# *FY 2010-11 Progress Report*

on activities of the

Florida Fish and Wildlife Conservation Commission

# Endangered and Threatened Species Management and Conservation Plan

# FLORIDA'S ENDANGERED AND THREATENED SPECIES MANAGEMENT AND CONSERVATION PLAN FY 2010-11 PROGRESS REPORT

by the

## Florida Fish and Wildlife Conservation Commission

Prepared by Staff of the
Florida Fish and Wildlife Conservation Commission

December 2011

Nick Wiley
Executive Director
Florida Fish and Wildlife
Conservation Commission

# TABLE OF CONTENTS

# LIST OF TABLES



# LIST OF FIGURES

# EXECUTIVE SUMMARY

This document constitutes the 33rd progress report and update of the Florida Endangered and Threatened Species Management and Conservation Plan as required by the Florida Endangered and Threatened Species Act of 1977 [§379.2291(5), Florida Statutes (F.S.)]. The Act required the preparation of an initial plan for submission to the 1978 Florida Legislature, and the annual preparation of a revised and updated plan for management and conservation of Endangered and Threatened species. Species of Special Concern also are included in this report. Species designated as Endangered, Threatened, or Species of Special Concern are collectively referred to as listed species.

The initial plan submitted in March 1978 remains the basic reference document for the annual updates. Subsequent annual reports may be consulted regarding a chronological history of the listed species activities. Copies are available from the Division of Habitat and Species Conservation, Species Conservation Planning Section, of the Florida Fish and Wildlife Conservation Commission (FWC), Tallahassee or at http://www.myfwc.com.

This report covers the fiscal year (FY) 2010-11, a period from July 1, 2010 to June 30, 2011. It includes a description of FWC's criteria for research and management priorities, statewide policies pertaining to listed species, required legislation, a funding request for FY 2012-13, a progress report providing a description of agency actions for listed species, and a description of FWC's citizen awareness program. The progress report section includes reports of staff activities covering listed mammals, birds, amphibians, reptiles, fish, and invertebrates. Additionally, this report provides updates on agency actions to provide coordination and assistance, Critical Wildlife Areas (CWA), incentive-based conservation programs, law enforcement, and permitting for listed species. Please contact FWC's Listed Species Coordinator if you would like more information about anything in this report. Contact information is listed below.

We would like to express our appreciation to each person who contributed to this report. Special appreciation is expressed to Caly Murphy for her assistance in the preparation of this report, and Elsa Haubold and Lawson Snyder for editorial review.

Bradley J. Gruver, Ph.D., Listed Species Coordinator
Caly Murphy, Assistant Listed Species Coordinator
Florida Fish and Wildlife Conservation Commission
Division of Habitat and Species Conservation
Species Conservation Planning Section
850-488-3831
brad.gruver@myfwc.com

# SUMMARY OF THREATENED WILDLIFE LISTS

The first Florida Endangered Species List for wildlife was promulgated in 1972 and consisted of 23 species. Listing was expanded in 1973 to include Threatened species, and again in 1979 to include Species of Special Concern. New Threatened species rules approved by the FWC Commissioners went into effect on November 8, 2010, creating the Florida Endangered and Threatened Species List. All species that are listed under the U.S. Endangered Species Act by the U.S. Fish and Wildlife Service (USFWS) or the National Oceanic and Atmospheric Agency's Marine Fisheries Service (NOAA-Fisheries) and are found in Florida are now included on the Florida Endangered and Threatened Species List as Federally-designated Endangered, Federally-designated Threatened, or Federally-designated Nonessential Experimental species. Species formerly listed as Endangered or Threatened by the Florida Fish and Wildlife Conservation Commission (FWC) and not Federally listed are included on the Florida Endangered and Threatened Species List as State-designated Threatened species. The Species of Special Concern List has been temporarily retained to allow time to assess whether these species meet the listing criteria for Threatened species (see the Threatened Species Management System and Listing Process section for details).

The official Florida Endangered and Threatened Species List is kept in Rule 68A-27.003, Florida Administrative Code (F.A.C.). The Species of Special Concern List is kept in Rule 68A-27.005 FAC. Currently, FWC lists 131 fish and wildlife species (**Table 1**) as Federally-designated Endangered (46), Federally-designated Threatened (20), Federally-designated Nonessential Experimental Population (one), State-designated Threatened (21), or Species of Special Concern (43). Collectively, these 131 species are referred to as Florida's listed species. Management and research activities were not conducted on all listed species this year and, therefore, not all species are discussed in detail in this report. A complete listing of Florida's listed wildlife species as of June 30, 2011 is included as Appendix A. Florida's listed species may also be accessed at http://myfwc.com/media/1515251/Threatened_Endangered_Species.pdf. The rules noted above may be viewed at the F.A.C. Website (https://www.flrules.org/gateway/ChapterHome.asp?Chapter=68A-27).

Federal agencies also list species as Endangered and Threatened. NOAA-Fisheries is responsible for listing most marine species and the Department of the Interior's USFWS is responsible for other species. The Federal list of animals and plants is administered by USFWS and published in the Code of Federal Regulations (CFR) 50 CFR ; animals in 50 CFR 17 and plants in 50 CFR 23. Additional information regarding Federal listings may be located at http://www.nmfs.noaa.gov for NOAA-Fisheries and http://www.fws.gov/endangered/species/us-species.html for USFWS. The Florida Department of Agriculture and Consumer Services (FDACS) has a Florida Statewide Endangered and Threatened Plant Conservation Program (http://www.fl-dof.com/forest_management/plant_conservation_index.html) that maintains a list of Florida's Federally listed plant species. This list may be accessed at http://www.fl-dof.com/forest_management/plant_conserve_list.html.

**Table 1**. Summary of the Florida Endangered and Threatened Species and Species of Special Concern lists as of June 30, 2011. Number of species listed by the FWC as Federally-designated Endangered **(FE)**, Federally-designated Threatened **(FT)**, Federally-designated Threatened because of similarity of appearance **[FT(S/A)]**, Federally-designated Nonessential Experimental **(FXN)**, State-designated Threatened **(ST)**, or Species of Special Concern **(SSC)**.

| STATUS DESIGNATION | FISH | AMPHIBIANS | REPTILES | BIRDS | MAMMALS | INVERTEBRATES | TOTAL |
|---|---|---|---|---|---|---|---|
| FE | 3 | 1 | 4 | 9 | 22 | 7 | 46 |
| FT | 1 | 1 | 6 | 4 | 1 | 6 | 19 |
| FT(S/A) | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| FXN | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| ST | 3 | 0 | 7 | 5 | 4 | 2 | 21 |
| SSC | 7 | 4 | 6 | 16 | 6 | 4 | 43 |
| **TOTAL** | **14** | **6** | **24** | **35** | **33** | **19** | **131** |

# STATUTORY REQUIREMENTS

## CRITERIA FOR RESEARCH AND MANAGEMENT PRIORITIES

The Florida Fish and Wildlife Conservation Commission (FWC) uses a variety of tools to evaluate and prioritize research and management needs for State listed species. One tool used is the State listing process described in Rule 68A-27, F.A.C. This process uses a quantitative system to identify Florida's most at risk species and directs the development of a management plan for each species undergoing a listing action. In addition to the listing process, FWC uses a species ranking process that was developed by FWC staff and published in Wildlife Monographs (Millsap, B. M., J. A. Gore, D. E. Runde, and S. I. Cerulean. 1990. *Setting priorities for the conservation of fish and wildlife species in Florida*. Wildlife Monographs 111). This ranking process provides a biological score, which ranks species based on their biological vulnerability; an action score that ranks species based on the amount of available information and ongoing management actions for a species; and a supplemental score that looks at variables not included in biological or action scores. These scores help identify species most in need and the amount of effort previously expended on them, which then is used to help in prioritizing agency resources. FWC's Florida Wildlife Legacy Initiative also maintains a list of Species of Greatest Conservation Need and identifies species trends as declining, stable, or increasing, and those species for which information is needed.

