sorghastrum secundum*), and multiple species of bluestems (*Andropogon* spp.). Forbs and legumes, such as Aster family taxa as narrowleaf silkgrass (*Pityopsis graminifolia*), gayfeathers and blazing stars (*Liatris* spp.), beak pencil flower (*Stylosanthes biflora*), and sensitive brier (*Mimosa quadrivalvis* var. *angustata*) are also found within the ground strata.

Sandhill requires frequent low-intensity growing season fires to maintain open structure; frequency and intensity also influence community structure and species composition. The natural frequency of fire in sandhill is every 1 to 3 years.

Other Natural Communities

Secondary habitats, other than scrub based habitats will be managed biodiversity within their community structures. Other habitats that occur or are likely to occur include:

- Pine Flatwoods
- Xeric Hammock
- Palmetto Prairie
- Wet Flatwoods
- Hydric Hammock
- Freshwater Marsh
- Depressional Marsh
- Salt Marsh

4.6.2.2 Wildlife

The primary focus of land management activities in the Reserve is for habitat improvement for the scrub-jay; however, other species will also benefit from these management activities. Additional management activities may be conducted to further benefit additional species throughout the course of the scrub-jay management.

Scrub-Jay

Scrub-jays are early successional specialists inhabiting frequently-burned xeric communities, without fire the scrub oaks grow too tall and dense for optimal use by scrub-jays. In more mesic scrub, such as that found on the Gulf Coast, fire intervals between 6 to 12 years is required to maintain suitable scrub-jay habitat (USFWS 1999a).

The optimal habitat for scrub-jays contains early successional scrub oaks that are between 3 and 6 feet in height, where the remaining vegetation is shorter and the oak canopy cover exceeds 50%. Over-story, if present should contain less than 1 tree per acre. Open ground with sparse herbaceous vegetation and bare sandy patches should cover between 10 and 50 % of the area (Breininger 2004; Burgman et al. 2001). Various management techniques will be used throughout the Reserve to restore and maintain these conditions.

Gopher Tortoise

The gopher tortoise is currently listed as threatened by FWC and is a candidate species for up-listing with the USFWS. The gopher tortoise is a moderate-sized, terrestrial tortoise averaging 9 to 11 inches in length. The gopher tortoise usually found in upland habitats, such as sandhill, pine flatwoods, scrub, scrubby flatwoods, dry prairies, xeric hammock, pine-mixed hardwoods, and coastal dunes which have historically been maintained by periodic wild fires. Fire suppression in these habitats creates thicker groundcover and mid-story making it difficult for the gopher tortoise to move through the habitat, and shades out the low growing plants that gopher tortoises eat.

The optimal habitat for the gopher tortoise includes upland forested habitats with canopy cover below 60% in order to stimulate production of tortoise forage plants. A diverse herbaceous groundcover strata that including grasses, legumes, and forbs, at 50% or greater that are burned at a 5 year interval or less to stimulate growth of tortoise forage plants (FWC Gopher Tortoise Management Plan 2007). Many of the management techniques and community structural components that will be employed for the scrub-jay will benefit the gopher tortoises within the Reserve.

Eastern Indigo Snake

The indigo snake is a large, iridescent black, non-venomous snake with a variably-colored throat. The indigo snake has been listed as threatened by FWC since 1971 and by the USFWS since 1978. The indigo snake is a habitat generalist, and can be found in several habitat types: pine flatwoods, scrubby flatwoods, high pine, dry prairie, tropical hardwood hammocks, edges of freshwater marshes, agricultural fields, coastal dunes, and human-altered habitats. A matrix of upland xeric habitats interspersed with wetlands improves habitat quality for this species (USFWS 1999). Gopher tortoise burrows are often utilized by indigo snakes for thermal regulation, protection prior to shedding, foraging, nesting, and mating.

Appropriate management to enhance and maintain scrub-jay and gopher tortoise habitat will also benefit the indigo snake while it is utilizing the Reserve. Furthermore, ancillary management of the non-scrubby habitats within the Reserve will also benefit the indigo throughout the various stages of its life cycle.

Florida Bonneted Bat

Although the Florida bonneted bat is known to use a variety of habitat types, not much is known about this species' use of scrub habitat. Because large trees, snags, and palm trees can occur in or adjacent to scrub, the County will survey for the presence of Florida bonneted bats (see Section 4.4, Minimization Measures) before conducting any habitat management activities on reserve lands that could result in damage to potential natural roost sites, such as trees or snags larger than 10 inches dbh (especially if they have cavities or loose bark), or palm trees with dead fronds still attached.

Additional Wildlife

Management of the Reserve has the potential to benefit a variety of additional species. In addition, to the other species that fall under the umbrella of the scrub-jay and gopher tortoise, such as commensals, species that are found outside of the scrub habitats will benefit by the additional management of the non-scrub habitats, as staffing and funding allow.

4.6.2.3 Soils

Scrub habitats occur on well-drained, often nutrient poor, sandy soils. Scrub soils tend to be entisols, with little to no horizonal development derived from quartz sand. There is little or no silt, clay, or organic matter in scrub soils because of its fine texture it is unable to hold water so rainfall and nutrients leach down through the sand, leaving a dry, nutrient-poor substrate. More nutrients are concentrated in the plant biomass of scrubs than in the soils.

4.6.3 Management Needs

The long term management of the Reserve will serve to restore and maintain habitat for the scrub-jay. The techniques and activities outlined in this section will aide in the accomplishment of the HCP Biological Objectives 1, 3, 4 and 8. Within the overall Reserve design management zones will be established based on geographic location. This will allow smaller parcels to be grouped together in larger land management sections and management plans.

Initial processing of parcels as they are acquired will include the following:

- Management zone incorporation
- Habitat mapping
- Changing zoning and land use
- Develop land management plan/update zone land management plan
- Initial habitat assessments
- Identify initial restoration, exotics, mowing, site inspections, and garbage removal "priority schedule"
- Baseline scrub-jay surveys
- Site security

4.6.3.1 Burn Plan

Historically, scrub habitats have been fire adapted for low frequency high intensity fires. The Natural Resources Division will aim for a burn cycles from 5 to 12 years; this is a more aggressive burn interval

than the standard 8 to 15 years as recommended by FNAI due to the quick understory growth for coastal scrubby communities. However, the overriding factor in determining burn cycles will be the vegetation height and density; specifically, to keep the overall vegetation height below 5 to 5.5 feet (FWC Scrub Management Guidelines 2009). These cycles will also vary based on the type of scrub component habitat being burned (i.e., scrub, scrubby flatwoods, rosemary scrub).

General burn plans for all of the scrub component habitats will include mechanical treatment to create ground fuel to carry fire. Whenever weather conditions safely allow, burns will be scheduled and conducted in the growing season rather than winter burns. This will allow for a more historically natural burn regime to help achieve as much ecological function as possible. However, historical burn conditions utilized high winds, low humidity and low fuel moisture (Myers 1990) these conditions, typically in the growing season, may not be compatible with burning the portions of the Reserve that have more residential interface, smoke, and safety concerns. After initial intensive restoration burns, in unoccupied habitat, all burns will attempt to create a mosaic of vegetation heights throughout the management units. Creating this mosaic of vegetation heights will allow for continuous acorn production, provide places to escape from predators, roosting cover, and nesting sites for resident scrub dependent species.

Burning Other Natural Communities

Though scrub component habitats are the management priority there may opportunities, as well as necessity for safety, to prioritize burning non-scrub communities that abut scrub or residential interface areas. These habitats may also provide escape or roosting cover while the scrub habitats are burned. In these cases, the overall burn plan for flatwoods type habitats may include limited mechanical treatment when fuel loads dictate, and a burn cycle of 2 to 4 years as necessary for safety or the benefit of other listed species.

Hydric communities that may occur within the Reserve, depressional marsh, slough, hydric hammock and mangrove swamp, do not have specific burn goals, as they are not considered pyrogenic communities. Fire may run into these communities in the ecotonal areas from the burning of the adjacent communities, thus preventing hardwood encroachment.

4.6.3.2 Mechanical Treatments

Though mechanical treatments are not an ecological substitute for prescribed burning, due to the exclusion of fire and some residential development surrounding portions of the Reserve, mechanical treatments in conjunction with prescribed fire will be a key management tool for the Reserve.

Types of Mechanical Treatments and Goals

Mechanical treatments that may be employed for management include, disking, roller-chopping, mulching, grinding, root-raking, chainsaws, and timbering. Most mechanical treatments, such as roller-chopping, mulching, grinding will be done as preparation for prescribed burning. These techniques will be employed to help create ground fuel to carry fire, create ignition strips, and make burn parameters safer by reducing fuel height.

Chainsaw work and timbering will primarily be used to thin and remove overstory trees, as scrub-jays typically do best in areas with no more than one tall tree per acre (Breininger 2004). To maximize

available space for scrub-jays thinning and overstory removal may also occur in abutting habitats such as pine flatwoods and the wetland edges (FWC Scrub Management Guidelines 2009) where feasible and appropriate. Thinning of both the scrub habitats and portions of the adjacent non-scrubby habitats will also help to maintain the suitability of the habitats by creating longer distances to forested edges.

Disking and root-raking will be used create and maintain fire lines. These treatment techniques also have the ability to create open sandy ground where other mechanical treatments and burning has not achieved the optimal 10 to 50% open ground conditions preferred by scrub-jays.

Mechanical Treatment Best Management Practices

Areas/zones where more intensive development may surround the portions of Reserve will have more prevalent use of mechanical treatments to create safer burn conditions. Mechanical treatments host the ability to negatively impact habitats and require oversight and the employment of best management practices. Whenever feasible and available, the preference for larger equipment will be track vehicles to help prevent soil disturbance. While the effects of soil disturbance on fossorial species and gopher tortoises are a concern, so is the introduction of exotic invasive species into disturbed areas. All mechanical equipment will be required to be cleaned prior to work on each parcel.

Mechanical treatments will primarily be used prior to and in conjunction with prescribed burning. To fully maximize these treatments staff will aim to burn within 3 to 6 months post-treatment (FWC Scrub Management Guidelines 2009). Beyond that additional treatments may be needed to rehabilitate the deteriorating mulch layer.

4.6.3.3 Invasive/Exotic and Feral Species Management

Exotic invasive plant species reduce the quantity and quality of habitat available for native plants and wildlife. The level of exotic invasive vegetation will vary throughout the Reserve. As parcels are acquired they will be evaluated for exotic and invasive species; the first priority for treatment will be Category I on the most current List of Invasive Species from the Florida Exotic Pest Plant Council (FLEPPC) with in the scrub communities, following that will be Category II species throughout the other areas of the Reserve.

Staff will attempt to eradicate nuisance exotics upon discovery. Prevention is the most effective method of control; staff will continually monitor the sites for early detection and control of populations. Currently, efforts to eradicate these Category I species closely parallel the exotic species control plans recommended by FLEPPC. Applications of the most recent treatment recommendations by species are available via the FLEPPC web site http://www.fleppc.org/.

Exotic/Feral Animals

Feral pigs (*Sus scrofa*) are the most prevalent and destructive feral animal within the area of the Reserve. Where feral pigs or rooting are observed, a trapping program will be implemented either with staff or an independent trapper, and potentially breaks in trapping to prevent the pigs from becoming "trap shy".

In areas of the reserve that are near or abut residential areas domestic cats (*Felis catus* spp.) and dogs (Canis lupus familiaris) may be of concern to scrub-jay populations. Feral cats will be trapped and removed, while education of homeowners regarding free-roaming pet cats will be developed.

4.6.3.4 Cooperative Management, Security and Access

Charlotte County staff is committed to working with all interested parties in accomplishing the management goals. Charlotte County has partnered for management activities and staffing support both on County projects and other agency projects with the Florida Forestry Service, the Department of Environmental Protection, South Florida Water Management District, Florida Fish and Wildlife Conservation Commission, and the Charlotte Harbor Environmental Center.

Staff will continue to coordinate activities, including cooperative ventures where we receive and/or provide assistance in mechanical vegetation reduction, prescribed burning, wildlife management and monitoring.

The Parks and Natural Resource Division (Division staff) ultimately has the responsibility for site security, including prevention of vandalism, property damage, unauthorized vehicle access, and trespassing. A three-part approach to site security is employed:

- **Signage and Fencing** – Signs and fencing shall be installed to restrict vehicle access and warn against other restricted or prohibited activities where necessary.
- **Staff** – Division staff will monitor the integrity of the fences, repair damage by vandalism and monitor the Reserve for evidence of ATV use.
- **Sheriff, FWC, Fire/EMS, and FFS** – Shall respond to emergency calls from citizens and investigate illegal activities when necessary.

Activities that that are not compatible with passive natural resource based activities are prohibited. Prohibited activities include alcoholic consumption, camping, hunting (except for the contracted removal of exotic and/or nuisance animals), harassing of wildlife, harvesting, destruction and/or removal of vegetation, any other activity that may have a negative impact on visitors, wildlife and/or the ecosystem.

Due to the smaller nature and proximity to residential development not all portions of the Reserve will be open to the public for passive recreation. As parcels are acquired, initial site security will include the following:

- Determination of areas suitable for public access and recreation
    - Identify any recreational improvements, such as trails
- Perimeter fencing will be installed on all parcels over 20 acres
    - Parcels under 20 acres may be fenced if trespass or damage issues arise
- Heavy duty gates will be installed on parcels over 20 acres without public access
    - Standard aluminum gates will be installed on parcels with public access
- Signage identifying the area as being preserved for listed species will be installed

4.6.3.5 Staffing and Funding

Charlotte County Parks and Natural Resources Division is comprised of the Natural Resources Manager, 4 environmental specialists and 2 program assistants that will provide staffing, management, and maintenance for the Reserve. A full time Environmental Specialist will be assigned to oversee and be directly responsible for coordination of all land management activities in the Reserve. Assistance from other Environmental Specialists and additional Community Services Department staff will be available as needed and the support of the Division Manager and other administrative positions will be available. As part of the overall funding mechanism approved by the Charlotte County Board of County Commissioners, an additional field staff position is included to oversee the implementation of the HCP and the long term management of the Reserve.

4.6.4 Monitoring and Reporting

Charlotte County will prepare and provide an annual HCP Report to the USFWS for the duration of the thirty year ITP. Once the ITP has expired, reports will be provided every 5 years. The report will be supplied annually by September 15. The monitoring activities outlined in this section, will aide in the accomplishment of the HCP Biological Objectives 1 & 7.

4.6.4.1 Baseline data

The 2009 Quest survey data used for the population viability analysis along with the historical data from 1992, 2001/2002 and the data points provided to Charlotte County by USFWS during our annual review will be considered the baseline data for both the County-wide population and the initial Reserve population.

As parcels are acquired initial scrub-jay surveys will be conducted to determine if the property is occupied, how many individuals are in the family group and the extent of the family group territory. During the initial habitat assessments (Section 4.0), general baseline habitat characteristics will be recorded including: habitat type, overgrowth, disturbance, and exotics. More detailed monitoring will take place as plots are established.

4.6.4.2 Scrub-Jay Monitoring

Scrub-jay monitoring in all occupied areas will be performed on a rotating basis so that the entire Reserve is covered over a 5-year period. Surveys will be conducted according to the most current standard scrub-jay survey protocols. Surveys will be conducted during either pre-nesting season (February) or post-fledging season (July) depending on enough suitable weather days as outlined in the survey protocol to cover that year's section of the Reserve. In addition to the rotating monitoring schedule, monitoring of transloclated scrub-jays will be conducted in accordance with the most current USFWS translocation guidelines.

4.6.4.3 Habitat Assessment Monitoring

Habitat monitoring for all scrub component habitats will be performed on a rotating basis so that the entire Reserve is covered over a 5-year period. In addition to the rotating monitoring schedule, a monitoring event will occur in a given management unit both prior to a management activity and 9

months post management. This will help to gauge the effectiveness of given management activities and techniques, thus allowing for adaptive management throughout the Reserve.

Details during monitoring events will include representative 10 meter2 plots in scrub component habitats. Random plots will be selected for photo points, and monitoring events will take place during the fall (October through November). Data collected during monitoring events will include:

- % Pine canopy coverage
- Average canopy height
- % Oak coverage
- Average oak height
- % Shrub coverage
- Average shrub height
- % Open/bare sand
- Dominant species
- Number of species observed
- Any Species of note
- % Exotic coverage

4.6.4.4 Monitoring Outside the Reserve

Long term scrub-jay population monitoring outside the review area will need to be conducted to assess the take and overall County population decline. Full County-wide surveys will be conducted every 10 years for the duration of the 30-year ITP. At the 5-year mark, targeted surveys will be conducted in areas where building has occurred, as determined by permits that have been issued. Presence/absence surveys will be conducted according to the most current standard scrub-jay survey protocols, utilizing baseline data (Section 5.1) as starting locations.

4.7 Adaptive Management

Adaptive management is the systematic acquisition and application of reliable information to improve natural resource management over time (Wilhere 2002), and is required by the USFWS to be a part of all current HCPs. Adaptive management allows monitoring and research to be incorporated into long-term management and restoration by establishing cause-and-effect relationships and thus providing a basis on which to make management decisions. Subsequently, management plans that come from HCPs are not set in stone and can be altered based on the needs of the habitat or species being covered. For example, if monitoring programs indicate fire regimes are not meeting the biological goals of the HCP, the frequencies can be changed in order to meet those biological goals or objectives.

The proposed monitoring program includes methods for tracking the success of management and restoration activities and the status of HCP implementation overall. An adaptive management strategy that employs the data produced from each monitoring event will be utilized to determine when monitoring or management techniques may need to be adjusted to ensure a more successful project. The data to be collected from monitoring events is outlined in Section 5.3. Monitoring events will take place on a regular 3 year rotating basis as well as immediately prior to a management event and 9 months post-management event. The results of these monitoring events will then be compared to the goals of the management unit based on optimal scrub habitat conditions and restoration goals allowing

for changing in cycles, timing and technique of future management events within a given management unit. The results of long-term monitoring will be used as needed to refine and enhance ongoing management activities throughout the Reserve. An adaptive management policy allows the land manager to react to changes observed within the restoration areas that may affect the achievement of optimum conditions for scrub-jays. Only translocated birds will be color banded, therefore the remaining scrub-jay populations will be monitored utilizing scrub-jays survey techniques as described by Fitzpatrick et al. 1991. The data from these surveys will be evaluated to determine group size and territory boundaries and as described in Breininger 2004 can be correlated by habitat quality and compared with literature standards to determine basic recruitment and mortality.

Adaptive management will also address other compliance and implementation issues that may arise under the HCP in the future. A review of the status of parcel acquisition goals will be conducted every five years to determine whether this program is on track. Contingency plans will be prepared and implemented if it appears that compliance with HCP goals are not being realized. Many of these parcels are in private ownership and although most are in relatively good condition to support scrub habitat in the future, there is no guarantee that they won't be developed or altered in some way as to make them less desirable. The County will implement the five year reevaluation process to track this and determine which parcels may no longer be available or desirable and adjust the composition of the Reserve accordingly. The parcels slated for acquisition within the Reserve may need to be updated to reflect these changes, or focus may need to shift to other parcels that are available and that are also important to future scrub-jay viability. This may include potential scrub-jay habitat located immediately adjacent to existing public lands outside of the east county focus area.

Adaptive Management may also be implemented to address regulatory changes, such as the listing of the gopher tortoise or Florida bonneted bat, or the designation of critical habitat, under the ESA. Currently the County plans to comply with existing State guidelines for the protection of the gopher tortoise throughout the County. As parcels are acquired in the Reserve, the County will use the habitat evaluation process to determine if the site is suitable and has capacity or the potential for capacity to be permitted for a long term gopher tortoise recipient site through FWC. Should the gopher tortoise be listed by the USFWS during the life of this permit, the HCP and ITP may be modified to include coverage for this species within the Plan Area and the County will have potentially already permitted recipient sites through FWC. If the Florida bonneted bat is listed or critical habitat is designated pursuant to the ESA during the life of this permit, and it appears that the activities covered under this HCP could potentially impact the species, or result in destruction or adverse modification of critical habitat, Charlotte County will confer with the USFWS to determine if the HCP and the ITP should be modified, or if other measures are appropriate.

It is expected that climate change has the potential to dramatically alter the character of habitats and ecosystems over the next century. These changes may have implications for management of the Reserve, as the lands may face increased development pressure, increased urban interface, and changes in vegetative structure (Section 7.4). How Charlotte County addresses climate change with respect to management practices within the Reserve will be addressed during the 5 year reviews with the USFWS.

5.0 Economic Analysis and Funding Program

For an Incidental Take Permit (ITP) to be issued, the federal Endangered Species Act (ESA) requires that the Applicant demonstrate and provide funding assurances in the HCP that it can fulfill the obligations of

the ITP.[1] Such a requirement is an important component of any HCP because the underlying goals and objectives of the plan cannot be attained and proposed conservation strategy cannot be implemented without adequate funding. As such, the proposed funding program outlined in this section will play a vital role in the successful implementation and long-term viability of the Charlotte County Scrub-Jay HCP. Through an ESA Section 6 Planning Grant from the USFWS for $90,000 Charlotte County hired an economic consultant for the phase 2 development of the HCP, to conduct the economic analysis.

This section presents the findings of the economic and funding analysis. The key objectives of this analysis are to estimate the range of costs associated with the implementation of the HCP and to establish the financial framework that would be used to offset these costs. Section 5.1 describes the conceptual approach to the analysis, including an overview of the methodology used, assumptions, and data sources. Section 5.2 presents planning-level cost estimates for the various actions and activities associated with implementation of the HCP. Section 5.3 evaluates development projections and trends in Charlotte County, which provides the context for future impacts on scrub-jay habitat. Section 5.4 presents HCP funding requirements and outlines alternative structures for the HCP funding program, including development fees, which can be used in conjunction with other public funding sources to finance the plan. It also presents an adaptive fee mechanism to account for fluctuating HCP implementation costs over time and addresses the framework for managing the financial resources associated with the HCP. Section 5.5 compares the costs and benefits of the proposed HCP relative to the existing statewide Florida Scrub-jay Umbrella HCP in effect in Florida in an effort to assess conditions with and without the proposed HCP.

5.1 Conceptual Framework

The conceptual framework used in the development of the economic and funding analysis can be organized into several key components, including the types of costs included in the analysis and the quantitative model used to estimate funding mechanisms to support the plan. In addition, because the proposed HCP conservation strategy accounts for existing scrub-jay habitat that is protected as part of other conservation programs, the conceptual framework also addresses how these other public lands factor into the economic and funding analysis. Key assumptions are also noted throughout this section where applicable.

5.1.1 Funding Model

A comprehensive spreadsheet model was developed to track costs and funding requirements associated with HCP implementation over the 30-year permit term; it also covers post-permit activities that will require a long-term endowment fund. The model uses a set of linked Microsoft Excel worksheets, which take into account HCP conservation requirements, including the proposed Reserve design, to generate a set of cost estimates at the individual parcel level, organized by the categories outlined above. Based on anticipated implementation costs, the model estimates funding requirements, including a long-term endowment fund, which have been filtered through various potential funding options, including development fees and conservation-related assessments. Ultimately, the decision was made by the Charlotte County Board of County Commissioners to utilize development fees to fund the HCP; therefore, this approach is the focus of the funding analysis presented here. Detailed tables covering the cost and funding estimates and analytical assumptions are presented in Appendix 6.

[1] Section 10 (a)(2)(B)(iii), Federal Endangered Species Act

5.1.2 Cost Estimates

The economic and funding analysis covers the cost of conservation activities that would be required as part of HCP implementation. These cost estimates are based on the best information available at the time the analysis was completed, including specific parameters that outline the anticipated implementation of the HCP. These parameters include the estimated impacts of future development and related habitat mitigation requirements; physical characteristics of the proposed Reserve system; anticipated management and monitoring activities; and the proposed implementation structure for the HCP. Specifically, costs associated with implementing the HCP are organized into the following categories, which are summarized below:

- Land acquisition and reserve development;
- Habitat assessment, planning, and restoration;
- Habitat management and maintenance;
- Monitoring and adaptive management;
- Changed circumstances; and
- Plan administration and staffing

The cost estimates used in the model were developed through close interaction with County staff that has experience in scrub-jay management through ongoing conservation programs. These estimates were reviewed in the context of other scrub-jay conservation program in the state, literature reviews, independent research, and professional judgment by biological and restoration staff with experience in scrub-jay management. HCP implementation costs are generally based on average unit costs, which are applied to the applicable "unit" of conservation anticipated under the plan; for example, average per-acre land values are applied to the number of acres of land required to develop the proposed Reserve to calculate land acquisition costs. The unit values used in the model represent the planning-level estimates, which will be adjusted to reflect real-world costs after Plan implementation begins and actual cost data are available. In addition, to account for uncertainties, contingencies have been added to the costs to help protect against short-term cost overruns. A general contingency of ten (10) percent is included in the cost model for all categories, except changed circumstances, which in essence reflects a management cost contingency. For this analysis, contingencies have been set at modest levels to reflect the fact that the proposed funding program has a fee adjustment program built in which allows for adjustments to cover changing economic conditions.

5.1.3 Proposed Scrub-Jay Reserve

At the core of the HCP conservation strategy is the development of the proposed reserve in (Figure 4.1). The acquisition and management of properties comprising the proposed Reserve represent the cost basis for this analysis. The overall size of the proposed Reserve is 4,496 acres, which includes public lands throughout the county and private to be acquired, primarily in eastern Charlotte County. Private lands in the proposed Reserve total approximately 1,336 acres. In accordance with conservation guidelines for the HCP, it is assumed that approximately 50 percent of these private lands would be conserved within the first 10 years of the plan.

Another point to note is that the proposed Reserve generally does not follow property boundaries. For this analysis, it is assumed that parcel will be acquired in their entirety, even though some areas are located outside the Reserve. As a result, land acquisition requirements are greater than the extent of

private property in the proposed Reserve. This surplus land would not require active management for scrub-jays.

In addition, there are also a number of properties identified as part of the proposed Reserve that are in public ownership and/or already managed for the purpose of scrub-jay conservation. Because these properties would become part of the proposed Reserve, they are integrated into the economic and funding analysis with the exception of up-front costs, including land acquisition and initial site improvements and habitat enhancements. Ongoing habitat management and monitoring cost of the scrub habitats on these public lands are included in HCP costs, and it is assumed that such management will be consistent with the HCP conservation programs outlined in Section 4.0. Specifically, the following properties are included in the analysis:

- Amberjack Environmental Park (102 acres); owner: Charlotte County
- Biscayne Trust conservation easement (75 acres); owner: easement granted to Charlotte County
- Burchers Tract conservation easement (311 acres); owner: SWFWMD
- Deep Creek (140 acres); owner: Charlotte County
- Hathaway Park (20 acres); owner: Charlotte County
- Prairie Creek Preserve (1,562 acres); owner: Charlotte County
- Rotunda Mitigation Area (34 acres); owner: Charlotte County
- San Casa Environmental Park (67 acres); owner: Charlotte County
- Shell Creek Preserve (367 acres); owner: Charlotte County
- Tippecanoe Environmental Park (300 acres); owner: Charlotte County
- Tippecanoe II Mitigation Area (183 acres); owner: Charlotte County

In total, approximately 3,160 acres of public lands within the proposed Reserve are currently managed for scrub-jay conservation; this represents about 70 percent of the total size of the proposed Reserve.

5.1.4 Development Assumptions

The estimated cost of the HCP will be covered in its entirety by development fees on undeveloped lots located within the scrub-jay review area, which has been established by USFWS using an 850-foot buffer surrounding scrub-jay populations in the County. In total, approximately 18,000 undeveloped lots would be subject to future development fees that, which would be levied at the time of development. For this analysis, costs have been allocated to all lots in the regulated area using a tiered-fee system (based on lot size), which assumes full build-out of these lots over the 30-year permit term.

5.2 HCP Costs

This section presents more detailed information on the various costs associated with implementation of the proposed HCP, including: land acquisition and Reserve development (Section 5.2.1); habitat assessment, planning, and restoration (Section 5.2.2); habitat management and maintenance (Section 5.2.3); monitoring and adaptive management (Section 5.2.4); changed circumstances (Section 5.2.5); and plan administration (Section 5.2.6). A summary of HCP implementation costs is presented in Section 5.2.7.

5.2.1 Land Acquisition

Land acquisition represents the largest component of cost for the proposed scrub-jay HCP. As outlined above, the creation of the proposed Reserve will require acquisition of approximately 1,810 acres of private lands, which include 1,336 acres within the Reserve boundary and 474 acres outside the Reserve. In addition, land acquisition costs also include transaction-related expenses, such as appraisals, title insurance, and other closing costs. Information on regional land values and representative transaction costs are presented below.

5.2.1.1 Land Values

Generally, land values in Charlotte County increased in the early- to mid-2000s during expansion in the local housing market, but have declined substantially in recent years due to the downturn in the real estate market. Rapid appreciation and/or depreciation in land values can pose a problem for HCP implementation due to the lag between the time that funding becomes available and land is acquired; accordingly, the flexibility to adjust fees to reflect current land values is an important component of the HCP funding program and is discussed in more detail in Section 5.4.4.

Estimates of current land values for properties located within the proposed Reserve were developed in part using information on recent sales of undeveloped land in eastern Charlotte County and just value of land in the proposed Reserve (as maintained by the County Assessor); however, due to the limited activity in the local real estate market in recent years, this information was augmented by insight on market trends and professional judgment. It is assumed that all private land would be acquired at fair market value. In the context of habitat conservation, fair market value also takes into consideration the habitat value of the properties located within the proposed Reserve.

5.2.1.1.1 Fee-Simple Land Values

The preferred approach to land acquisition is fee-simple purchase of private property in the proposed Reserve; therefore, fee-simple land values represent the starting point in estimating land acquisition costs. Generally, land values, expressed in dollars per acre, are influenced by a number of factors including, but not limited to existing and future land use, parcel size,[2] and proximity to amenities.
Overall, the market value of land in proximity to the proposed Reserve is relatively uniform. Current land values range from approximately $6,000 to $10,000 per acre for most of the Reserve properties, with the exception of properties with proximity or frontage to Highway 17, which are valued substantially higher at about $20,000 per acre. To calculate HCP costs, the mid-point in the ranges were used, in conjunction with the assumption on habitat value premiums.

[2] Generally, smaller parcels tend to have higher average per-acre values compared to larger parcels. Smaller parcels are typically in closer proximity to development pressure, which has an influence toward higher land values. Further, larger parcels are generally characterized by a different type of real estate market, one where the focus is on agricultural and rural residential uses, which have lower per-acre values compared to urban real estate markets. Also, there is a smaller pool of buyers, and therefore demand, for large parcels of land; as a result, prices tend to be lower.