In addition to these tools, FWC must also consider available funding sources and activities required by legislation, court rulings, grant agreements, and approved management plans when setting priorities. FWC uses the listing process, the species ranking process, available funding sources and consideration of other required activities including approved management plans to allocate resources for the management and conservation of Florida's State listed species.

## STATEWIDE POLICIES PERTAINING TO LISTED SPECIES

Listing Actions (*Brad Gruver*). – The Commission did not work on any listing actions during FY 2010-11. Previously completed biological status reports and management plans are available at http://myfwc.com/wildlifehabitats/imperiled/listing-action-petitions/.

Threatened Species Management System, the Listing Process, and Management Plans (*Brad Gruver*). – In 1999, FWC adopted a Threatened species listing process, with the assistance of stakeholders, modeled upon listing criteria developed by the International Union for the Conservation of Nature. Due to controversy surrounding some listing actions, the FWC placed a moratorium on listing actions in 2002 and, again with stakeholder input, re-evaluated the listing process. The listing process was modified in April 2005 based on stakeholder consensus of some items; however, the stakeholders could not reach consensus on several other issues and controversy continued to surround the listing process. In December 2007, the FWC Commissioners directed agency staff to review the listing process again and further explore options for listing species in Florida. Additionally, the FWC Commissioners asked staff to better define the context of the listing process within a broader Threatened species management system. A leadership team was developed and began working on these issues in early 2008. A

summary of the team's progress was presented to the FWC Commissioners in June 2008, and the team received additional direction from the FWC Commissioners to continue development of a revised listing process and Threatened species management system. The team developed a vision and concept for the Threatened species management system, met with major stakeholder groups, and developed a package of proposed rule changes to establish a revised listing process within the Threatened species management system.

Proposed rules were presented to the FWC Commissioners in December 2009 that were further revised through additional meetings with stakeholders and review of public comments. The final rules were sent to the FWC Commissioners in September 2010 and subsequently approved. These rules became effective on November 8, 2010 and may be accessed at https://www.flrules.org/gateway/ChapterHome.asp?Chapter=68A-27. Florida's new Threatened species management system has many improvements and is expected to provide better conservation for Florida's listed species. To remove some of the controversy surrounding what category a species should be placed in (Endangered, Threatened, Special Concern), Florida's list is now comprised of all species Federally listed in Florida, and a separate, single-category State list of species at risk of extinction in Florida that are not Federally listed. By maintaining a single listing category, the State's efforts can be focused on what needs to be done for the species instead of what the species is called. This single listing category is now called State-designated Threatened. In addition, all species grandfathered on the State's list must be assessed against the new listing criteria to ensure they are still at a high risk of extinction and they must have a management plan developed with public input over the next three years to guide conservation of the species. The management system further eliminates duplication of permitting with Federal agencies by not requiring State permits in addition to Federal permits for take of listed species.

As of the effective date of the revised rules, the FWC listed 64 species as State-designated Threatened (21) and Species of Special Concern (43). In November 2010, status reviews were conducted on 61 of these species to determine if they met the criteria for listing as State-designated Threatened. Three species (Miami blue butterfly, Panama City crayfish, and the gopher tortoise) were recently evaluated using the current criteria and determined to meet the criteria for State-designated Threatened. They were not re-evaluated in November 2010. Based on the status reviews and other information, staff recommended that 40 of the 61 species be listed as State-designated Threatened. Staff also recommended that 16 species be removed from the State-designated Threatened (three) and Species of Special Concern (13) lists. The Species of Special Concern category is intended to be abolished after all of species in the category are determined to either meet or not meet the criteria for State-designated Threatened listing status. Staff recommendations were approved by the FWC Commissioners in June 2011. Pursuant to the listing rule, FWC was directed to proceed with development of management plans addressing all 64 species. No listing status changes will occur until management plans are approved by the FWC Commissioners.

Two of the 64 species (the Miami blue butterfly and gopher tortoise) have already received approval of their management plans. Two other species (the Florida black bear and Panama City crayfish) have draft management plans in development. Staff began work in December 2010 on the process to be used to develop management plans for the remaining 60 species. In the first half of 2011, FWC staff took the first step of management plan creation and developed goals and objectives for each of the 60 species. Staff plan to engage stakeholders in the second half of 2011 to review the goals and objectives and continue working on the remaining aspects of the management plan.

## REQUIRED LEGISLATION

Currently, FWC has no requests for legislative changes affecting wildlife species that are listed. FWC will work with the Legislature should any legislation involving listed wildlife species be proposed.

## FWC'S RESPONSE TO THE DEEPWATER HORIZON OIL SPILL (*Elsa Haubold*)

During FY 2010-11, FWC continued to support the response efforts to the Deepwater Horizon oil spill. FWC worked with Florida Department of Environmental Protection (FDEP), county governments, water management districts, and several Federal agencies in the following areas during the State of Florida's emergency response to the BP Deepwater Horizon oil spill: reconnaissance, scientific support, Natural Resources Damage Assessment sampling, and wildlife response.

FWC staff were on duty at Joint Incident Command posts in Mobile, Alabama, and the Florida Peninsula Command Post in Miami, which also oversaw operations for the remaining Sectors in Florida: St. Petersburg, Key West, and Miami. Additionally, FWC staff were deployed to the Emergency Operations Center in Tallahassee, as well as County Emergency Operations Centers throughout the Panhandle. Hundreds of FWC staff worked behind the scenes to coordinate all activities and communications regarding wildlife issues.

FWC was actively involved in reconnaissance efforts. Staff members were deployed on FWC aircraft and offshore on FWC vessels to monitor Florida's shoreline for the presence of oil and to provide information that allowed emergency management officials to make informed, timely decisions regarding response, mitigation, and recovery. FWC staff developed wildlife management plans for Sector Command Centers. Staff also developed wildlife-related guidance for night-time cleaning crews. FWC staff participated in the Natural Resource Damage Assessment, which included pre- and post-spill impact conditions from an ecological and economic standpoint. This process was science-based and provided supporting data needed for long-term remediation, as well for future litigation. FWC staff provided guidance to Tri-State, BPs wildlife rescue and rehabilitation contractor, on how to develop and review wildlife protocols. These protocols were established to address issues such as risks associated with wildlife translocation, proper translocation sites to prevent re-oiling, monitoring of both oil and non-oil related wildlife mortality, and oiled wildlife response planning.