5.2.1.1.2 Conservation Easement Values

Although the goal of the HCP is fee-simple acquisition of all lands in the proposed Reserve, in some cases, there may be the need or desire to acquire interest in land via conservation easements[3] instead of fee title. The use of conservation easements provides opportunities to preserve the habitat value of the land, while minimizing costs. For this analysis, it is conservatively assumed that all land would be acquired in fee-simple; however, information on the potential cost savings associated with the use of conservation easements is presented below for context.

The cost of acquiring a conservation easement on a property is driven by the extent of property rights that are retained by the landowner and management requirements, which vary on a case-by-case basis. Insight on approximate cost-savings is provided by land acquisitions under the Florida Forever Program.[4] Between 2001-2002 and 2010-2011, a total of 203,587 acres of land were acquired in fee-simple at a cost of $745.2 million, or about $3,660 per acre. During that same period, conservation easements on 64,383 acres were acquired at a cost of $69.9 million, or $1,085 per acre. Based on these figures, the cost to obtain conservation easements is approximately 30 percent of fee-simple value.

Conservation easements that are pursued as part of this HCP will reviewed and approved by USFWS prior to execution, until a template has been established and agreed upon by USFWS and the Applicant.

5.2.1.2 Transaction Costs

A number of transaction costs are associated with the land acquisition process, whether it be fee title or conservation easement. Typically, these costs are part of the due diligence process and may include commissions and legal fees, title searches and insurance, and appraisals. Depending on the property being acquired, other types of transaction costs can include items such as Phase 1 Environmental Assessments. Transaction costs can be estimated using per-acre or per-transaction costs. The latter is preferred as most of these costs are not driven by the size of the property being acquired. For this analysis, estimates of transaction costs are based on representative per-transaction expenses incurred by Charlotte County as part of their prior land acquisitions. Overall, transactions costs are estimated at $2,000 per transaction. This unit cost is applied to the total number of transactions required to establish the proposed Reserve. It is conservatively assumed that each parcel acquired would generate incremental transaction costs.

5.2.1.3 Summary of Land Acquisition Costs

The cost to acquire land to establish the HCP Reserve was calculated by multiplying the number of acres of land that would be acquired by average per-acre land values plus transaction costs and contingencies. Overall, the total estimated land acquisition cost for the HCP is approximately $18.7 million for approximately 1,810 acres of private land (excluding contingency costs); this equates to an average cost of about $10,300 per acre. With contingencies, land acquisition costs are an estimated $20.6 million,

---

[3] A conservation easement refers to a legally enforceable land preservation agreement that transfers certain use rights on a property from a landowner to a qualified land protection organization, typically restricting future urban development on the property. These restrictions remain with the property in perpetuity. The landowner who relinquishes these development rights continues to privately own and manage the land subject to easement restrictions.

[4] Florida Senate, Issue Brief 2011-201 (October 2010)

which account for about 53.7 percent of total HCP costs over the 30-year permit period and 36.7 percent of total HCP costs, including the long-term endowment fund.

5.2.2 Habitat Assessment, Planning, and Restoration

Once properties are acquired, the Implementing Entity would be responsible for a range of conservation-related activities on private lands in order to integrate the land into the Reserve. These up-front activities would typically be implemented within the first year after acquisition, and therefore, are classified as one-time costs; however, some management activities would be continued at periodic intervals during and after the permit term, albeit at less intensive levels. The types of initial habitat planning and enhancement activities considered here include: biological assessments, development of habitat-level management plans, initial site improvements (e.g., boundary surveys, fencing and gates, signage, parking, and trail clearing), invasive species removal, general habitat restoration and enhancements, and translocation of scrub-jays.

5.2.2.1 Biological Assessments

The biological assessment and inventory would document existing biological conditions on the property and provide the foundation for determining parameters to be included in the management plan. While the costs of conducting the biological assessment and inventory would vary by habitat conditions and location, it is estimated that the average cost of these activities is approximately $125 per acre.

5.2.2.2 Management Plans

Using information developed as part of the biological assessment, property-specific management plan would be developed for all lands in the proposed Reserve. The management plans will describe how lands within the Reserve will be managed to ensure the long-term viability of the Charlotte County scrub-jay population. Representative components of the management plan would address topics such as invasive species control, prescribed fire measures, and other management issues. These plans would be updated periodically (with the costs associated with plan updates included under ongoing management presented below). It is anticipated that management plans would be developed for property “groups” rather than at the individual parcel level. In total, management plans would be developed for the 17 property groups outlined in Section 5.1.3 at an estimated cost of $2,000 per plan.

5.2.2.3 Site Improvements

Most private lands would undergo varying levels of site improvements upon acquisition, such as removal of degraded facilities, repair and replacement of gates, installation of signage and new fencing, and development of parking areas and trails to facilitate public access. Although the extent of the improvements needed is dependent on condition of the property at the time it is acquired, the HCP's cost estimates are based on the average unit costs and assumptions on the extent of improvements on properties. In addition, some costs related to the provision of public access are limited to select properties rather than the entire Reserve. The following unit costs are used in the funding model:

- Boundary surveys: $75/acre
- Fencing, new: $2.00/linear foot
- Fence removal: $2.00/linear foot
- Gates, new: $150/gate

- Signage: $1,080/site
- Parking area: $7.75/ton
- Trail clearing and mulch: $4.80/linear foot

5.2.2.4 Habitat Restoration and Enhancement

A range of initial habitat restoration and enhancement activities would be implemented on private lands acquired as part of the Reserve. Representative activities include invasive species removal (both mechanical and herbicides), as well as general habitat improvements, such as supplemental plantings. Average unit costs used in the funding model include:

- Habitat restoration and enhancement, general: $130/acre
- Invasive species removal, mechanical: $2,250/acre
- Invasive species removal, herbicide: $725/acre

Not all of the land area would require these habitat improvement measures, nor would it be cost-effective to do so. Therefore, for this analysis, it is assumed that 20 percent of the entire land area on properties acquired would be subject to habitat improvements once properties are acquired even though the entire land area may not be scrub habitat. Invasive species control measures would continue as part of ongoing habitat management at regular intervals, but on a more limited scale.

5.2.2.5 Scrub-Jay Translocation

To facilitate scrub-jay recovery, there will likely be the need to translocate scrub-jays to Reserve properties. The number of translocation events is unknown. For this analysis, it is assumed that 20 translocation events would occur throughout the Reserve. The average cost of scrub-jay translocation is approximately $75,000 per event.

5.2.2.6 Summary of Habitat Assessment, Planning and Restoration Costs

The total cost of initial habitat assessment, planning, and restoration activities is estimated at $3.4 million over the 30-year permit term; this equates to an average cost of about $1,575 per acre for private lands and $314 per acre for existing public lands. Costs associated with habitat enhancement account for about 8.9 percent of HCP costs over the permit period and 6.1 percent of total HCP costs.

5.2.3 Habitat Management and Maintenance

All Reserve lands would be subject to active management and maintenance activities. Ongoing costs associated with Reserve management and maintenance activities include capital expenditures on equipment, materials and infrastructure improvements; maintenance of facilities; invasive species control; and vegetation management. It also includes periodic updates to management plans.

5.2.3.1 Management Plan Updates

As described in Section 5.2.2.2, management plans will be developed on each individual property group that would be acquired to establish the Reserve. Due to changing conditions, updates to these

management plans would be required. It is assumed that the plans would be updated every 10 years at a cost roughly approximate to 50 percent of the initial plan cost, or $1,000 per plan.

5.2.3.2 Facility Maintenance

Facility maintenance activities would include, but not limited to, fence and gate repair and trail maintenance. Average unit costs for these activities used in the funding model are:

- Fence and gate repair: $0.90/linear foot
- Trail maintenance: $4.80/linear foot

It is further assumed that fence and gate repair would occur at 20-year intervals on all properties. Trail maintenance on select properties would occur annually.

5.2.3.3 Invasive Species Control

There are multiple approaches to invasive species control, which are outlined in Section 5.2.2.4, including mechanical removal of exotic species and use of herbicides. Over the long term, these invasive species control measures would be implemented at five-year intervals and would be applied to approximately 10 percent of the land area within the Reserve (cost is assumed at treatment for 100% coverage). The same unit costs listed in Section 5.2.2.4 apply to routine management of lands within the Reserve.

5.2.3.4 Vegetation Management

In addition to invasive species control, other vegetation management techniques would be applied on land within the Reserve. These techniques would include mechanical treatment (e.g., mowing) and prescribed burning. Average unit costs for these activities used in the funding model are:

- Mechanical treatment: $24/acre
- Prescribed burning: $32/acre

It is assumed that mechanical treatment would occur every four years and cover approximately 20 percent of land area on any given property. For prescribed burning, an approximate six-year interval is assumed and would cover the Reserve properties in their entirety.

5.2.3.5 Summary of Habitat Management and Maintenance Costs

Total management costs over the 30-year permit term, including contingencies, are an estimated $10.6 million. On an annual basis, management costs range from about $288,600 in year 1 to $402,200 in year 30, increasing incrementally as private land is added to the Reserve. This is equivalent to average annual management cost of approximately $89 per acre. During the post-permit term, management costs are expected to continue at about $402,200 annually, which would cover long-term O&M expenditures, and would be covered by an endowment fund.

5.2.4 Monitoring and Adaptive Management

Habitat monitoring and adaptive management apply to all new lands acquired within the proposed Reserve. Applicable protocols, including the timing and frequency of monitoring activities, are outlined in detail in the HCP monitoring and adaptive management program described in Section 4.5. For this analysis, monitoring costs are estimated at approximately $30 per acre on newly-acquired properties and $10 per acre on existing public lands, excluding contingency costs. Total monitoring costs over the 30-year permit term, including contingencies, are an estimated $615,600, increasing from about $16,700 in year 1 to $23,300 by year 30 as land is added to the Reserve. Long-term monitoring costs beyond the permit term are expected to remain stable and would be covered by an endowment fund.

5.2.5 Changed Circumstances

The HCP funding program is required to account for costs associated with the Plan's defined Changed Circumstances (Section 7.2). Due to the uncertainty inherent in Changed Circumstances, it is not possible to forecast the frequency and magnitude of these events in the Plan Area with sufficient precision. As such, for this analysis, it was assumed that the cost of remedial measures to address Changed Circumstances would be approximately 10 percent of the total management budget (in perpetuity) as described in Section 5.2.3. No additional contingencies are considered. Total estimated cost to address Changed Circumstances in the Plan Area is $966,500 over the permit term and almost $36,600 annually over the long run.

5.2.6 Plan Administration

Plan administration costs represent standard operating costs that would be incurred by the Implementing Entity, i.e., Charlotte County, during implementation of the HCP. The primary source of administrative costs is expected to be staffing as dedicated staff time will be required to process permit applications and ensure HCP compliance. Office-related and other miscellaneous expenses would also likely be incurred. Because the Implementing Entity would continue to manage the HCP Reserve after the permit term expires, these costs would continue in perpetuity. Estimates of plan administration costs are based on the HCP implementation strategy (see Section 7.0) and budgetary information from other conservation programs implemented by Charlotte County.

Staffing costs include salaries and benefits for County employees working on the administrative aspects of the HCP. Labor costs associated with most habitat enhancement, management, and monitoring activities are excluded from administrative cost as these activities are assumed to be undertaken primarily by outside contractors.

Office expenses include, but are not limited to, computers, other IT equipment and software, supplies, communications, copying and printing, and postage. Office expenses attributed directly to employees, such as computers, are based on staffing requirements over time. There are no costs associated with office space and furniture as the Implementing Entity would utilize existing County offices.

Miscellaneous administrative costs include, but are not limited to, costs associated with insurance (liability and vehicle), accounting, legal review, travel, vehicle leasing, conferences and training, public outreach, and expenses associated with management of subcontractors.

Overall, it is estimated that annual administrative costs for the HCP would be approximately $65,000 annually, excluding contingencies, and would remain relatively constant over the permit term and into perpetuity. Over the 30-year permit period, administrative costs total over $2.1 million. Long-term administrative costs beyond the permit term would be covered by an endowment fund.

5.2.7 Summary of HCP Costs and Funding Requirements

A summary of HCP implementation costs is presented in Table 5-3 and Table 5-4. The cost estimates include both short-term (capital) and long-term (operational) costs. Capital costs represent one-time costs for land, infrastructure or major equipment, while operational costs are ongoing costs that would extend beyond the permit term. The costs presented in these tables represent the total funding requirements for implementation of the HCP.[5]

Table 5-1 shows costs across the various cost components outlined above over the 30-year permit term, as well as long-term costs during the post-permit period. The total cost of the HCP over the permit term is estimated at almost $38.4 million, which equates to an average annual cost of nearly $1.3 million per year. Over the long-term (extending into perpetuity), the Reserve would require ongoing expenditures for long-term habitat management, monitoring, and Plan administration totaling about $533,500 annually. Land acquisition represents the largest cost component during the permit term (nearly 54 percent of total cost), while about 75 percent of costs after the permit term would be attributed to habitat management.

Table 5-1: HCP Cost Summary by Component

	Permit Term		**Post-Permit Term** [1]	
Cost Component	**Total Cost**	**Percent**	**Average Annual Cost**	**Percent**
Land Acquisition	$20,608,800	53.7%	$0	0.0%
Habitat Assessment, Planning & Restoration	$3,406,500	8.9%	$0	0.0%
Habitat Management	$10,631,300	27.7%	$13,405,900	75.4%
Monitoring & Adaptive Mgmt	$615,600	1.6%	$776,200	4.4%
Changed Circumstances	$966,500	2.5%	$1,218,700	6.9%
Plan Administration	$2,145,000	5.6%	$2,383,300	13.4%
Total	**$38,373,600**	**100.0%**	**$17,784,200**	**100.0%**

[1] Requires non-wasting endowment to cover costs beyond the permit term

A summary of HCP implementation costs over time is presented in Table 5-2. The cost information is organized into five-year increments over the 30-year permit term; costs anticipated after the permit term are presented as average annual values. As expected, costs would increase incrementally as land is added to the Reserve, thereby increasing expenditures for habitat management and monitoring.

[5] The post-permit costs, however, do not represent the endowment required to fund implementation of the HCP in perpetuity; more information on the endowment fund is presented in Section 5.5.6.2.

Table 5-2: Summary of Plan Implementation Costs over Time

Cost Component	Total Cost per Period (5-Year Increments)							Total (Permit Term)	Annual Ave (Permit Term)	Annual Ave (Post-Permit)
	0	**1-5**	**6-10**	**11-15**	**16-20**	**21-25**	**26-30**			
Land Acquisition	$0	$5,152,200	$5,152,200	$2,576,100	$2,576,100	$2,576,100	$2,576,100	$20,608,800	$687,000	$0
Habitat Planning and Enhancement	$0	$871,300	$845,000	$422,500	$422,500	$422,500	$422,500	$3,406,500	$113,500	$0
Habitat Management and Maintenance	$0	$1,503,000	$1,652,400	$1,756,900	$1,831,600	$1,906,300	$1,981,000	$10,631,300	$354,400	$402,200
Monitoring and Adaptive Management	$0	$87,000	$95,700	$101,700	$106,100	$110,400	$114,700	$615,600	$20,500	$23,300
Changed Circumstances	$0	$136,600	$150,200	$159,700	$166,500	$173,300	$180,100	$966,500	$32,200	$36,600
Plan Administration	$0	$357,500	$357,500	$357,500	$357,500	$357,500	$357,500	$2,145,000	$71,500	$71,500
TOTAL	**$0**	**$8,107,700**	**$8,253,000**	**$5,374,500**	**$5,460,300**	**$5,546,100**	**$5,631,900**	**$38,373,600**	**$1,279,100**	**$533,500**

5.3 Development Trends and Projections

Future impacts on existing scrub-jay habitat areas and revenues raised from the compensatory mitigation on new development in these areas will depend on amounts and types of development occurring in these habitat areas over time. For this analysis, it is assumed that the cost of the HCP will be allocated to all 18,000 lots within the Scrub-Jay Review Area (i.e. full build-out); however, it is useful to balance this assumption with development trends and projections within Charlotte County as presented below.

This analysis of development trends and projections of urban growth in Charlotte County provides a framework for assessing future impacts on existing scrub-jay habitat. Shares of future growth likely to occur in existing habitat areas, as opposed to other areas of the County, will depend on these factors:

- Amount of developable land and platted lots in habitat areas in the County urban service area versus non-habitat areas.
- Comparative costs of development in habitat areas versus non-habitat areas, considering the cost of habitat mitigation (i.e., fees assessed on new development) and lot/land costs.

The County's 2010 Evaluation and Appraisal Report (EAR) shows a total of more than 108,000 vacant lots in the Urban Service Area, including more than 102,000 residential lots. The desirability and marketability of these for new development and numbers in designated habitat mitigation areas are, at present, unknown. To the extent that there are ample developable lots and other developable lands to accommodate future growth in the Urban Service Area that would not be encumbered by the need for compensatory mitigation, and lot/land costs are otherwise comparable, future development in habitat areas may occur at a slower rate than county-wide projections; however, the proposed fee structure under the county-wide HCP would minimize the financial deterrent of building in scrub-jay habitat and with the relative suitability of developable land within scrub-jay habitat, it is plausible that development rates in these areas would be comparable to other parts of Charlotte County.

5.3.1 Residential Growth Trends

Housing is the largest consumer of urban land in Charlotte County, occupying over 60,000 acres of land, as indicated in the 2010 EAR report. In the twelve years since and including year 2000, permits were issued for an estimated 23,842 new housing units (see Table 5-3). Seventy percent of these were for single family homes, the largest consumer of urban land, with lots ranging from less than a quarter-acre to more than an acre. Eighty-two percent of all housing units and 89 percent of single family homes were permitted in unincorporated areas of the County. The City of Punta Gorda accounted for all other housing units permitted.

The number of new housing units permitted annually over the past twelve years averaged slightly less than 2,000 (see Table 5-3). Annual activity, however, varied widely and wildly from a high of 4,694 units in 2005 to a low of only 296 units in 2009. Annual permit activity in the first four years of the decade (2000-2003) was relatively constant at around 2,000± units per year. Activity picked up dramatically from 2004 through 2006, averaging more than 4,200 units yearly, the height of what was to become the housing bubble. The bubble burst beginning in 2007, and the housing market hit bottom in 2008, where it has stayed since, averaging only 370 new units permitted annually for the past four years.

Table 5-3. Charlotte County Housing Permit Trends, 2000-2011

Year	Total County			Unincorporated Area		
	SF Units	MF Units	Total	SF Units	MF Units	Total
2000	1,211	459	1,670	614	366	980
2001	1,529	597	2,126	1,245	183	1,428
2002	1,589	403	1,992	1,397	246	1,643
2003	1,953	569	2,522	1,804	375	2,179
2004	2,331	1,321	3,652	2,207	1,090	3,297
2005	2,902	1,792	4,694	2,539	916	3,455
2006	3,052	1,283	4,335	2,985	1,109	4,094
2007	932	438	1,370	896	295	1,191
2008	312	121	433	290	49	339
2009	286	10	296	274	10	284
2010	293	132	425	253	132	385
2011(*)	301	26	327	273	26	299
Total	16,691	7,151	23,842	14,777	4,797	19,574
Averages						
2000-2011	1,391	596	1,987	1,231	400	1,631
2004-2006	2,763	1,465	4,228	2,577	1,038	3,615
2008-2011	298	72	370	273	54	327

(*) Annualized based on data through November.
SF Single family homes.
MF Attached and multifamily units.
Source: U.S. Bureau of the Census; URBANOMICS, Inc.

The amount of new housing construction planned and permitted in the last decade in most areas of Florida and the U.S. is unlikely to occur again in any imaginable future. The housing market bubble was driven largely by unsound financing practices that are unlikely to be repeated, plus over-reaching by

developers and homebuilders. Population and housing projections provided herein show a more realistic future for Charlotte County's housing market.

5.3.2 Population and Housing Trends and Projections

The 2010 Census shows how overheated the Charlotte County housing market was in the past decade (see Table 5-4). The number of housing units added since the 2000 Census (20,874) exceeded the increase in the county population (18,351) and is more than double the increase in the number of households (9,506). The result is a vacancy rate that surged by more than seven percent, from 19.9 percent in 2000 to 27.1 percent in 2010.

Table 5-4. Charlotte County Population and Housing Trends and Projections, 2000-2040

Parameter	Census		Projections (1)		
	2000	**2010**	**2020**	**2030**	**2040**
Population and Households					
Total Population -- Change	141,627 ----	159,978 18,351	176,300 16,322	192,700 16,400	206,700 14,000
Household Pop (2)	139,035	156,966	172,950	189,040	202,775
Persons/Household (3)	2.18	2.14	2.10	2.07	2.04
Households -- Change	63,864 ----	73,370 9,506	82,360 8,990	91,325 8,965	99,400 8,075
Housing					
Total Housing Units -- Change	79,758 ----	100,632 20,874			
Occupancy Status (4) -- Pct Households -- Pct Seasonal -- Pct Other Vacant	 80.1 13.2 6.7	 72.9 15.3 11.8	 77.0 15.0 8.0	 77.0 15.0 8.0	 77.0 15.0 8.0
Housing Demand (4)			***11,675***	***11,645***	***10,485***

(1) University of Florida Bureau of Economic and Business Research (BEBR) Amedium@ projections, 6/11.
(2) Household population is approximately 98 percent of total population. Remaining population is housed in group quarters, including correctional facilities, assisted living facilities, and others.
(3) Declining household size projected by URBANOMICS for 2020-2040.
(4) Occupancy status projected by URBANOMICS for 2020-2040.
(4) Future housing demand determined by dividing projected households by a 77 percent occupancy factor.

Table 5-4 shows that projected demand for housing in future years is substantially less than the number of units added in the past decade. Housing projections in this analysis are driven by projections of the Charlotte County population made by the University of Florida's Bureau of Economic and Business Research (BEBR). BEBR "medium" projections shown above for 2020-2040 were published in June 2011 after the 2010 Census was released and reflect diminished growth expectations for Florida caused by the lingering collapse of the national and state housing markets and continuing high unemployment levels. BEBR projections in 2011 are significantly less than earlier (2009) BEBR and 2008 County projections presented in the 2010 EAR report. For example, the County projected a population of 285,488 in 2040, compared to the 2011 BEBR projection of only 206,700.

The 2011 BEBR population projections support demand for another 33,800 housing units in Charlotte County from 2010 to 2040. County population projections in the 2010 EAR report, assuming they prove to be more accurate, would support demand for another 82,800 housing units, based on the same household size and vacancy assumptions used in this analysis.

The majority of units classified by the Census Bureau as "vacant" are units held for seasonal and recreational use (i.e., second and vacation homes). The vacancy rate for these increased from 13.2 percent in 2000 to 15.3 percent in 2010, indicating a proportional as well as an absolute increase in the number of second and vacation homes in the County. A proportional increase is somewhat unexpected, as second homes tend to convert to permanent residences over time.

The vacancy rate for other vacant units, including unoccupied units that are up for sale, for rent, or which have been simply vacated, increased from 6.7 percent in 2000 to 11.8 percent in 2010. The five percent differential indicates that "current" vacancies (in 2010) are more than 5,000 units above historical and more typical 2000 vacancy rates, representing a potential four-to-five year supply of available units.

5.3.3 Future Urban Land Use Needs

The County's 2010 EAR report identifies a total of 60,552 acres of residential land use in Charlotte County. The average density of residential use in the County is 1.66 housing units per acre, based on the 2010 Census count of 100,632 housing units. Future development is likely to occur at higher densities in the designated Urban Service Area.

For purposes of this analysis, future residential land needs are estimated based on average densities of two units per acre and three units per acre. Projected housing demand from 2010 to 2040 would require 16,910 acres of land at two units per acre and 11,265 acres at three units per acre (see Table 5-5).

The 2010 EAR report also shows a total of 12,050 acres of commercial, mixed use, and industrial land use in the County. This equates to an average demand of 0.12 acres of land per housing unit, based on the same 2010 Census count of housing units. While it could be argued that determination of demand for commercial and industrial land may require a more complicated methodology, the approach used in this analysis is considered adequate for making general estimates of future commercial/industrial land needs. Land needed to accommodate commercial/ industrial demand from 2010 to 2040 totals an estimated 4,060 acres (see Table 5-5).

Table 5-5. Urban Land Needed To Support Projected Future Growth, 2010-2040

Land Use	Existing Conditions	Additional Land Needed (acres)		
		2010-2020	2020-2030	2030-2040
Residential				
Existing Land Use (acres) (1)	60,552			
Existing Housing Units (2)	100,632			
Average Density (units/acre)	1.66			
Housing Demand (3)		11,675 units	11,645 units	10,485 units
Land Needed at 2 Units/Acre		5,840	5,825	5,245
Land Needed at 3 Units/Acre		3,890	3,880	3,495
Commercial/Mixed Use/Industrial				
Existing Land Use (acres) (1)	12,050			
Demand per Housing Unit (acres)	0.12			
Land Needed		1,400	1,400	1,260
Total Land Needed		5,290 - 7,240	5,280 - 7,225	4,755 - 6,505

(1) 2010 Evaluation and Appraisal Report
(2) 2010 Census
(3) See Table B
Source: URBANOMICS, Inc.

The total amount of land needed to support projected future growth in the thirty-year timeframe ranges from 15,325 to 20,970 acres, depending on residential density. Development projections within scrub-jay habitat are difficult to estimate. In total, there are 17,984 lots in scrub-jay habitat that could be developed over the permit term. The development potential of these lots is based on a range of factors, including site-specific characteristics, such as location. It is also driven by the costs of development, which have historically been higher in scrub-jay habitat due to the high mitigation fees relative to the value of these lots. With the proposed HCP in place, it is assumed that the relative difference in development costs on lots inside/outside scrub-jay habitat will be relatively small; therefore, although it is difficult to predict economic conditions and the overall health of the regional housing market over a 30-year planning horizon, it is plausible that the development rate within scrub-jay habitat will be roughly the same as county-wide projections.

5.3.4 County Growth Patterns

Patterns of growth of the County population and housing inventory during the past decade can be seen by comparing data from the 2000 and 2010 Censuses by County Census Division (CCD) and Census Tract (CT). Charlotte County is divided into three CCDs:

- Punta Gorda CCD – the area east of the Peace River and Charlotte Harbor
- Port Charlotte CCD – the area between the Myakka and Peace Rivers on the north side of Charlotte Harbor
- Grove City/Rotunda CCD – the Cape Haze peninsula and Gulf islands west of the Myakka River and Charlotte Harbor

Table 5-6. Charlotte County Population and Household Trends by Subarea, 2000-2010

Area	Population			Households		
	2000	**2010**	**Change**	**2000**	**2010**	**Change**
Punta Gorda CCD -- Percent of County	33,606	38,251 23.9	4,645 25.3	15,520	17,671 24.1	2,151 22.6
CT 101 (1)	3,556	3,837	281	1,056	1,131	75
CT 105 (consolidated) -- Percent of County	8,450	11,832	***3,382*** ***18.4***	3,771	5,299	***1,528*** ***16.1***
Port Charlotte CCD -- Percent of County	76,111	83,418 52.1	7,307 39.8	33,303	37,175 50.7	3,872 40.7
CT 201 (consolidated) -- Percent of County	10,225	14,163	***3,938*** ***21.5***	4,443	6,367	***1,924*** ***20.2***
CT 204 -- Percent of County	5,203	8,006	***2,803*** ***15.3***	2,224	3,530	***1,306*** ***13.7***
Grove City/Rotunda CCD -- Percent of County	31,910	38,309 23.9	6,399 34.9	15,041	18,524 25.2	3,483 36.6
CT 305 (consolidated) -- Percent of County	9,012	14,338	***5,326*** ***29.0***	4,384	6,944	***2,560*** ***26.9***
County Totals	141,627	159,978	18,351	63,864	73, 370	9,506

(1) CT101 is the area of the county east of US17N and I-75S and includes the proposed Reserve area.
CD County Census Division
CT Census Tract; Aconsolidated@ means that these tracts are divided into two or more smaller tracts.
Source: U.S. Bureau of the Census; URBANOMICS, Inc.

Population, household, and housing data for 2000 and 2010 are summarized in Table 5-6 and 5-7 for all three CCDs and selected CTs within them that experienced the largest shares of growth in the past decade. CT101 is not material to this analysis of growth patterns but included in the tables as it includes the area west of US17N in which lands that could contribute to the proposed Reserve are located.

The Port Charlotte CDD accounted for more than half of the County's population and households in 2010, but only about 40 percent of countywide growth that occurred from 2000 to 2010 (see Table D). The Punta Gorda and Grove City/Rotunda CDDs were about equal in size in 2010, with a quarter of the County population and households, but the Grove City/Rotunda CDD captured 35 percent of countywide growth from 2000 to 2010, while the Punta Gorda CDD generally maintained its quarter share.

Table 5-7. Charlotte County Housing Trends by Subarea, 2000-2010

Area	All Housing Units			Vacant Units (1)		
	2000	**2010**	**Change**	**2000**	**2010**	**Change**
Punta Gorda CCD -- Percent of County	19,975 25.0	24,111 24.0	4,316 20.7	4,275 26.9	6,440 23.6	2,165 19.0
CT 101 (2)	1,487	1,654	167	431	523	92
CT 104 (consolidated) -- Percent of County	6,315	8,195	***1,880*** ***9.0***	1,169	2,399 8.8	***1,230*** ***10.8***
CT 105 (consolidated) -- Percent of County	4,812	6,587	***1,775*** ***8.5***	1,041	1,558 5.7	517
Port Charlotte CCD -- Percent of County	39,160 49.1	48,031 47.7	8,871 42.5	5,857 36.9	10,856 39.8	4,999 44.0
CT 201 (consolidated) -- Percent of County	5,267	8,384	***3,117*** ***14.9***	824	2,017 7.4	***1,193*** ***10.5***
CT 204 -- Percent of County	2,875	4,891	***2,016*** ***9.7***	651	1,361 5.0	710
Grove City/Rotunda CCD -- Percent of County	20,803 26.1	28,400 28.3	7,687 36.8	5,762 36.3	9,966 36.6	4,204 37.0
CT 305 (consolidated) -- Percent of County	5,569	10,431	***4,862*** ***23.2***	1,185 7.5	3,487 12.8	***2,302*** ***20.2***
County Totals	79,758	100,632	20,874	15,894	27,262	11,368

(1) Vacant units include units held for recreational and seasonal use and unoccupied units for sale and for rent.
(2) CT101 is the area of the county east of US17N and I-75S and includes the proposed Reserve area.
CCD County Census Division
CT Census Tract; Aconsolidated@ means that these tracts are divided into two or more smaller tracts.