Through November 2011 when the last consolidated wildlife report was made available, 254 visibly-oiled birds had been collected alive and 238 dead. Another 715 birds without visible external oil were recovered dead on Florida beaches. Forty-two of the live birds were released. Three live visibly-oiled and 14 not visibly-oiled sea turtles were rescued alive. One dead visibly-oiled sea turtle was recovered and 69 additional dead sea turtles (not visibly oiled) were recovered. One visibly-oiled dolphin was rescued alive and three dolphins without visible oil were recovered dead. It is unknown whether all of the recovered wildlife is related to the oil spill. The most common birds recovered during the oil spill in Florida were the Northern gannet, common loon, pied-billed grebe, and laughing gull. Listed species recovered during the oil spill included sea turtles, brown pelicans, least tern, roseate spoonbill, and black skimmer.

Since the emergency response ended in August 2010 and the state Emergency Operations Command stopped operations, FWC staff have continued to be involved in Natural Resource Damage Assessment projects and in staffing the response from the Regional Command Center

and Joint Information Center in New Orleans, LA. Under Natural Resource Damage Assessment, FWC staff are assessing the effects of the oil spill and engaging in discussions as a Florida Co-Trustee (with FDEP as the Trustee) to determine early restoration projects that might be implemented in Florida. Natural Resource Damage Assessment work is expected to continue for several years. More information about the Deepwater Horizon Spill may be found at http://www.restorethegulf.gov.

FUNDING REQUEST

Recommended Funding Level (*Sandy Wilson*).--The recommended level of funding for the FWC listed species programs in FY 2012-13 is $25,797,528 (**Table 2**). This includes funding to maintain and enhance current programs and allow for the continuation of awards from Federal grants designed to assist in development of recovery programs.

**Table 2**. FWC Endangered and Threatened Species Budget Request for FY 2012–13.

| Funding Source | Amount |
|---|---|
| **Nongame Wildlife Trust Fund** | **$2,164,843** |
| **Florida Panther Research & Management Trust Fund** | **$1,325,222** |
| **Save the Manatee Trust Fund** | **$3,523,301** |
| **Marine Resources Conservation Trust Fund** | **$7,162,727** |
| **Land Acquisition Trust Fund** | **$3,038,656** |
| **State Game Trust Fund** | **$579,414** |
| **Conservation and Recreation Lands Trust Fund** | **$15,119** |
| **Federal Grants** | **$7,987,261** |
| **Grants and Donations Trust Fund** | **$986** |
| **Total** | **$25,797,529** |

PROGRESS REPORT

The mission of the Florida Fish and Wildlife Conservation Commission (FWC) is "managing fish and wildlife resources for their long-term well-being and the benefit of people." Management of species that are Endangered or Threatened, and Species of Special Concern includes: surveying and monitoring of species; habitat improvement and restoration; development and implementation of management plans; conservation planning; agency commenting on potential impacts to species; and citizen awareness. Research is a systematic means of generating the scientific information necessary to support and guide management of listed species. Research is also leading to a better understanding of how wildlife managers may alter population processes through management actions, as well as leading to management actions that have aided in species stabilization and conservation. This section briefly describes the progress of ongoing listed species management and research by FWC.

## MAMMALS

### Beach Mice (*Samantha Dupree, Jeff Gore, Dan Greene, and Melissa Tucker*)

Several subspecies of the old-field mouse, collectively known as beach mice, inhabit coastal dune habitat along the northwest coast and east coast of Florida. Due to the extensive development of their coastal habitat, all but one of the beach mouse subspecies are Federally-designated as Endangered or Threatened, including: Choctawhatchee beach mouse; Anastasia Island beach mouse; St. Andrews beach mouse; and Perdido Key beach mouse (all Federally-designated Endangered); and the Southeastern beach mouse (Federally-designated Threatened).

Conservation and Population Monitoring – For the past few years, FWC biologists have worked with land management partners to monitor beach mouse populations with track stations set in dune habitat on public lands. Track stations contain PVC baited tubes with inked pads that record tracks of beach mice as they enter the tubes. Track stations have been established within the range of each of the Federally–designated Endangered subspecies in northwest Florida and they are checked monthly to determine the presence of mice. In FY 2010-11, FWC expanded the monitoring to three new areas, conducted a reintroduction of the Choctawhatchee beach mouse at Grayton Beach State Park, began writing manuscripts to publish the results of beach mouse monitoring, and managed volunteers through the FWC volunteer program to assist with beach mouse monitoring.

FWC biologists monitored St. Andrews beach mice at two public areas – East Crooked Island at Tyndall Air Force Base in Bay County and at Rish Park on the St. Joseph Peninsula in Gulf County. At East Crooked Island, 42 track stations were monitored during FY 2010-11. All of the tubes recorded tracks in some month during FY 2010-11 and an average of 95% of the stations checked each month detected mouse tracks. This is the same average observed during FY 2009-10. All 21 stations at Rish Park also recorded tracks during FY 2010-11 and a monthly average of 81% of stations detected mouse tracks. This is slightly more than the average of 77% observed during FY 2009-10.

In Bay County, FWC biologists expanded track tube surveys to three new locations to monitor Choctawhatchee beach mice: West Crooked Island (under management of Tyndall Air Force Base); Shell Island (Federal property portion, under management of Tyndall Air Force

Base); and Shell Island (State property portion, under management of St. Andrew's State Park). At West Crooked Island, all 30 tubes recorded beach mouse tracks at least once during the year, and an average of 65% of the tubes checked each month detected tracks. At the Tyndall Air Force Base's portion of Shell Island, all 35 tubes detected mouse tracks at least once during the year, and an average of 80% of the stations checked each month detected mouse tracks. At St. Andrew State Park's portion of Shell Island, 11 of 15 tracking stations recorded tracks in some month during the year, and an average of 77% of the stations checked each month detected mouse tracks.

In Walton County, the Florida Department of Environmental Protection (FDEP) and FWC continued to monitor the population of Choctawhatchee beach mice at Deer Lake State Park, Topsail Hill Preserve State Park, and Grayton Beach State Park. During FY 2010-11, 15 of 16 stations at Deer Lake recorded tracks in at least one month and an average of 50% of the tubes checked detected tracks each month. In comparison, an average of 51% of the tubes contained tracks in FY 2009-10. At Topsail Hill, 31 of the 32 stations recorded tracks in at least one month and a monthly average of 64% of stations detected mouse tracks compared to an average 75% observed during FY 2009-10. In April of 2011, partners from FDEP and the U.S. Fish and Wildlife Service (USFWS) trapped mice at Topsail Hill Preserve State Park for five consecutive nights. Sixty-five beach mice were captured throughout the park with 93 total captures (including recaptures). At Grayton Beach State Park, the Choctawhatchee beach mouse has not been detected since track tube surveys started in October 2008. In April 2011, 43 mice were translocated from Topsail Hill to Grayton Beach State Park. The number of track tubes at Grayton Beach State Park was increased from 30 to 45 tubes to provide complete coverage in the park and to monitor the status and expansion of the mice. By June 30, 35 of the 45 tubes recorded tracks in at least one month and a monthly average of 41% of the stations checked each month detected mouse tracks. This indicates that the mice survived the initial transfer from Topsail to Grayton and have expanded into suitable dune habitat in their new home.