The distribution and growth of housing units in the County is very similar to that for population and households (see Table 5-7). The Port Charlotte CDD accounted for nearly half (48 percent) of all housing units in the County in 2010, but captured a smaller share of growth (42.5 percent) from 2000 to 2010. Nevertheless, the Port Charlotte CDD added nearly 8,900 housing units in the past decade. The more seasonal Grove City/Rotunda CDD, with 28 percent share of housing units in 2010, captured 37 percent of countywide growth from 2000 to 2010, increasing by about 7,700 units. The Punta Gorda CDD grew the least, adding only 4,300 units during the decade.

Census Tracts (CT) with the largest increases in population, households, and housing units from 2000 to 2010 are highlighted in Tables 5-6 and 5-7. The leader in all categories is CT 105 in the Cape Haze area, with increases of 5,326 residents, 2,560 households, and 4,862 housing units, representing 29.0, 26.9, and 23.2 percent of countywide growth. CT 105 includes the Rotunda, Placida, and South Gulf Cove areas and is a combination of CTs 305.01, 305.02, and 305.03, as defined in the 2010 Census.

The second most active Census Tract was CT 201 in the Port Charlotte area, with increases of 3,938 residents, 1,924 households, and 3,117 housing units, representing 21.5, 20.2, and 14.9 percent of countywide growth. CT201 is in the northeast corner of the Port Charlotte CCD, mostly east of I-75, and includes the Harbour Heights area. CT 201 is a combination of CTs 201.01, 201.03, and 201.04, as defined in the 2010 Census.

Third most active was CT 105 in the Punta Gorda CCD, with increases of 3,382 residents, 1,528 households, and 1,775 housing units, representing 18.4, 16.1, and 8.5 percent of countywide growth. CT 105 includes South Punta Gorda, South Punta Gorda Heights, and the Pirate Harbor/ Burnt Store Road area, and is a combination of CTs 105.01 and 105.02, as defined for the 2010 Census. CT 105.01 extends east of I-75 and is smaller and less populated than CT 105.02, which covers an area extending south from Punta Gorda to the Lee County on the west side of I-75.

CT 204 in the northwest corner of the Port Charlotte CCD was the fourth most active growth area, adding 2,803 residents, 1,306 households, and 2,106 housing units from 2000 to 2010, representing 15.3, 13.7, and 9.7 percent of countywide growth. CT 204 includes the El Jobean area and areas west of Murdock.

Collectively, these four Census Tracts accounted for 15,449 new residents, 7,318 new households, and 11,770 new housing units, representing 84.2, 76.9, and 56.3 percent of countywide growth. These statistics reveal that population and household growth in the past decade were much more concentrated than growth of housing units, which tended to be more spread out.

An example is CT 104 in the Punta Gorda CCD, which added 1,880 housing units, but only 1,093 residents and 650 households. This area includes much of the City of Punta Gorda and the Charlotte Park area. Many housing units in the Census Tract are seasonal. Another example is CT 203 in the Murdock area of the Port Charlotte CCD, which added 1,541 housing units during the decade, but only 1,142 residents and 841 households.

It is interesting to note that several Census Tracts actually lost population from 2000 to 2010, including CT 102 in the Punta Gorda CCD, CTs 205, 206, 207, and 208 in the Port Charlotte, and CT 303 in the Grove City/Rotunda CCD. Housing units counts also declined in these Census Tracts.

The highest housing vacancy rates are found in the more seasonal Grove City/Rotunda CCD, including 51.5 percent in CT 304, 44.5 percent in CT 303, and 33.4 percent in CT 305. CTs 303 and 304 include the Englewood, Grove City, and Manasota Key areas. Comparatively high vacancy rates are also found in CT 210 (33.7 percent) and CT 204 (27.8 percent in the Port Charlotte CCD, and CT 101 (31.6 percent) and CT 104 (29.3 percent) in the Punta Gorda CCD.

Future growth in the County is likely to follow similar geographic patterns, with greatest concentrations occurring in the Rotunda/South Gulf Cove area, in northeastern and northwestern sections of the Port Charlotte CCD, and from Punta Gorda south to the Lee County line west of I-75. There appear to be large numbers of undeveloped lots or tracts of developable land to support continued growth in these areas. It is noted that the Rotonda/South Gulf Cove area and parts of the Port Charlotte CCD are locations with strong development potential, but are located within scrub-jay habitat, and as a result, growth in these areas would be hindered without the proposed HCP. With the HCP in place, these high-growth areas would benefit from streamlined regulations and relatively lower mitigation costs offered by the HCP.

5.4 HCP Funding Program

Long-term viability of the HCP requires adequate funding to offset the Plan's implementation costs outlined in Section 5.2. There are several funding mechanisms that could be used to generate the necessary revenues to implement the HCP, including fees imposed on future development. Other non-secured sources of funding may also be used to offset HCP implementation costs, such as grants. However, because there is no way to ensure the viability of these sources, they are not included in the funding estimates. This section outlines the key parameters of the HCP funding program, which include:

- Alternative funding approaches;
- Allocation of costs between existing and future development;
- Development fees;
- Other potential funding sources available to the HCP;
- Mechanism to adjust HCP funding requirements over time;
- Funding adequacy and assurances; and
- Post-permit funding, including endowment funds

5.4.1 Funding Options Considered

A range of funding options was considered in the course of developing the HCP. These included development fees; property tax assessments in the form of Municipal Service Taxing Units[6] (MSTUs); benefit assessments through Municipal Service Benefit Units[7] (MSBUs); use of existing property tax

[6] An MSTU is a service unit for which an ad valorem tax levy is imposed to cover the cost of providing a service or improvement, based upon taxable value. MSTUs have been established by the Board of County Commissioners through an adopted ordinance or resolution that outlines the boundaries of the district and the services or improvements to be provided.

[7] An MSBU is a service unit which receives a specific benefit for which a special assessment is imposed to cover the cost providing the service or improvement. MSBUs have been established by the Board of County Commissioners through an adopted ordinance or resolution that outlines the boundaries of the district and the services or improvements to be provided.

revenue (i.e., Environmentally Sensitive land millage); and use of reinstated property tax assessments on lands within scrub-jay habitat. Combinations of these funding approaches were also considered.

Most of the funding approaches considered could independently cover the costs of the HCP; however, some may not be viable under existing regulations (e.g., proposed millage rates that exceed statutory thresholds). Ultimately, it was a policy decision on which funding option to implement as part of the proposed HCP. The BOCC elected that development fees levied on undeveloped properties represented the most equitable HCP funding option. More information on the equitable allocation of HCP costs and the nexus between scrub-jay habitat impacts and who pays for the Plan is presented below. All fees associated with the HCP will be placed in a segregated budget account for the express purpose of the implementation and management of the HCP.

5.4.2 Cost Allocation and Nexus

One consideration for the HCP funding program is the fair share allocation of HCP costs to future development. Conceptually, it can be argued that HCP costs associated with mitigating the impacts attributed directly and indirectly to future development are most equitably allocated to developers (in the form of compensatory mitigation). Conversely, species conservation can also be viewed as a public good; thereby requiring public funding. This section discusses the allocation of project costs, including a nexus analysis between development impacts and proposed fees.

First, it is important to address the purpose of compensatory mitigation and how the fee will be used. Generally, the purpose and use of proposed compensatory mitigation is to aid in the recovery of the scrub-jay by providing the monetary resources required to implement proposed conservation activities. The specific conservation actions subject to funding have been described in detail as part of the HCP conservation strategy (see Section 4.0) and have been summarized along with related costs in Section 5.2 above.

In terms of nexus, the extensive use of impact fees in Florida has resulted in establishment of rational nexus standards for local land use exactions to assure a rational relationship between the demands of new development and assessments against it. In fact, a "Dual Rational Nexus Test" has been established under Florida case law, which states that impact fees are valid when: (1) a reasonable connection, or rational nexus, exists between the anticipated need for additional capital facilities and the growth in population; and (2) a reasonable connection, or rational nexus, exists between the expenditure of the impact fee proceeds and the benefits accruing from the growth of those proceeds. Although these standards are typically evaluated in terms of new infrastructure and facilities, they are applied in the context of habitat conservation below.

The first standard requires that impact fees be no more that the government's costs which are reasonably attributable to the new development. The basic assumption here is that future development will directly and indirectly convert habitat to urban uses, which results in adverse impacts to the scrub-jay, as well as a decline on the overall ecological value and diversity of the region. Under the ESA, such impacts must be mitigated; in fact, the USFWS has established mitigation requirements for new development in scrub-jay habitat in Florida. Under the proposed Countywide HCP, the burden of mitigation shifts to Charlotte County in exchange for the ITP that would allow development pursuant to local land use regulation. When the HCP is approved and an ITP issued, the proposed conservation strategy, including the establishment of a Reserve in the County, will have been approved by USFWS as appropriate mitigation for projected new development. The costs of such mitigation have been

articulated in this section, namely an estimated $38.4 million over the 30-year permit period and $533,500 annually over the post-permit period. It is these costs which serve as the basis for the proposed compensatory mitigation and have been allocated across projected development on a pro-rated basis based on geographical extent of impacts, (i.e., acres). As a result, the financial burden to new development does not exceed the conservation costs attributed to such development, thereby meeting this standard.

The second standard stipulates that the development derive some benefit from the use of the fees collected. In this case, the benefit afforded to prospective development projects is the granting of an ITP, which allows the development to proceed in a timely and relatively cost-effective manner (compared to status quo conditions). In other words, the benefit takes the form of regulatory certainty and streamlined local land use approval of new projects that comply with all other land use regulations (e.g., zoning). Accordingly, this standard is also met.

5.4.3 Development Fees

The basic premise in calculating the HCP fees is that the fees are set at levels that fully offset the cost of compensating for the take authorized by the HCP. The HCP uses a "tiered-fee" structure, where separate fees are calculated based on the size of lot that is developed within scrub-jay habitat. The HCP fees have been calculated on a per-lot basis; e.g., the fee represents the payment required to compensate for an individual lot that is developed within scrub-jay habitat (according to different lot size tiers). Certain components of the fee cover one-time fixed costs that would occur over the Permit term, such as expenditures for land acquisition and initial site improvements and habitat enhancements. Other cost components would extend beyond the permit term and constitute expenses in perpetuity. These include habitat management and maintenance, monitoring and adaptive management, and Plan administration. The fees for these components are structured as contribution to a non-wasting endowment fund.

5.4.3.1 Development-Related Impacts

In order to estimate development fees, total HCP costs must be allocated across the projected level of development within the scrub-jay regulated area. The regulated area corresponds to the 2011 USFWS review area for scrub-jays and serves as the boundary within which future development will be subject to the development fee. For the purpose of estimating development fees, it is assumed that all undeveloped lots within the regulated area would be developed, which represents a "full build-out" scenario. The projected number of acres subject to the development fee was calculated as follows:

1. Base: current USFWS scrub-jay review area
2. Include all lots that fall partially within the review
3. Exclude lots that comprise the proposed Reserve
4. Exclude lots that are already developed, including larger lots in east county
5. Exclude agricultural lots that have already been cleared for agricultural use

In total, it is estimated that approximately 5,700 acres of future development, encompassing slightly less than 18,000 parcels, would be subject to the scrub-jay development fee. This figure approximates the maximum level of potential habitat take over the life of the HCP.

5.4.3.2 Acreage Tiers

Proposed development fees are based on the size of undeveloped lots within scrub-jay habitat. For this analysis, eight acreage tiers have been used to estimate fees ranging from less than 0.22 acres to over 100 acres. The majority of lots are less than 0.5 acres (approximately 96.5 percent), which captures the quarter-acre platted lots that are prevalent throughout the County. HCP costs were allocated to fee tiers based on the total acreage within each tier, and fees were calculated by allocating costs uniformly across the total number of lots with each respective tier.

Table 5-8: HCP Development Fees, by Acreage Tier

Tier	# Lots	Total acres	Ave. Lot Size (acres)
1: 0.00 - 0.22 acres	5,239	630	0.12
2: 0.23 - 0.49 acres	12,120	2,965	0.24
3: 0.50 - 1.00 acres	209	129	0.62
4: 1.01 - 3.00 acres	321	461	1.44
5: 3.01 - 5.00 acres	22	84	3.83
6: 5.01 - 20.00 acres	60	517	8.62
7: 20.01 - 99.99 acres	9	323	35.86
8: > 100.00 acres	4	557	139.36
Total	**17,984**	**5,666**	**0.32**

5.5.3.2 Fee Estimates

The proposed breakdown of development fees for the HCP are presented in Table 5-9, which shows how the different fee (or cost) components factor into the total fee. It also presents the proportion of fee that is based on fixed costs over the Permit term and contribution to an endowment that will be used to fund post-Permit operations and management. The largest components of the development fee are attributed to land acquisition and habitat management costs. In addition, the majority of the development fee would cover costs over the 30-year permit term (approximately 78 percent), while the remaining 22 percent covers the costs of the long-term endowment required to fund the HCP in perpetuity.

Table 5-9: HCP Development Fees, by Fee Component

Fee Component	Percent of Fee
Land Acquisition	44.0%
Habitat Assessment, Planning and Enhancement	7.3%
Habitat Management and Maintenance	36.3%
Monitoring and Adaptive Management	2.1%
Changed Circumstances	3.3%
Plan Administration	7.0%
TOTAL DEVELOPMENT FEE	**100.0%**
Fixed Costs (Permit Term)	***78.4%***
Endowment Contribution (Post-Permit)	***21.6%***

The proposed development fees for the HCP are presented in Table 5-10. As expected, the development fees increase in accordance with the acreage tiers. Fees start out at $1,100 per lot for the smallest parcels (less than 0.22 acres). For quarter-acre lots, the fee would be $2.200 per lot. Within the largest tier (greater than 100 acres), development fees would be over $1.2 million per lot.

Table 5-10: HCP Development Fees, by Acreage Tier

Tier	Fee ($/Lot)
1: 0.00 - 0.22 acres	$1,100
2: 0.23 - 0.49 acres	$2,200
3: 0.50 - 1.00 acres	$5,500
4: 1.01 - 3.00 acres	$12,800
5: 3.01 - 5.00 acres	$34,100
6: 5.01 - 20.00 acres	$76,700
7: 20.01 - 99.99 acres	$319,000
8: > 100.00 acres	$1,240,000

5.4.3.3 Applicability of HCP Fees

The proposed HCP fees would apply to all Covered Activities[8] on undeveloped properties within (or transected by) the HCP regulated area, which is analogous the current USFWS scrub-jay review area. Fees would be assessed based on the entire lot acreage even if it partially falls out of the regulated area or is only partially developed.

5.4.4 Grants and Other Funding Sources

There are also public funding sources and mechanisms that can be used to offset HCP implementation costs. In fact, the ability to secure public funding can contribute directly to the success and financial viability of the HCP over the long term, although the HCP does not rely on public funding as a key precept in meeting funding assurance requirements under the ESA.[9]

A wide range of grants are potentially available to serve as an ancillary funding source for the HCP. Grants are typically available at the federal and state government levels, as well as from non-profit organizations. Concerns with grant funding include the uncertainty with securing grants, fluctuations in available funding over time, time and expense in preparing grant applications, and restrictions on uses of grant funds. Nevertheless, grants and other funding sources should be evaluated on a case-by-case basis during HCP implementation. This section identifies grants programs that may be applicable in the context of the proposed HCP.

5.4.4.1 Federal

Below is a list of potential grant funding opportunities at the federal level:

- Conservation Grants, Cooperative Endangered Species Conservation Fund (U.S. Fish and Wildlife Service)
- Recovery Land Acquisition Grants, Cooperative Endangered Species Conservation Fund (U.S. Fish and Wildlife Service)
- State Wildlife Grants Program (U.S. Fish and Wildlife Service)

These federal grants may be pursued to acquire private parcels in West and Mid-County adjacent to existing public lands (See Section 6.6) in an effort to provide conservation benefits to the species above and beyond the requirements of the HCP and ITP.

5.4.4.2 State (Florida)

Below is a list of potential grant funding opportunities in the State of Florida:

- State Wildlife Grant Program (Florida Fish and Wildlife Conservation Commission)
- Land & Water Conservation Fund Act State Grants (Florida Department of Environmental Protection, National Park Service)

[8] For more information on Covered Activities, refer to Section 3.0.

[9] The total cost of HCP implementation is fully covered by proposed development fees outlined in Section 5.5.2.1

- Coastal Partnership Initiative Grant Program (Florida Department of Environmental Protection)

5.4.4.3 Non-Profit

Below is a list of potential grant funding opportunities supported by non-profit organizations:

- Keystone Initiative Grants (National Fish and Wildlife Foundation)
- Charter Grant Programs (National Fish and Wildlife Foundation)
- William Belton Conservation Grant (American Bird Conservancy)

5.4.5 Funding Adjustments

The proposed funding program must ensure that the HCP is sustainable over time. If funding lags behind increasing costs, Plan implementation may be compromised. Therefore, the funding program must be flexible and able to respond to changing economic conditions, including inflationary pressures and a dynamic real estate market. It must also be able to respond to other unexpected funding shortfalls over time. Because it is not possible to predict future changes in costs and revenues, the HCP includes a fee adjustment component that provides for periodic adjustments to proposed fees. There are two components to the fee adjustment program: automatic adjustments and periodic audits.

5.4.5.1 Automatic Adjustment of Development Fees

The proposed HCP fees will be automatically adjusted for inflation on or before March 1 of each year. The HCP fees can be organized into two categories: land acquisition and the operations and maintenance (O&M) costs of implementing the HCP. These categories may be subject to differing rates of inflation. Therefore, an inflation index that is appropriate to the specific category has been selected for each (Table 5-11).

The cost of land acquisition is tied directly to real estate values in the HCP Plan Area; O&M costs cover all other costs considered in this analysis and are tied more generally to changes in the cost of labor/personnel, services, and goods and materials used in operating the Reserve. Based on their inherent differences, it is anticipated that different rates of inflation could apply to land acquisition and O&M costs over time. Therefore, they require different inflation indices.

There are no readily available cost indices for land acquisition, as the variation in land values is often attributed to site-specific factors. However, there are correlations between the housing market, housing prices, and land costs. As such, trends in housing prices can provide insight on changes in land values, particularly land with high development value. There are several data sources that track housing prices. For this analysis, the recommended index to adjust the land acquisition cost portion of development fees is the annual Home Price Index (HPI)[10] for the Punta Gorda Metropolitan Statistical Area (MSA) from the Federal Housing Finance Agency (FHFA).[11] The fee adjustment index would be based on the change in the average annual HPI (Quarter 1 through Quarter 4) for the prior calendar year. For example, the adjustment factor that would be applied to the land acquisition portion of the

[10] For more information, see: http://www.fhfa.gov/Default.aspx?Page=87. Based on the "All-Transaction" index.

[11] The FHFA was established in 2008 combining the Office of Federal Housing Enterprise Oversight (OFHEO), Federal Housing Finance Board (FHFB), and the parts of the Department of Housing and Urban Development (HUD).

fee in March 2013 would be based on the average annual change in the HPI from Quarter 1 through Quarter 4 of 2012.

O&M costs would be indexed using the Producer Price Index (PPI) for the *Nonresidential Building Maintenance & Repair* industry published by the U.S. Department of Labor, Bureau of Labor Statistics (BLS).[12] This PPI metric measures the average change over time in the selling prices received by domestic producers for their output. The PPI for the *Nonresidential Building Maintenance & Repair* industry was determined to be the most applicable index as it tracks costs most relevant to ongoing O&M activities.[13] The fee adjustment index would be based on the change in the average annual PPI (January through December) for the prior calendar year.

Table 5-11: Development Fee Adjustment Index

Fee Component	Adjustment Index	Historic Index Range
Land Acquisition	Change in the annual Home Price Index (HPI) for the Punta Gorda, FL MSA in the prior calendar year (Federal Housing Finance Agency)	-27.3% to +27.0% (2000-2011)
O&M (Other Fee Components)	Change in the Producer Price Index (PPI), *Nonresidential Building Maintenance & Repair* industry, for the prior calendar year (BLS)	+1.3% to +1.5% (2009-2011)

5.4.5.2 Periodic Audit and Adjustment of Development Fees

In addition to annual fee adjustments, it will be important to conduct periodic comprehensive reviews of the HCP funding program and fees to ensure that the fees generated by Covered Activities are adequately covering their share of HCP costs. A comprehensive fee audit would be completed by March 15 at least every 5 years for the duration of the permit term (i.e., years 5, 10, 15, 20, and 25), where year 1 is the first full calendar year of HCP implementation. This fee audit would be in addition to the year 2, 4, and 6 reviews, and may be conducted sooner than year 5 if warranted by the amount of development activity. Audits of HCP fees can occur more frequently, if needed, particularly during the early stages of HCP implementation to address cost-related uncertainties in early years of the Plan using "real-world" data compiled as part of development and management of the Reserve. The 5 year interval between comprehensive audits should allow adequate time to compile sufficient data to analyze the relationship between costs and fee revenues over time. The audit process would include a detailed review of implementation costs and how they have tracked the assumptions in the original funding plan. For example, actual land sales in the planning area that have occurred subsequent to HCP, including land acquisitions made as part of the HCP, would be reviewed and used as inputs to estimate current land costs at the time the audit is performed. O&M costs would also be reviewed to determine whether the automatic adjustment of fees is tracking actual costs. Following completion of the independent fee audits, HCP Fees may be adjusted to reflect refined cost estimates and development patterns.

[12] For more information, see: http://www.bls.gov/ppi/

[13] The Consumer Price Index (CPI), was not considered to be an accurate gauge of changes in HCP implementation costs as it includes too broad a spectrum of commodities, many of which are not pertinent to HCP activities.

5.4.6 Funding Adequacy and Assurances

The proposed conservation strategy in the HCP reflects a Reserve design that includes both existing public lands and private lands that would need to be acquired to meet scrub-jay conservation requirements. The HCP funding program is designed so that development fees would cover all expected compensatory mitigation costs of the HCP related to acquisition and management on lands not already in public ownership. All fees associated with the HCP will be placed in a segregated budget account for the express purpose of the implementation and management of the HCP. Funding assurances for existing publicly-owned lands are also covered in this section. In either case, there are potential funding shortfalls that may arise and remedies in place to address them.

5.4.6.1 Short-Term Funding Shortfalls

It is acknowledged that future costs of conservation are difficult to predict. Therefore, the proposed compensatory mitigation adjustment program would be used to address any potential funding shortfalls in meeting the mitigation costs of the Plan, which would help ensure funding adequacy over the long term. In addition, a contingency fund would be maintained to address any funding shortfalls, associated primarily with higher-than-expected land management and monitoring costs in the short term. Contingency funding was accounted for in estimating total plan costs in Section 5.2. If this fund is inadequate to cover short-term deficiencies, the County would consider whether to adjust the level of conservation activities, including management and monitoring requirements, without jeopardizing the need to meet conservation requirements of the Plan. Adjusting management or monitoring requirements outside the adaptive management framework would require approval of Charlotte County and USFWS, and some changes may require a minor or major amendment to the Plan.

5.4.6.2 Post-Permit Funding (Endowment)

The management, monitoring, and administration of the HCP Reserve would continue in perpetuity after the 30-year permit term, which requires a perpetual funding stream to cover costs over time. Perpetual funding requires the establishment of a non-wasting endowment,[14] which generates sufficient interest earnings to cover ongoing costs. The required size of the endowment depends on the magnitude of ongoing costs and the expected return on investment from the endowment over time.[15] The average annual cost to manage lands acquired within the proposed Reserve during the post-permit term is $533,500. The endowment required for post-permit funding is an estimated $17.8 million, which is included in the estimated development fees and other funding approaches.

5.5 Comparison to Scrub-Jay Umbrella HCP

As part of the economics analysis for the HCP, a comparison of the likely costs and benefits of a County-wide HCP relative to other scrub-jay permitting options available to Charlotte County residents was conducted. Because more than 97 percent of the 17,984 parcels that may benefit from the HCP are small platted parcels (less than 1.0 acre), this comparison focuses on platted lots. The potential costs or benefits to larger parcels are expected to be proportionally similar to those of smaller lots.

---

[14] An endowment generally refers to a transfer of funds to be invested for a specific purpose and for which the principal amount is to remain intact (i.e. “non-wasting”) in perpetuity or for a specific period of time.

[15] The size of proposed endowment fund is calculated based on a three (3) capitalization rate, which takes into account anticipated rates of return on investments and inflation.

As background for the analysis, FWS Biological Opinions and other permitting documents addressing projects with potential scrub-jay impacts in Charlotte County were reviewed from the public record. The goal of the review was to determine what types of projects were using the Umbrella HCP process, the length of time that was required for review and approval by the FWS, and the permit conditions and requirements associated with the issued permits.

Approximately 30 Biological Opinions or other documents that were issued by the FWS in 2007 and 2008 were reviewed. Project impacts to scrub-jay habitat ranged from 0.22 acres to 82.4 acres. Most (20) of the projects impacted less than 0.5 acres. Twenty-five of the projects were single-family residential projects on platted lots. Five of the projects were larger projects, including multi-family residential and Charlotte County infrastructure and facilities projects (e.g., Fire/EMS station). These permits provide a historical context to the review of scrub-jay permits in Charlotte County and are illustrative of the costs that have been required to gain such permits.

We also evaluated the likely time and costs and would be required if a County-wide HCP were not implemented and parcels had to use the existing Statewide Umbrella HCP or standard HCP application process for larger projects. The Umbrella HCP is available for use by Charlotte County parcels that: (1) are less than or equal to 1 acre in size; (2) were platted prior to January 1, 2006; (3) are accessible by two-wheel drive vehicle from a government maintained right-of-way, and (4) are located within an urban area, including partially built-out subdivisions, as are common throughout Charlotte County. Parcels not meeting the above criteria would be required to utilize the standard HCP process or Section 7 consultation.

5.5.1 Permit Review Timeframes

The length of time required for permitting is a significant concern and cost to permit applicants. Review delays may result in additional project costs associated with land carrying costs and project financing. The FWS advises that applicants should expect a review time frame of 6 to 12 months for a standard HCP. Actual timeframe may vary depending on agency workloads, the completeness of permit applications, and the responsiveness of the applicant to requests for additional information. From the review of past FWS scrub-jay permitting records using the standard HCP process in Charlotte County, an interval of up to two years frequently occurred between the initial agency consultation and/or permit application and issuance of the resulting permits. This timeframe was independent of the size of the project, with small single-family parcels regularly taking as long as larger parcel to get a permit. The historic review timeframes are probably representative of the review timeframes that projects using the standard HCP process may expect in the future.

The FWS developed and implemented the Statewide Umbrella HCP in 2007 in an attempt to streamline permitting for lots meeting the criteria outline above. From discussions with FWS staff, the Umbrella HCP process is expected to take 3 to 6 months for review and approval of a permit. To date, no permits have been issued under the Umbrella HCP in Charlotte County.

With implementation of a County-wide HCP, Charlotte County would assume responsibility for administration of the permitting program including application reviews. Through the incorporation of a scrub-jay review as part of its process for the review of building and/or site plan permits, Charlotte County will be able to ensure compliance with the County-wide HCP concurrent with the review of other aspects of the application and thus avoid project delays resulting from other agencies.

5.5.2 Costs to Applicants

Under both the Standard HCP process and the State-wide Umbrella HCP, applicants incur costs (1) of permit application fees, (2) to hire consultants needed to assist in scrub-jays surveys and the preparation and negotiation of the permit application, and (3) to comply with mitigation requirements of the FWS. Each of these costs is discussed below.

5.5.3 Permit Application Fees

Currently, the FWS requires a permit application fee of $100 for a standard HCP and $50 for the Statewide Umbrella HCP. When applied to the 17,984 parcels that would be required to apply for a FWS permit if the County-wide HCP were not in place, these application fees total $920,000. With an approved County-wide HCP, the scrub-jay review will be incorporated in the County's development/permit review; therefore the costs of these FWS application fees would be precluded.

5.5.4 Consultant Costs

Typically, the applicant for a scrub-jay permit must hire a qualified consultant to assist with required scrub-jay surveys, preparation and negotiation of permit applications. Scrub-jay survey costs for a single-family residential lot average approximately $1,750. When extrapolated to the total number of parcels in the County's scrub-jay review area, consultant costs for surveys under the current FWS permitting options would exceed $30 million. With the implementation of a County-wide HCP, it is anticipated that most parcels participating in the County plan, particularly platted single-family lots, would not have to complete scrub-jay surveys in support of applications for construction approval.

In addition, consultants are generally also required to assist applicants in the preparation and negotiation of permit applications. Consultant costs for single-family lots using the standard HCP project average about $5,000 to $10,000. Larger and/or more complex projects may incur additional consulting costs in support of permitting. When extrapolated to the total number of parcels in the County's scrub-jay review area, consultant permitting costs under current FWS permitting options could exceed $130 million. With the establishment of a County-wide HCP and the establishment of county-specific criteria for participation in the program, the need for applicants to incur the costs of consultants would be significantly reduced or eliminated, particularly for existing platted single-family lots that make up over 95 percent of the parcels within the scrub-jay review area.

5.5.5 Mitigation Costs

The costs to comply with FWS habitat mitigation requirements under current FWS scrub-jay mitigation guidelines are high and may be cost-prohibitive for many projects, particularly single-family lots. From a review of the permits issued during 2007 to 2008, the estimated cost associated with the mitigation varied from $30,619 to $111,694 per acre. These costs were based on mitigation ratio of 2 acres of mitigation for each acre of impacted area and land costs established by the FWS for Charlotte County. The typical mitigation fee for a quarter acre lot in 2007 and 2008 was $15,308 to $55,847.

The 2011 FWS scrub-jay mitigation fees under the standard HCP or state-wide Umbrella HCP process range from $23,400 per acre for the central part of Charlotte County to $84,600 for the Cape Haze Peninsula. When applied to a quarter acre lot required to provide 2:1 mitigation, the mitigation cost per

lot ranges from $11,700 to $42,500, costs that likely exceeds the value of many undeveloped lots in the county. When these mitigation fees are extrapolated to the entire acreage currently within the Charlotte County scrub-jay review area, the total mitigation cost to Charlotte County residents using current fees is estimated at between $140 and $350 million. Furthermore, this cost can expected to rise in the future if a County-wide HCP is not implemented, as the FWS has indicated that mitigation ratios for scrub-jay impacts could increase to 3:1 or 4:1 over time in certain portions of the county.