Monitoring was also conducted at two sites where Choctawhatchee beach mice have not been observed for several decades. Ten monitoring stations were surveyed at Camp Helen State Park and 11 stations were surveyed at St. Andrews State Park in Bay County. Beach mouse tracks were not detected at either park during FY 2010-11.

The Perdido Key beach mouse currently has the smallest distribution of all the subspecies of beach mice. After Hurricane Ivan hit Perdido Key in 2004, beach mouse populations dropped to extremely low levels, but they have recently started to rebound. In FY2010-11, FWC biologists along with partners from FDEP and the National Park Service monitored track stations that were first established in 2005 in the Perdido Key Unit of Gulf Islands National Seashore (Escambia, Okaloosa, and Santa Rosa counties in Florida; Jackson and Harrison counties in Mississippi) and Perdido Key State Park (Escambia County). At Gulf Islands National Seashore, beach mouse tracks were detected in 78 of 80 tubes checked with a monthly average of 91% of stations having tracks. This is an increase from the monthly average of 57% observed during FY 2009-10. At Perdido Key State Park, mouse tracks were detected at 79 of the 81 tracking stations, and an average of 82% of the stations checked each month detected mouse tracks. This is an increase from the average of 17% observed during FY 2009-10.

Track stations allow FWC to monitor dune habitats for the presence of beach mice, with reduced risk and labor associated with trapping. Monitoring across the ranges of the Gulf Coast subspecies of beach mice provides managers with current information on beach mouse presence, and during FY 2010-11, helped them to identify areas for future trapping, management, and

translocations. Track station data confirmed that occupied beach mouse habitat did not decrease from the previous year for most of the beach mice subspecies, with the exception of the population of Choctawhatchee beach mice that declined slightly at Deer Lake State Park (declined one percent) and the population at Topsail Hill Preserve State Park (declined 11%).

Perdido Key Beach Mouse Captive Breeding – Just prior to landfall of Hurricane Ivan in 2004, eight beach mice were taken from Perdido Key State Park in Escambia County and transferred to a holding facility at the University of South Carolina. In 2007, the original eight mice and their descendants were moved to three Florida zoos in order to provide the public an opportunity to see beach mice and to educate visitors about beach mouse biology and conservation. As of summer of 2011, the zoos continued to support captive colonies of Perdido Key beach mice and each zoo provided opportunities for the public to view the mice and learn about their status in the wild. The mice have been breeding successfully in captivity and these mice were used to reestablish a wild population in 2010.

FWC biologists, in conjunction with the Alabama Department of Conservation and Natural Resources, USFWS, the Brevard Zoo in Brevard County, The Teaching Zoo at Santa Fe Community College in Alachua County, and Palm Beach Zoo in Palm Beach County, continued to monitor the status of Perdido Key beach mice at the Florida Point Unit of Gulf State Park, Alabama. In March 2010, 48 captive-born Perdido Key beach mice from Florida zoos were released at this site to re-establish a wild population. In September 2010, 24-weeks post release, 51 individual mice were captured (among 125 total captures, including recaptures of some individuals) during a three-night survey in order to monitor the population. In March 2011, 52 weeks after the release, 73 individual mice were captured among 354 total captures (including the recapture of some individuals) during a five-night survey. Non-native house mice are also present in the dune habitat at Gulf State Park and that confounds monitoring efforts because the house mice visit the track stations and leave tracks similar to those of beach mice. Over the past year, FWC biologists have been working on a project to differentiate these two species using measurements of footprints, and within the next year, should be able to consistently distinguish tracks of the two species.

Anastasia Island Beach Mouse Population Monitoring –FWC, FDEP, National Park Service, and St. Johns County Habitat Conservation staff initiated a range-wide monitoring program for Anastasia Island beach mice on Anastasia Island in St. Johns County using track tubes in combination with live-trapping. The study area extended from the southern half of Anastasia State Park to the southern end of Fort Matanzas National Monument, and includes approximately ten miles of coastal dune habitat between the two locations. At Anastasia State Park, ten track stations were monitored for five months during FY 2010-11, and nine out of ten stations detected mice in at least one monthly check. On average, 70% of track stations detected mouse tracks during the monthly checks. Fort Matanzas National Monument has 31 track stations that have been monitored for six months, with 25 out of the 31 stations detecting mice. On average, the track stations at Fort Matanzas had a 75% detection rate over the six-month period. FWC, partnering with St. Johns County Habitat Conservation staff, installed and monitored 34 track stations for three months between the State Park and the National Monument; 24 out of 34 stations detected mice, and on average, the detection rate for tracks was 64%. The ten mile managed dune area is currently undergoing trapping, with an average of 40 trap stations every other half mile monitored each month. During four months of trapping, the capture rate

was 15%; 22 individuals were captured among 32 total captures. Trapping and use of track tube stations along Anastasia Island expands the level of monitoring of the Anastasia Island beach mouse, and represents the first multi-agency range wide monitoring effort for this subspecies

Development Impacts – Because habitat loss is a primary cause for the decline of beach mouse populations, working with land development projects within beach mouse habitat is a critical component of beach mouse conservation. FWC works with USFWS, developers, and local governments to identify ways to mitigate the loss of beach mouse habitat while allowing development to continue. During FY 2010-11, FWC biologists consulted with landowners and State and Federal agencies regarding development at several sites in beach mouse habitat on both the Atlantic and Gulf coasts.

**Florida Black Bear** (*Dave Telesco and Walter McCown*)

The Florida black bear, listed as Threatened under Florida's former listing process, was transferred to the State-designated Threatened species list in November 2010 under the new Threatened species management system (see page 1). A biological status review was then conducted by FWC and external experts to determine whether or not the Florida black bear (and all other 60 species) met the new Threatened species listing criteria. It was determined that the black bear did not meet the required criteria to meet Threatened species status; staff recommended to the FWC Commissioners that the species be removed from the Endangered and Threatened Species List. The Florida black bear will not be removed from the list until a management plan has been approved by the FWC Commissioners to prevent the species from becoming listed again. The Florida black bear biological status review may be accessed at http://myfwc.com/media/1353789/Florida%20black%20bear%20final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352257/Florida%20Black%20Bear%20Supplemental%20Information.pdf.

The Florida black bear exists primarily on large segments of public and private land throughout the state. FWC continues to engage in research and management efforts to ensure the conservation of the Florida black bear for future generations of Floridians.

Conservation efforts have allowed Florida black bear populations to rebound from historic lows in many areas throughout the state. As the black bear populations expand and Florida's human population grows, human-bear conflicts continue to increase in number and intensity. Black bears require large areas to live and their populations are fragmented throughout the state. FWC provides proactive conservation and management planning tools to citizens and partnering organizations to maintain the Florida black bear for the benefit of the species as well as Florida citizens and visitors. A major focus of FWC's Bear Program is increasing awareness of black bears and avoidance of conflicts with them.