5.5.6 Comparison Summary

Table 5-12 summarizes the estimated permitting and mitigation costs to Charlotte County residents under the existing FWS Standard HCP and state-wide Umbrella HCP processes. When these costs are totaled, the costs to Charlotte County residents to address scrub-jay permitting requirements on all of the parcels within the scrub-jay review area is estimated to range between $431 million and $865 million. Additionally under current practices, the mitigation fees paid under the current processes (an estimated $140 to $350 million) will leave Charlotte County and be used by the FWS to acquire and manage scrub-jay habitat in other counties.

In comparison, the total costs to implement a County-wide HCP are projected at $56.2 million, a significant overall saving to Charlotte County residents. As a result of the savings, it is anticipated that any mitigation fees or other costs to applicants for the approvals under the County-wide Plan would be significantly less than those now experienced under the FWS processes. Further benefits of the County-wide Plan are expected to include: (1) a more timely review and approval of projects when compared to the FWS review and (2) the fact that all funds generated by the plan will stay in Charlotte County for scrub-jay conservation.

Table 5-12: Comparison of With and Without a Charlotte County-Wide HCP

	Without County-wide HCP			
Parameter	**Standard HCP**	**State-wide Umbrella HCP**	**With County-wide HCP**	**Notes**
Number of Qualifying Parcels	416	17,568	17,984	
Qualifying Parcel	>1 acre, any proposed use	≤ 1 acre, single-family residential parcel	No restrictions	
Affected Acreage	1,943 acres	3,723 acres	5,666 acres	
Permit Review Timeframes	FWS estimate 6 - 12 months, but typically takes 2+ years	FWS estimate 3 – 6 months, current average is 3 – 4 months	Concurrent with County Building/Development Services review	County administration of Plan will preclude projects from being delayed by FWS review

Costs to Applicant				
FWS Application Fee	$100 / HCP	$50 / HCP	Not required	County-wide HCP precludes $920,000 in federal application fees
Scrub-Jay Survey Costs	$1,750+, survey costs increase with parcel size	$1,750 /parcel	Not required	County-wide HCP should preclude need for most surveys, saving an estimate $30+ million
Consultant Fees	$5,000 - $10,000+, permitting consultant costs increase with project size and complexity	$5,000 - $10,000	Significantly reduced to not required	County-wide HCP should preclude need for consultants on single-family residential parcels, saving an estimated $130+ million
Mitigation Ratio	2 acres of mitigation required for each 1 acre of impact Mitigation ratios could be increased by FWS in future		Mitigation requirements fixed for 30-year duration of HCP	
Mitigation Fees	$23,400 - $42,500/acre Depending on location in County		$1,100 - $1,240,000 per lot	Mitigation fee must offset any County-wide Plan costs not covered by other funding strategies
¼-acre Parcel Mitigation Cost	$11,700 - $42,500 Depending on location in County		$2,200/lot	
Total Mitigation /Plan Costs	Projected cost to mitigate all scrub-jay habitat $140 - $350 million		Plan total costs $56.2 million	
Disposition of Mitigation Funds	Mitigation Funds Leave Charlotte County		Mitigation Funds Stay in Charlotte County	

6.0 Description of Alternatives Considered

The development of the HCP involved an analysis of a variety of Reserve options. A total of five Reserve Design Alternatives were developed for each scrub-jay metapopulation (M5, M6, and M7) within Charlotte County. The first two Reserve Design Alternatives for each metapopulation include the following:

1) The Base, including all suitable and potentially suitable scrub-jay habitat on public and private lands where development is less than 40%, (development is defined as a parcel containing a structure within suitable and potentially suitable scrub-jay habitat polygons); and

2) Public Lands, including only existing public lands with suitable and potentially suitable scrub-jay habitat.

Reserve Alternative 3 describes all aforementioned public lands and the least fragmented private lands with less than 20% development within suitable and potentially suitable scrub-jay habitat. Reserve Alternative 4 includes all aforementioned public lands, least fragmented private lands with less than 20% development immediately adjacent to public lands, and private lands with suitable or potential scrub-jay habitat that would be managed as corridors between public lands. Alternative 5 includes all public lands and privately owned scrub-jay habitat in suburban areas where ≥ 25 acre 'blocks' of habitat free of residential or commercial development could be delineated, including areas in Deep Creek that do not appear in other Alternatives.

Although multiple scrub-jay groups were surveyed in Englewood and Deep Creek, the first four Alternatives do not include these areas, as development is greater than 40%. It is expected that less than 40% development is a threshold where management costs could still be reasonable, logistics of management would still be achievable, and the sustainability of scrub-jays is possible. However, typically these areas are surrounded by existing or future planned development, and to some extent contain interspersed development. As a result, limited habitat management of these areas may be possible in the short term, but will become more costly and difficult in the future, which will negatively affect scrub-jay survival and occupation. We do not expect these birds to persist, but they might provide a source of immigration and colonists to move to and sustain populations on public lands.

6.1 No Action Alternative

Under a No Action Alternative, commercial, residential, and publicly owned lots occupied by scrub-jays in Charlotte County would be required to follow current guidelines and mitigate through the compensatory fund established through a Statewide "Umbrella" HCP for the scrub-jay. In 2006, the USFWS teamed with The Nature Conservancy (TNC) to create a mitigation fund (Florida Scrub-Jay Conservation Fund) to rapidly acquire scrub-jay conservation lands and to ensure in-lieu mitigation fees would be used to promote the Statewide recovery of the species (USFWS Federal Register Volume 72, Number 135). With proper restoration and management, these lands are intended to provide optimal habitat to scrub-jays and other scrub dependent species. Details regarding this program can be found in the following document:
http://www.fws.gov/northflorida/ScrubJays/Docs/Umbrella/FSJ_Umbrella_HCP_EA.pdf

Under this alternative, mitigation lands that may be acquired would not necessarily be located within Charlotte County and a net loss to the regional scrub-jay population could result. This option is also cost-prohibitive; the mitigation cost per ¼-acre parcel is estimated in the range of $11,700 to $42,300, depending on the location within the County. In addition, the process of obtaining an individual ITP (rather than applying to be included in the Statewide "Umbrella" HCP) has the same cost-prohibitive mitigation rate, and can take up to two years. This is costly in both time and funding, is prohibitive to economic development in the County, and may result in the net loss to the region's scrub-jay population, and is therefore not a reasonable or acceptable alternative.

6.2 Reserve Alternative 1 (Base)

The Base Reserve Alternative includes all private and public parcels identified as suitable and potentially suitable scrub-jay habitat where development is less than 40%. This was applied to all three metapopulation areas. Based on the PVA model, this alternative resulted in reasonable long-term viability results for the scrub-jay, however is not feasible or acceptable due to the costs involved and the inability to acquire all remaining scrub parcels in the County.

6.3 Reserve Alternative 2 (Public Lands)

Only existing public lands with suitable and potentially suitable scrub-jay habitat are included in all three metapopulation areas. This alternative is not viable, as the PVA results show a high probability of extinction when scrub-jay habitat is limited to only existing public lands. According to the results of the PVA, existing public lands are not adequate to sustain the scrub-jay populations without additional protected lands that could: 1) increase the size of populations occurring on protected, manageable lands, and 2) increase the connectivity between these properties.

6.4 Reserve Alternative 3

Reserve Alternative 3 describes all aforementioned public lands and the least fragmented private lands with less than 20% development within suitable and potentially suitable scrub-jay habitat. Alternative 3 for M5 is the same as the Base (Alternative 1), since all potentially suitable habitats within this Metapopulation fit these qualities. Starting from the Base of M6, this alternative excludes potential scrub-jay habitat east of Como Street Canal and a small polygon in the Eleanor Avenue area along the Myakka River due to these areas having development greater than 20%. Starting from the Base of M7, this alternative excludes potential scrub-jay habitat in Prairie Creek Estates and portions of Washington Loop as these areas are greater than 20% developed.

This Alternative is not acceptable because population modeling results for each metapopulation indicate high extinction rates in M5 and M6. This is likely due to poor demographic rates for scrub-jays in suburban areas. Extinction rates for M7 (Prairie Creek area) were less than that of the M5 and M6 populations for this alternative, but is still unacceptably high.

6.5 Reserve Alternative 4

Reserve Alternative 4 includes all aforementioned public lands, the least fragmented private lands with less than 20% development immediately adjacent to public lands, and private lands with suitable or potentially suitable scrub-jay habitat that would be managed as corridors between public lands. This fourth Alternative for M5 is the same as the Base, as there are no suitable or potentially suitable scrub-jay habitats between public lands or North and South Gulf Cove. South Gulf Cove, however, may provide a 'stepping stone' between scrub-jays in the Charlotte Harbor Buffer Preserve, Rotonda, and Amberjack to North Gulf Cove. Alternative 4 for M6 only includes existing public lands, as there are no connectivity options for this metapopulation, which is confined by the Myakka River to the west and south and urbanization to the north and east. Alternative 3 for M7 adds Prairie Creek Estates and portions of Washington Loop, and excludes some areas of Deep Creek and Jones Loop as these private properties do not facilitate a corridor nor are they adjacent to public lands.

This alternative is not preferred again because the majority of scrub-jays in M5 and M6 are located in suburban areas, where scrub-jay demographic parameters are poor and extinction rates are high. M7 consists mostly of rural areas with much more Type 1 scrub habitat in a rural setting than in a suburban matrix, and more and larger public lands occupied by scrub-jays are found in M7. The population viability for M7 is improved somewhat over Alternative 3, but the extinction rate is remains higher than shown for the preferred.

6.6 Reserve Alternative 5 (Preferred Alternative)

Reserve Alternative 5 consists of all county-wide public lands and the suitable private scrub habitats that would provide breeding and foraging habitat and serve as dispersal corridors between public lands east of the Peace River in the Prairie/Shell Creek area. Based on the results of the detailed scrub-jay PVA and TAC input, Alternative 5 was chosen as the Preferred Alternative with a focus on acquisition and management in East County (M7) where scrub-jay viability was highest.

Compared to Reserve Alternative 4, Alternative 5 provides additional blocks of potential scrub-jay habitat greater than 25 acres, but also creates habitat patches that may provide connectivity to populations of scrub-jays on Charlotte County public lands and populations to the north, in Sarasota County. However, the viability in the areas of West and Mid-County (M5 and M6) did not benefit from the addition of privately owned scrub patches, nor is it feasible to manage habitat and scrub-jay populations in a suburban area with the potential for high density residential development, habitat management sensitivities (smoke), and ¼-acre lots that are difficult to acquire and successfully manage. However, TAC consensus included the consideration of expanding existing public lands in West and Mid-County through the acquisition of adjacent private parcels, in an effort to expand populations throughout the county, where possible.

7.0 Plan Implementation

Charlotte County will be the ITP Permittee, will be the responsible party to ensure the conditions of the HCP are followed, and will provide for all of the necessary funding for implementation of the HCP, including long-term management. Restoration, monitoring, and management activities will be conducted by Charlotte County staff, and they will be responsible for securing any required contractors and dedicating County staff to the project. County staff will conduct or oversee the monitoring programs and will be responsible for annual reporting and any coordination that may be required with the USFWS.

7.1 Implementation Schedule

The Reserve System provides a blueprint for the protection and management of almost all of the remaining scrub habitats in the eastern part of Charlotte County, as well as continued management of all existing public scrub lands. The County has begun the process of negotiating parcel acquisition and will continue to do so throughout the life of the HCP.

Parcel acquisition will be tied to the collection of fees discussed in Section 5 and must be based on willing sellers. Timing of acquisition of specific parcels is therefore not known at this time; however, the County will track and reevaluate the progress of acquisition at years 2, 4, 6 and every five years thereafter. Due to the high likelihood of development or the inability to purchase all of these lands, the

Plan must remain flexible. It was recommended by USFWS to create flexibility in the plan to allow for adjustments in acquisition due to the fact that this is a willing seller only acquisition program. Through the County permitting process the County will establish minimization and avoidance criteria for parcels over three acres (as described in Section 4.4), which will help to deter the complete conversion of larger parcels both inside and outside the Reserve. Additionally, the County will to the extent practical and legal incentivize the sale of Reserve parcels rather than focusing on deterring development. With a willing seller program and without the ability to eminent domain, regardless of incentives or disincentives to sell or build there is no guarantee that all parcels outlined in the Reserve can or will be acquired. The parcels that are projected to comprise the Reserve will also be re-evaluated during the County and USFWS comprehensive reviews..

Any management or restoration required on newly acquired parcels will begin immediately following acquisition, with the exception of scrub-jay nesting season on occupied properties. The County will be responsible for implementation and timely completion of all restoration activities to minimize temporal habitat loss. Restoration methods and long-term management will take place according to the plans outlined in Section 4.

7.2 Changed Circumstances

Circumstances which can affect the HCP or covered species and are reasonably foreseeable as possible to occur in the future include hurricanes or other severe weather events, wildfires, flooding, occasional freezes, and unanticipated population declines due to disease, or predation. Scrub-jay and eastern indigo snake losses within Charlotte County as a result of one or more of these circumstances will not result in changes to the HCP, and compliance with all Conservation Measures will be maintained.

Additional circumstances which would affect HCP implementation include the inability to acquire all of the parcels identified in the Reserve. Many of these parcels are in private ownership and although most are in relatively good condition to support scrub habitat in the future, there is no guarantee that they won't be developed or altered in some way as to make them less desirable. The County will implement the reevaluation process described in section 1.6 of this document to track this and determine which parcels may no longer be available or desirable, and adjust the composition of the Reserve accordingly.

The Florida bonneted bat is proposed for listing as endangered under the ESA. Information on the habitat use or habitat preference is lacking, and home range information is not available at this time. There is currently a lack of data on occurrences of this species in Charlotte County outside of the Fred C. Babcock/Cecil M. Webb Wildlife Management Area or the Babcock Ranch Preserve. If the Florida bonneted bat or the gopher tortoise are listed, or critical habitat is designated, pursuant to the ESA, and it appears that the activities covered under this HCP could potentially impact the species or result in destruction or adverse modification of critical habitat, the USFWS and Charlotte County will confer to determine if the HCP should be amended to cover the take of the species, or if other measures are appropriate.

7.3 Unforeseen Circumstances

According to the Endangered Species Habitat Conservation Planning Handbook (USFWS and NMFS 1996), "unforeseen circumstances" are defined as "changes in circumstances surrounding an HCP that were not or could not be anticipated by HCP participants and the Service, that result in a substantial and adverse change in the status of a covered species."

It is understood that unforeseen circumstances could arise that might affect the HCP, and Charlotte County is committed to addressing these to the extent reasonably practicable. Catastrophic or other unforeseen events could cause the USFWS and FWC to review any changes in the viability of the covered species. The USFWS and FWC will reinitiate consultation and changes will be agreed upon by all parties (USFWS, FWC, and the County). It is agreed that any actions that may be required to address unforeseen circumstances will be similar to those proposed by the HCP, and shall consist of adaptive management, alterations to schedules, or adjustments to monitoring programs.

The monitoring program to be implemented as a result of the HCP will provide the information to determine whether unforeseen circumstances have arisen within the Plan Area or that may affect the target species such that these need to be addressed. Adaptive management provisions may be implemented by Charlotte County in response to such an event and will include consultation with the USFWS to determine if additional measures are required.