In summer 2010, FWC completed work on a comprehensive, statewide draft management plan that began in spring 2007 and was designed to conserve Florida black bears. The plan establishes a framework for community involvement for the benefit of bears and citizens. The plan was released for public comment on June 1, 2010. A website was established to allow the public to provide comments on the plan. FWC participated in briefings with local government officials and meetings with the public in Apalachicola, Deltona, and Fort Walton Beach between

August and October 2010. During that time period, FWC Commissioners approved the new State Threatened Species Rule that required certain issues be addressed in all management plans for listed species. For example, the rule required all Threatened State species to undergo a biological status review. FWC, therefore, closed the public comment period and revised the draft plan to come into compliance with the new rule. FWC and several external experts completed a biological status review of the Florida black bear in November 2010 and determined that the black bear did not meet any of Florida's new listing criteria. Florida's listing criteria identifies species that have a high risk of extinction. The FWC Commissioners agreed with the recommendation to remove the black bear from the Threatened species list, and instructed staff to develop a draft management plan for their review. The black bear will remain as a State-designated Threatened species until the FWC Commissioners approve a Florida Black Bear Management Plan. FWC expects to release the new draft of the Florida Black Bear Management Plan in fall or winter 2011.

During FY 2010–11:

- FWC received 4,192 calls regarding black bears (i.e., sightings, bears in garbage, complaints).
- The number of black bears killed by vehicles totaled 126 individuals for the year.

The contracted Black Bear Response Agent Program, implemented to assist biologists with the black bear management tasks of educating the public, carcass recoveries, and capture efforts as needed, remains active in North and Central Florida. Contracted black bear response agents were dispatched by FWC to respond to 369 requests for assistance during FY 2010-11. The majority (66%) of responses were to provide education and outreach to the public in order to prevent human-bear conflicts from continuing in neighborhoods. Other responses were divided between carcass retrievals (22%) and assistance with trapping efforts (13%). The Black Bear Response Agent Program allows FWC to meet rising public demand for service.

FWC runs an internship program to develop future conservation professionals and expand the abilities of the FWC to address black bear related topics. The internship program allows students to gain credit through their universities for their experience, while acquiring training in the profession of wildlife management and research. Twenty interns from several universities including Florida State University, Florida Agricultural and Mechanical University, Stetson University, and the University of Central Florida participated in the fall 2010 and spring and summer 2011 sessions. These students contributed 3,585 hours of time to black bear management and research. Intern projects have provided valuable information on a wide range of bear management and research topics, including: a follow-up study on citizens who have contacted FWC about black bear problems; examining the relationship between human population density and black bears, urbanization zones and frequency of black bear sightings; developing a public service announcement contest for high school students; and coordinating public events and volunteer efforts to increase public awareness of black bears.

One of the major causes of human conflicts with black bears is that people's garbage attracts bears into neighborhoods. Through partnerships with local governments, businesses, and communities, FWC has reduced black bear access to garbage across the state. Results of those efforts include shifting waste service pick-up times so residents can more easily take garbage out the morning of pick-up rather than the night before, and making black bear-resistant equipment

like cans, sheds, and electric fencing more readily available. FWC provided comments during the year on impacts to black bears from proposed residential developments and highway projects.

FWC continued to train law enforcement officers on bear behavior and conflict response. Ninety-four personnel were trained, including FWC law enforcement officers and personnel from six local and State law enforcement and natural resource agencies. Permits were issued to six agencies authorizing 64 staff members to assist FWC with human-bear conflict response.

FWC developed a cub rehabilitation protocol in FY 2009-10. The cub rehabilitation protocol includes preferred methods and techniques for rehabilitating black bear cubs. During FY 2010-11, FWC sent the protocol to professional captive wildlife facilities across the state to recruit official cub rehabilitation facilities. FWC vetted four facilities in Florida who are now the official rehabilitators for the state: Busch Wildlife Sanctuary in Jupiter; Homosassa Springs Wildlife State Park in Homosassa; Jacksonville Zoo in Jacksonville; and the Wildlife Sanctuary of Northwest Florida in Pensacola.

FWC completed a study to estimate the minimum number and range of black bears in Citrus, Hernando, and Pasco counties. This population is the smallest and most at risk in the state. Information gathered in this study was used to provide an estimate of black bear range, a minimum population estimate, and to develop a habitat management plan for bears in the area. This information will help FWC and other State and Federal land managers conserve black bears in their area.

During FY 2010-11, FWC began a project that will measure and describe parameters of optimal black bear habitat in oak scrub and pine flatwoods habitats. This information will help State and Federal land managers provide conditions beneficial to black bears in those areas where habitat management is needed to increase the likelihood of persistence for small or fragmented populations of black bears.

FWC continued a contract with the University of Kentucky to estimate the range and abundance of bears in Glades and Highlands counties. This population is small and fragmented and exists on remnant parcels of Florida scrub within a patchwork of public and private ownership. This was the second year of a three-year project funded by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida.

Another grant was secured from the Florida National Guard to begin research on black bears in Camp Blanding, Florida. Camp Blanding is the largest (73,000 acres, 29,542 hectares) parcel of natural habitat within the wildlife corridor that extends from Ocala National Forest in Central Florida to Osceola National Forest in northeast Florida. An ecologically intact corridor facilitates genetically healthy black bear populations and habitat for dispersing sub-adult black bears. The goals of the study include identifying ecologically significant lands in and near Camp Blanding and providing recommendations for habitat management beneficial to black bears.

FWC conducted a national web-based survey to estimate bear range in North America and create a map of this range. Many populations of bears in North America, including many in Florida, have been expanding in recent years and this information will help guide management decisions across the bear's range. This new range map will replace the previous one completed in 1994.

FWC identified wildlife management areas critical to black bear conservation where FWC is the lead agency. Wildlife management areas can play a critical role in conserving small or fragmented populations of black bears and FWC is working to develop habitat management plans that will benefit bears.

Research, funded by the State Game Trust Fund, was also begun during FY 2010-11 to compile relevant management information on saw palmetto. Saw palmetto berries are an important food resource for black bears yet management strategies for other species often seek to reduce its presence.

FWC has employed an extensive outreach effort to help people learn about bears. Black bear ecology and natural history programs were provided to the public, as well as suggestions for successfully living in black bear country. FWC participated in 106 public presentations, meetings, and events to offer over 11,430 people information about black bears and ways to minimize conflicts. FWC distributed over 10,000 black bear-related information materials to the public during FY 2010-11. In addition, 13 regional and five statewide news releases were sent out relating to black bears.

For more information on Florida black bears, please visit http://myfwc.com/wildlifehabitats/managed/bear/.

**Florida Bonneted Bat** (*Josh Birchfield and Jennifer Morse*)

The Florida bonneted bat, listed as Endangered under Florida's old rules, became a State-designated Threatened species in November 2010 after a new listed species rule and Threatened species management system was passed by the FWC Commissioners (see page 1). A biological status review was conducted by FWC and external experts to determine whether or not the Florida bonneted bat met the new Threatened species listing criteria. It was determined that the Florida bonneted bat did meet Threatened species status listing criteria due to a very small or restricted population (typically less than eight square miles, or 20 square kilometers, and typically found in five or fewer locations); and a severely fragmented (less than ten locations), continual declining extent of occurrence (smaller than 7,722 square miles or 20,000 square kilometers). The Florida bonneted bat biological status review may be accessed at http://myfwc.com/media/1351535/Florida%20bonneted%20bat%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352263/Florida%20Bonneted%20(Mastiff)%20Bat%20Supplemental%20Information.pdf.

The Florida bonneted bat is the largest and rarest bat species in Florida. There was only one known colony statewide (in a bat box at a private residence in Ft. Myers) until 2006 when bonneted bats were detected via acoustic surveys by the Florida Bat Conservancy on Babcock Webb Wildlife Management Area (WMA) in Charlotte County. In 2007, FWC installed four roosts, each consisting of one pair of single-chambered bat houses, on the WMA. In December 2008, two roosts were occupied by bonneted bats, tripling the number of known roosts for this species. FWC confirmed that two more bat houses were being used by Florida bonneted bats in May 2010, bringing the total confirmed occupied bonneted bat roosts on Babcock Webb WMA to four. These roosts are checked periodically by FWC to monitor occupancy.

During FY 2010-11, a graduate student from Florida Gulf Coast University's Department of Marine and Ecological Sciences initiated a research project exploring habitat influences on selection of artificial bat houses by Florida bonneted bats on Babcock Webb Wildlife Management Area (WMA). The purpose of this research is to compare habitat surrounding occupied and unoccupied bat houses at four spatial scales: roost, local (within 33 feet or ten meters of roosts), stand (within 36-197 feet or 11-60 meters of roosts), and landscape (within 16

miles or 25 kilometers of roosts). FWC assisted in reviewing the research proposal, and assisted with access to the WMA periodically during data collection. During FY 2010-11, project planning and data collection were the primary activities. This research should be completed during FY 2011-12.

**Florida Manatee** (*Leslie Ward-Geiger and Carol Knox*)

The Florida manatee (listed by the USFWS as the West Indian manatee) is native to Florida's coastal estuaries and riverine waters and is a Federally-designated Endangered species. Manatees have been protected in Florida since 1892. The manatee is also Federally protected under the Marine Mammal Protection Act and the Endangered Species Act. Florida's efforts to conserve the manatee are funded primarily by the Save the Manatee Trust Fund that derives approximately 1/3 of its funds from the sale of specialty license plates. Conservation efforts are guided by the Florida Manatee Sanctuary Act of 1978, the Florida Manatee Management Plan approved by the FWC Commissioners in December 2007 (which may be accessed at http://www.myfwc.com/media/415297/Manatee_MgmtPlan.pdf), and the USFWS Florida Manatee Recovery Plan of 2001.

In 2004, FWC and the USFWS established the Manatee Forum – a diverse stakeholder group, with the goal of reducing litigation by establishing areas of common ground, identifying problems or conflict, developing potential solutions, and accepting differences through increased communication. During FY 2010-11, the Manatee Forum met twice, once in November and once in February. During the November meeting, many research updates were provided and the February meeting focused on speed zone discussions and legislative updates from the Forum members. FWC believes in the importance of having a stakeholder group focused on manatee issues. The opportunity for information exchange and the discussion of ideas is valuable to both agencies.

*Management Activities*

FWC and the USFWS continue to work closely on manatee issues, particularly human-related threats and habitat loss. For more information regarding manatee conservation efforts, please see the Save the Manatee Trust Fund annual report provided to the President of the Florida Senate and the Speaker of the Florida House of Representatives each year, available at: http://www.myfwc.com/research/manatee/trust-fund/annual-reports/. Manatee management activities are directed by the FWC Manatee Management Plan and focus on five program areas:

Manatee Protection Plans (MPPs) – This work involves the development and implementation of comprehensive county-based MPPs and the approval of MPPs by the FWC Commissioners. These plans are approved with concurrence by the USFWS. FWC is currently analyzing new manatee data and assisting Duval County in drafting a revision to their current plan with hopes of completion in the next year. Sarasota County conducted their own data analysis and revisions; however, FWC provided review before the final draft was prepared. FWC continued to provide Miami-Dade County assistance on possible revisions to their existing MPP and provided assistance to Charlotte County as they considered whether to develop their first MPP. In February 2011, the Charlotte County Commission approved the development of a county MPP.

Protection Zones – FWC develops boat speed and safe haven zones statewide to protect manatees. Extensive work is required involving county governments, stakeholder groups, and the public in order to develop and authorize the zones. FWC worked with Local Rule Review Committees in both Broward and Flagler counties as they considered FWC's proposals for revised or new speed zones in their counties. Both Review Committees provided their reports to FWC for consideration, and FWC provided responses to both county reports. FWC then proceeded to develop the draft zones for presentation to the FWC Commissioners and requested permission to publish the proposals, open the public comment period, and hold a public hearing in each county in hopes of receiving additional public comment.

Permit Reviews – FWC produced 265 final comment letters for proposed projects reviewed during the year. These biological opinions provide recommendations to regulatory agencies on ways to reduce impacts to manatee. Implementation of the boat facility-citing portion of FWC approved MPPs is accomplished during the permit review process. Distribution of public information about manatees is also accomplished through these comments, as facilities are required to post informational signs on manatees and distribute written materials to boat users. FWC is also working on several efforts to streamline reviews of permits in cooperation with permitting agencies and the USFWS.

Manatee Habitat – FWC participated in various intergovernmental groups and task forces regarding minimum flows at springs, invasive aquatic plant control, seagrass monitoring and protection, and other habitat related concerns. FWC worked to address the potential loss of warm water manatee habitat provided by power plant discharges by ensuring all of the appropriate monitoring plans for power plant conversions in Palm Beach and Brevard counties were carried out. FWC continued working with other agencies and The Nature Conservancy on a project in Fanning Springs to improve manatee access in that spring run. The project is scheduled for completion by the end of 2011.

*Research Activities* – The manatee research program included work in the following areas:

Mortality and Rescue – A network of researchers and law enforcement agencies was established in 1974 to recover manatee carcasses and assist injured manatees. During FY 2010-11, 470 manatee carcasses were documented in Florida. All but eight of these carcasses were recovered and examined in order to determine causes of death. Collision with watercraft accounted for 78 of the 470 cases. Other causes of manatee death are those associated with near-term or newborn (perinatal) issues, cold stress, natural causes, and human influence. A statewide unusual mortality event was declared during FY 2010-11 by the Federal Working Group for Marine Mammal Mortality Events due to prolonged cold temperatures during the winter of 2010-2011. These prolonged cold temperatures resulted in high numbers of cold-related mortality, and numerous rescues of cold stressed animals. An interactive searchable web-based database with manatee mortality information is available at http://myfwc.com/research/manatee/rescue-mortality-response/mortality-statistics/.