7.4 Climate Change Considerations

Climate change has been moving to the forefront of conservation issues in recent years. Possibly the biggest threat to Florida is sea level rise associated with climate change. With portions of Charlotte County in close proximity to water bodies, habitats in these areas may be at long-term risk and scrub habitat, particularly in the western portions of the county, may not remain suitable for scrub-jays.

One approach to combating sea level rise in regards to fulfilling requirements for the HCP is to provide multiple scrub reserves above the elevation of predicted future water levels. Potential impacts of climate change on the HCP may include additional development pressure on scrub/uplands and reduced ability to manage the Reserve at optimal conditions. Scrubby habitats are dependent on fire for maintenance of the vegetative structure required by scrub-jays. Rising sea levels, increased temperature and evapotranspiration, and changes in rainfall will all affect the ability to manage the lands through prescribed fire. Increased urban interface, flooding, increased humidity levels due to evapotranspiration, increased droughts, and changes in rain patterns all have the potential to make prescribed burning more dangerous and less feasible; these issues will be address through adaptive management (Section 4.7).

7.5 No Surprises

The “No Surprises” policy establishes a clear commitment from the USFWS to honor the agreements under an approved HCP for which the permittee is implementing the terms and conditions in good faith (USFWS 1996). The HCP Handbook (FWS and NMFS 1996) states the USFWS will not require the commitment of additional land or financial compensation beyond the level of mitigation provided within the approved HCP, as long as the County remains in compliance with the provisions of the HCP and the conservation actions are being adequately implemented.

8.0 Literature Cited

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

Bednekoff, P.A., R. Bowman, and G.E. Woolfenden. 2008. Do conversational gutterals help Florida scrub-jays coordinate their sentinel behavior? Ethology 114:313-317.

Bellwood, J.J. 1981. Wagner's mastiff bat, *Eumops glaucinus floridanus* (Molossidae) in southwestern Florida. Journal of Mammology; 62:411-413.

Belwood, J.J. 1992. Florida mastiff bat *Eumops glaucinus floridanus*. Pages 216-223 in Rare and Endangered Biota of Florida. Vol. I. Mammals (S.R. Humphrey, (ed.). University Press of Florida; Gainesville, Florida.

Boughton, R. and R. Bowman. 2011. State wide assessment of Florida Scrub-Jay on managed areas: a comparison of current populations to the results of the 1992-93 survey. Report to USFWS.

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

Bowman, R., and G.E. Woolfenden. 2001. Nest Success and the timing of nest failure of Florida Scrub-Jays in suburban and wildland habitats. In: Marzluff, J.M., Bowman, R., Donnelly, R.E. (Eds.), Avian Conservation and Ecology in an Urbanizing World. Kluwer Academic Publishers, New York, pp. 383-402.

Breininger, D.R. 2004. An Adaptive Approach to Managing Florida Scrub-Jay Habitat. NASA/TM-2004-211532

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

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

Breininger, D.R., M.J. Provancha, and R.B. Smith. 1991. Mapping Florida scrub jay habitat for purposes of land-use management. Photogrammetric Engineering and Remote Sensing 51:1467-1474.

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

Breininger, D.R., V.L. Larson, D.M. Oddy, R.B. Smith, and M.J. Barkaszi. 1996. Florida scrub-jay demography in different landscapes. Auk 113:617-625.

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

Breininger, D.R., B. Toland, D.M. Oddy, and M.L. Legare. 2006. Landcover characterizations and Florida scrub-jay (Aphelocoma coerulescens) population dynamics. Biological Conservation 128:169-181.

Burgman, M.A., D.R. Breininger, B.W. Duncan, and S. Ferson. 2001. Setting reliability bounds on habitat suitability indices. Ecological Adapations 11:70-78.

Christman, S.P. 2000. Florida scrub-jay distribution and habitat analysis, Sarasota County. Sarasota County Natural Resources. Sarasota County, Florida. 139 pp.

Coulon, A., J.W. Fitzpatrick, R. Bowman, B.M. Stith, C.A. Makarewich, L.M. Stenzler, and I.J. Lovette. 2008. Congruent population structure inferred from dispersal behavior and intensive genetic surveys of the threatened Florida scrub-jay (Aphelocoma coerulescens). Molecular Ecology 17:1685-1701.

Coulon, A., J.W. Fitzpatrick, R. Bowman, and I.J. Lovette. 2010. Effects of Habitat Fragmentation on Effective Dispersal of Florida Scrub-Jays. Conservation Biology. 24:1080-1088.

Coulon, A., J.W. Fitzpatrick, R. Bowman, and I.J. Lovette. 2012. Mind the gap: genetic distance increases with habitat gap size in Florida scrub jays. Biological Letters 8:582-585.

Cox, J.A. 1987. Status and distribution of the Florida scrub jay. Florida Ornithological Society Special Publication number 3. Gainesville, Florida.

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

Dodd, C.K., Jr., and W.J. Barichivich. 2007. Movements of large snakes (Drymarchon, Masticophis) in north-central Florida. Florida Scientist 70:83-94.

Duncan, B.W., D.R. Breininger, P.A. Schmalzer, and V.L. Larson. 1995. Validating a Florida scrub jay habitat suitability model, using demography data on Kennedy Space Center. Photogrammetric Engineering and Remote Sensing 56:1361-1370.

Eger, J.L. 1999. Wagner's mastiff bat, *Eumops glaucinus*. Pages 132-133 in The Smithsonian book on North American Mammals (D.E. Wilson and S. Ruff, eds.). Smithsonian Institution Press; Washington, D.C.

Fleischer, A.L., R. Bowman, and G.E. Woolfenden. 2003. Variation in foraging behavior, diet and the time of breeding of Florida scrub-jays in suburban and wildland habitats. The Condor 105:515-527.

Fitzpatrick, J.W., G.E. Woolfenden, and M.T. Kopeny. 1991. Ecology and development-related habitat requirements of the Florida scrub jay (*Aphelocoma coerulescens*). Florida Game and Freshwater Fish Commission Nongame Wildlife Program technical report number 8. Tallahassee, Florida.

Fitzpatrick, J.W., B. Pranty, and B. Stith. 1994. Florida scrub jay statewide map 1992-1993. Archbold Biological Station. Lake Placid, Florida.

Fitzpatrick, J.W., G.E. Woolfenden, and R. Bowman. 1999. Dispersal distance and its demographic consequences in the Florida Scrub-jay. *In:* Adams, N.J. and Slotow, R.H. (eds). Proc. 22 International Ornithological Congress, Durban: 2465-2479. Johannesburg: BirdLife South Africa. http://www.int-ornith-union.org/files/proceedings/durban/Symposium/S41/S41.2.htm

Florida Fish and Wildlife Conservation Commission. 2011. Bald Eagle Nest Locator. https://public.myfwc.com/FWRI/EagleNests/nestlocator.aspx

Florida Fish and Wildlife Conservation Commission. 2011. Florida bonneted bat biological status review report. March 31, 2011. Florida Fish and Wildlife Conservation Commission; Tallahassee, Florida.

Florida Fish and Wildlife Conservation Commission. 2009. Scrub Management Guidelines for Peninsular Florida: Using the Scrub-Jay as an Umbrella Species.

Florida Fish and Wildlife Conservation Commission. 2007. Gopher Tortoise Management Plan.

Florida Natural Areas Inventory. 2010. Natural Communities Guide.

Hogan, S.G. III. 1994. The reproductive success and behavior of the Florida Scrub Jay (*Aphelocoma coerulescens coerulescens*) Pitelka 1951 on the barrier island in Brevard County, Florida. M.S. thesis, Florida Institute of Technology, Melbourne, Florida.

Koenig, W.D., F.A. Pitelka, W.J. Carmen, R.L. Mumme, and M.T. Stanback. 1992. The evolution of delayed dispersal in cooperative breeders. Quarterly Review of Biology 67:111-150.

Layne, J.N., and T.M. Steiner. 1996. Eastern indigo snake (Drymarchon corais couperi): summary of research conducted on Archbold Biological Station. Report prepared under Order 43910-6-0134 to the U.S. Fish and Wildlife Service; Jackson, Mississippi.

Lack, D. 1968. Ecological adaptations for breeding in birds. Methuen, London, England.

Lippincott, C.L. 1997. Ecological consequences of *Imperata cylindrical* (cogongrass) invasion in Florida sandhill. Dissertation, University of Florida, Gainesville.

Marks, G.E. and C.S. Marks. 2008a. Status of the Florida bonneted bat (*Eumops floridanus*). Submitted by George E. Marks and Cynthia S. Marks of the Florida Bat Conservancy for the U.S. Fish and Wildlife Service under grant agreement number 401815G192. January 31, 2008. Florida Bat Conservancy; Bay Pines, Florida.

Marks, G.E. and C.S. Marks. 2008b. Status of the Florida bonneted bat (*Eumops floridanus*). Supplemental report. Submitted by the Florida Bat Conservancy under grant agreement number 401815G192. Florida Bat Conservancy; Bay Pines, Florida.

Marks, G.E. and C.S. Marks. 2012. Status of the Florida bonneted bat (*Eumops floridanus*). Submitted by George E. Marks and Cynthia S. Marks of the Florida Bat Conservancy for

the U.S. Fish and Wildlife Service under grant agreement number 40181AG121. May 4, 2012. Florida Bat Conservancy; Bay Pines, Florida.

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

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

Menges, E.S., and D.R. Gordon. 2010. Should mechanical treatments and herbicides be used as fire surrogates to manage Florida's uplands? A review. Florida Scientist 73:147-174.

Miller, K.E., and B.M. Stith. 2002. Florida scrub-jay distribution and habitat in Charlotte County. Final report, contract no. 2001000116: scrub-jay survey. December 2002. 204 pp.

Moler, P.E. 1992. Eastern Indigo Snake *Drymarchon corais couperi* (Holbrook). Pp. 181-186, *In.* P.E. Moler (Ed.). Rare and Endangered Biota of Florida, Volume 3, Amphibians and Reptiles. University Press of Florida, Gainesville, FL. 291 pp.

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

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

Myers, J. 2013. Email exchange with Paula Halupa. Emergence counts of Florida bonneted bats on Fred C. Babcock/Cecil M. Webb Wildlife Management Area from J. Myers,. Florida Game and Freshwater Fish Commission, Nongame Wildlife Section; Frostproof, Florida. April 2, 2013.

Myers, R.L., and J.J. Ewel. 1990. Ecosystems of Florida. University Press of Florida. Gainesville, FL.

NatureServe. 2007. Eastern indigo snake *Drymarchon couperi*. http://www.natureserve.org/explorer/

Pranty, B., J.W. Fitzpatrick, and B.M. Stith. 1997. Unpublished manuscript. Distribution of the Florida scrub-jay, 1992-1996.

Quinn J.S., G.E. Woolfenden, J.W. Fitzpatrick, and B.N. White. 1999. Multi-locus DNA fingerprinting supports genetic monogamy in Florida scrub-jays. Behavioral Ecology and Sociobiology 45: 1–10.

Robson, M. 1989. Status survey of the Florida mastiff bat. Final performance report. Florida Game and Freshwater Fish Commission, Nongame Wildlife Section; Tallahassee, Florida.

Robson, M.S., F.J. Mazzotti, and T. Parrott. 1989. Recent evidence of the mastiff bat in southern Florida. Florida Field Naturalist 17(4):81-82.

Root, K.V. 1996. Population viability analysis for the Florida scrub-jay (*Aphelocoma coerulescens coerulescens*) in Brevard County, Florida. Unpublished Ph.D. dissertation, Florida Institute of Technology; Melbourne, Florida, May 1996.

Sauter, A., R. Bowman, S.J. Schoech, and G. Pasinelli. 2006. Does optimal foraging theory explain why suburban Florida scrub-jays (*Aphelocoma coerulescens*) feed their young human-provided food? Behavioral Ecology and Sociobiology 60:465-474.

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

Shawkey, M.D., R. Bowman, and G.E. Woolfenden. 2004. Why is brood reduction in Florida scrub-jays higher in suburban than in wildlife habitats? Canadian Journal of Zoology 82:1427-1435.

Small, P. 2012. Email from Paula Halupa. Notes from conference call with Parks Small, Bureau of Natural and Cultural Resources, Florida Department of Environmental Protection (FDEP), and other FDEP staff. Tallahassee, Florida. July 19, 2012.

Stevenson, D.J., K.J. Dyer, and B.A. Willis-Stevenson. 2003. Survey and monitoring of the eastern indigo snake in Georgia. Southeastern Naturalist 2:393-408.

Stevenson, D.J., M.R. Bolt, D.J. Smith, K.M. Enge, N.L. Hyslop, T.M. Norton, and K.J. Dyer. 2010. Prey records for the eastern indigo snake (*Drymarchon couperi*). Southeastern naturalist 9:1-18.

Stith, B.M. 1999. Metapopulation viability analysis of the Florida scrub-jay (*Aphelocoma coerulescens*): a statewide assessment. Final Report to the Endangered Species Office, U.S. Fish and Wildlife Service, Jacksonville, FL. Contract No. 1448-40181-98-M324. August 1999.

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

Thaxton, J.E., and T.M. Hingtgen. 1996. Effects of suburbanization and habitat fragmentation on Florida scrub-jay dispersal. Florida Field Naturalist 24:25-60.

Timm, R. and J. Arroyo-Cabrales. 2008. *Eumops floridanus*. In: IUCN 2011. IUCN Red List of Threatened Species. Version 2011.2. <http://www.iucnredlist.org/>. Accessed on 11 April 2012.

Timm, R. M., and H. H. Genoways. 2004. The Florida Bonneted Bat, *Eumops floridanus* (Chiroptera: Molossidae): Distribution, Morphometrics, Systematics, and Ecology. Journal of Mammology; 85(5): 852-865.

Townsend, A.K., R. Bowman, J.W. Fitzpatrick, M. Dent, and I.J. Lovette. 2011. Genetic monogamy across variable demographic landscapes in cooperatively breeding Florida scrub-jays. Behavioral Ecology 22:464-470.

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

USFWS. 1999. "Multi-species recovery plan for the threatened and endangered species of South Florida." Technical Agency Draft. Atlanta, Georgia.

USFWS. 2008. Eastern indigo snake *Drymarchon couperi* 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service Southeast Region, Mississippi Ecological Services Field Office. Jackson, Mississippi.

USFWS. 2011. Florida Scrub-Jay Translocation Guidelines. http://www.fws.gov/northflorida/Scrub-Jays/Docs/20110606_gd_Scrubjay_translocation_guidelines.pdf

Woolfenden, G.E., and Fitzpatrick, J.W. 1984. The Florida scrub jay, demography of a cooperative-breeding bird. Princeton Univ. Press, Princeton, NJ.

Woolfenden, G.E., and J.W. Fitzpatrick. 1990. Florida scrub jays: a synopsis after 18 years of study. Pages 240-266 *in:* Cooperative breeding in birds; long-term studies of ecology and behavior (P.B. Stacey and W.D. Koenig, eds.). Oxford University Press, Oxford, U.K.

Woolfenden, G.E., and J.W. Fitzpatrick. 1991. Florida Scrub Jay ecology and conservation. Pages 542-565 *in* Bird population studies (C.M. Perrins, J.D. Lebreston, and G.J.M. Hirons, Eds.). Oxford University Press, New York.

Woolfenden, G.E., and J.W. Fitzpatrick. 1996. Florida scrub-jay. Pages 1-27 *in* A. Poole and F. Gill, eds. The birds of North America, No. 228. The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union; Washington D.C.