FWC and cooperators rescued 97 sick or injured manatees under the Federally permitted statewide rescue program. Three oceanaria (Lowry Park Zoo in Tampa, Miami Seaquarium, and Sea World in Orlando) participate in the State funded rehabilitation program for critical care treatment and are partially reimbursed by FWC for their costs. As of June 2011, 54 of these rescued manatees were released back into the wild. FWC participated as a contributing organization to multi-agency efforts to release and track rehabilitated manatees that were rescued

due to injury, cold stress, or other problems. As part of that partnership, FWC participated in pre-release health assessments and releases of rehabilitated manatees in various parts of the state, and assisted in monitoring two manatees in Brevard County. The information obtained during manatee rehabilitation, treatment, and necropsy assists in reducing manatee mortality by identifying important threats.

Population Assessment – FWC uses a variety of methods to assess and monitor the current and future status of the manatee population in Florida. Population assessments currently include conducting manatee counts at winter aggregation sites, aerial surveys used to determine regional distribution of manatees and to assess habitat use, and estimating survival, population growth, and reproductive rates through photo-identification and the recent application of genetic markers.

The annual statewide manatee synoptic survey was conducted in winter 2011. A team of 21 observers from several organizations counted 4,834 manatees statewide during January 2011. The count is considered a minimum count. For more information about aerial surveys and the synoptic count, please refer to http://myfwc.com/research/manatee/projects/population-monitoring/.

On a regional basis, FWC uses surveys to determine the seasonal distribution and habitat use of manatees. These surveys usually are flown twice monthly in specified counties for a period of two years. Distributional surveys were conducted during FY 2010-11 in eastern Pinellas, Martin, and St. Lucie counties. Currently, researchers are developing new aerial survey techniques that will provide precise and reliable estimates of distribution and population size. These new methods and resultant data will contribute to models that incorporate information about how well observers detect manatees from the air and will relate environmental variables to the number of animals counted by observers. Details are described in the "Monitoring Activities" and "Ongoing and Future Research" sections of the Manatee Management Plan (pages 84-114) that may be accessed at http://myfwc.com/media/214332/Manatee_Mgmt_Plan.pdf.

FWC, in cooperation with the U.S. Geological Survey Sirenia Project and Mote Marine Laboratory, maintains an image-based, computerized database called the Manatee Individual Photo-Identification System that is used for photo-identification of individual manatees. These data provide life history information and assist scientists in estimating survival and reproduction rates, critical data required for determining the status of the manatee population.

Significant data gaps still exist in Florida manatee population assessments. In particular, it has been very difficult to estimate vital statistics for manatees in southwest Florida through photo-identification because of factors such as unfavorable photographic conditions and limited animal accessibility. Three demographic parameters are in need of refinement to better model manatee status and recovery: annual reproductive rates, annual gender-specific movement probabilities between the northwest and southwest regions, and gender-specific adult survival rates in the southwest region. Genetic testing offers an additional means of identifying individual manatees and its application could greatly enhance existing monitoring and assessment studies. The Manatee Management Plan identifies the need for optimal genetic tissue-sampling protocols for free-swimming manatees in order to implement a robust genetic identification program for the above-described monitoring applications. FWC successfully tested a new method to collect skin samples from free-swimming manatees in winter 2008. During the winters of 2009-10 and 2010-11, FWC conducted genetic sampling surveys with the main objective of collecting manatee skin biopsy samples. These surveys provided a number of

samples and the results will help design future genetic sampling surveys. Additionally, FWC is collaborating with the U.S. Geological Survey to develop statistical models that integrate data from photo-identification and genetic-identification surveys, as well as the carcass recovery program, to estimate population vital rates.

Behavioral Ecology – During FY 2010-11, FWC's behavioral ecology program continued to analyze data from a two-year field research project on tagged manatee interactions with motorized watercraft in southwest Florida. This work was in collaboration with researchers at Florida State University, Duke University in North Carolina, and Woods Hole Oceanographic Institution in Massachusetts. A thorough understanding of the behavioral and sensory mechanisms underlying manatee-boat collisions is necessary in order to devise effective methods of avoidance. The goal of the project is to create a combined picture of manatee behavior, acoustics, and vessel trajectories so that we can better understand the responses displayed by manatees when approached by boats and the acoustic cues that may mediate such responses. The research combined state-of-the-art, manatee-borne electronic tags with boat-based observations and aerial videography. FWC and Florida State University staff reviewed more than 4,000 vessels paths calculated with data from a laser rangefinder and are developing the analytical techniques to identify behavioral changes from the sensor data to reconstruct manatee movement paths underwater. In addition to the Save the Manatee Trust Fund, this project was funded by FWC's Florida Manatee Avoidance Technology Program and the Disney Worldwide Conservation Fund.

Warm-water habitat is of particular interest to FWC and agency partners because the predicted future loss of this habitat is a key, long-term threat to the manatee population. FWC, along with the U.S. Geological Survey, Mote Marine Laboratory in Sarasota, and Florida Power and Light partners, have formulated plans to monitor how manatees will respond to a major change at a traditionally used power plant near Titusville. Part of the monitoring plan entails using telemetry to describe fine-scaled movements and habitat use. Ten manatees were captured and tagged with global positioning system (GPS) tracking devices in December 2010 as part of a multi-year telemetry study in Brevard County. Individuals were tracked over the winter period and tags were removed in March 2011. Tagged manatees showed strong site fidelity to the Florida Power and Light refuge during cold weather, and two manatees visited passive thermal basins in canals off the southern Banana River.

**Florida Panther** (*Marc Criffield, Mark Cunningham, Darrell Land, Mark Lotz, and Dave Onorato*)

The Florida panther is a Federally-designated Endangered subspecies of the puma (also called cougar or mountain lion) that at one time occurred throughout much of the southeastern U.S. Unregulated harvest of panthers through the mid-1900s and, more recently, habitat loss and fragmentation due to the growth of the human population reduced the panther population and isolated it from other puma populations. When FWC began investigations into the status and distribution of panthers in the early 1970s, there were an estimated 30-50 panthers still living in South Florida. The small population size and geographic isolation from other puma populations made the Florida panther very vulnerable to extinction. Therefore, in the mid 1990s, FWC released eight female puma from Texas into areas occupied by Florida panthers to increase the health of the panther population by increasing the diversity of the population's genetic composition. Of the eight female Texas puma that were introduced into the Florida panther

population, five died and the other three were removed from the population in 2002 and 2003 to avoid including too much of their DNA in the Florida panther population. These three puma were placed in captivity. FWC continues to monitor the effects of this genetic infusion and its impact on the panther population. Today, the Florida panther population is estimated to be between 100-160 adults in South Florida due in part to these actions.

Pedigree analyses verified successful pairings between Florida panthers and the Texas puma females, as well as between subsequent generations of the offspring of these pairings (admixed panthers). Inbreeding continued to occur to some extent, although not at pre-1995 levels. Pedigree analyses also documented that certain panther lineages were more frequently afflicted with undescended testicles and heart defects. Genetic markers showed greater genetic variation than existed before restoration, with obvious impacts on the frequency of physical defects associated with inbreeding: fewer undescended testicles, a higher percentage of normal sperm, and fewer instances of heart defects, kinked tails, and cowlicks. Today's population has increased genetic diversity and is comprised of younger individuals than the pre-restoration panther population.

Panther survival rates improved as genetic diversity increased for both adults and kittens. Adult females had higher survival rates than adult males. The female Texas puma offspring had the highest survival rates both as kittens and as adults. Kitten survivorship, irrespective of genetic diversity, declined as the number of panthers in the population increased. These findings confirm that inbreeding was a serious problem for the panther population.

While genetic restoration of the Florida panther was successful with regard to some of its initial objectives, Florida panthers remain isolated and will therefore suffer from inbreeding and loss of genetic variation over time. This may eventually require the release of additional pumas in Florida to assure the long-term survival of the panther population.

FWC and its partner, Big Cypress National Preserve (BCNP), continue to monitor the panther population and its genetic health. A sample of panthers are captured between November and February and fitted with radio collars containing radio transmitters. Panthers are located and their locations recorded several times a week. Since 1981, 193 panthers have been radio-collared, providing essential data for the management and conservation of the population. Radio telemetry data were collected on 36 Florida panthers during FY 2010-11. In addition to monitoring by radio telemetry, FWC and BCNP biologists sample panther dens to record data on newborn kittens. In FY 2010-11, 12 panther dens were sampled by FWC and BCNP biologists resulting in the documentation of 35 kittens (21 males, 14 females). Kittens handled at these dens were permanently marked with transponder chips called PIT tags, which were placed below the skin. Since 1992, 341 kittens have been handled (weighed, sexed, dewormed, inserted transponder chip, samples collected) at dens.

During FY 2010-11, 27 wild Florida panthers were known to have died, including eight (four males, four females) radio-collared panthers, twelve (eight males, four females) uncollared panthers, four neonate panther kittens (died at their den during a wildfire), and three additional uncollared panthers that are currently under investigation by the FWC Division of Law Enforcement and the USFWS. In addition, skeletal remains of a female panther were recovered from BCNP, but it is unknown whether the panther died during the reporting period or what contributed to this panther's death. Twelve of the 27 panthers died after being hit by vehicles, six were killed by other panthers (called intraspecific aggression), and two died from undetermined causes.

In addition to monitoring the Florida panther population, several panther management and research activities were conducted during FY 2010-11. FWC continued to evaluate Global Positioning System (GPS) radio collars in FY 2010-11. GPS systems that send data locations to FWC panther researchers via text messaging have shown promise as a means of determining prey selection and predation rates of Florida panthers. These radio collars work reasonably well on panthers and offer a significant advancement over traditional monitoring of panthers. FWC also continued testing of GPS pods that attach to traditional VHF (very high frequency) radio collars. This system allows for the collection of location data at a more rapid rate than traditional VHF collars while also permitting long-term monitoring of collared panthers. Preliminary findings revealed that GPS pods are less successful at acquiring locations than other GPS collars that have been tested. The use of pods may be warranted for certain projects, but they will not provide data necessary to monitor predation rates of Florida panthers.

During FY 2010-11, FWC began genetic analyses of panther DNA. Laboratory methods to assess individual identification and species identification have been optimized and data collection is currently ongoing.

FWC investigates human-panther interactions in accordance with the Interagency Florida Panther Response Plan (http://www.fws.gov/verobeach/MammalsPDFs/R4FWSPantherEAFinal.pdf?spcode=A008). Using this protocol, FWC verified that panthers were responsible for preying upon domestic livestock (called depredations) in twenty-seven separate events during FY 2010-11. Two human-panther interactions qualified as encounters according to the Response Plan (defined as an unexpected direct meeting or a series of meetings over a short period between a human and a panther): panthers were encountered by a guard station attendant near the Everglades restoration area in Picayune Strand State Forest; and by a hobby animal owner as he was feeding pets in the back yard. One human-panther interaction qualified as an incident, defined as an interaction between a panther and a human that involves the panther displaying potentially threatening behavior: a panther growled in defense of its prey at a person as the person unknowingly approached too closely.

All of the verified depredation losses this past year occurred in Collier County and the majority occurred in Golden Gate Estates east of Naples. Golden Gate Estates is approximately 150 square miles in area and borders the Florida Panther National Wildlife Refuge, Picayune Strand State Forest, and the Corkscrew Regional Ecosystem Watershed. Panthers occupy these public lands. Lot sizes range typically from one to five acres (0.4 to two hectares) and most lots still contain native habitat. Keeping livestock is permitted under local zoning codes. During depredation investigations, FWC provides assistance and advice to affected residents that can reduce the risk to pets and hobby livestock. FWC recommends that hobby animals and pets either be secured in barns or pens with roofs or kept indoors. FWC produced a brochure with these recommendations and provides this information on-line at www.floridapanthernet.org.

In late 2010, FWC received reports of panthers killing calves on commercial cattle ranches; three cases were verified. Ranchers have reported that many more calves may have actually been taken. Methods that work to protect back yard hobby livestock, such as enclosing livestock at night, are not practical for large-scale ranches. Cattle ranches are often thousands of acres and provide abundant game and ample cover for panthers. Managing these cattle ranches in ways that benefit wildlife is vital to the long-term survival of the panther. In order to address the problem of depredation on commercial cattle ranches, a small working group was created. This group consisted of ranch owners, the Cattlemen's Association, the Department of

Agriculture and Consumer Services, Defenders of Wildlife, the USFWS, and FWC. FWC worked closely with its partners on this problem. The idea of creating a fund that would compensate cattle ranchers for losses of calves from panthers was explored. Two research projects were developed and funding secured. The University of Florida's Institute of Food and Agriculture Sciences will lead a study to investigate the survival of calves on two ranches that have panthers. The FWC will initiate a study of panther prey selection on and near ranch lands. Both studies will be initiated in FY 2011-12.

FWC provided information and reviews of numerous road and development projects throughout southern Florida. Three proposed major road projects fall within important panther habitat and FWC has been providing guidance on minimizing or avoiding panther impacts.

During FY 2008-09, FWC was contacted by U.S. Senator Bill Nelson's office in response to constituent concerns with the high number of Florida panthers hit and killed by cars and trucks. FWC provided the Senator's staff with information on the impacts of roadways and traffic on panthers and other wildlife. Wildlife crossings are the most effective solution to alleviating panther deaths on roads, but they are also expensive. The last two wildlife crossings, completed a few years ago, cost an estimated $4.5 million each. FWC discussed with Senator Nelson's staff the idea that a new panther crossing design could be developed that would be less expensive but equally effective. Through Senator Nelson's efforts, $955,000 of Federal funds were secured for this pilot project. The Collier County Department of Transportation Planning is working with the Florida Department of Transportation and FWC to design and build a smaller and less expensive wildlife crossing on a Collier County road. Collier County expects to select a Design/Build firm for this project during FY 2011-12.

Research continues to be an important part of Florida panther conservation. Research plans are vetted with FWC's partners to ensure that the research and monitoring efforts are well-designed, coordinated, and meet priority needs. FWC completed several long-term research projects during FY 2010-11 including: estimates of kitten survival, evaluation of panther habitat selection using GPS radiocollars, and analyses on nearly 30 years of panther genetic data. FWC continues to assess fine-scale panther movement rates using GPS collar data and to collaborate with the University of Florida on a matrix-based demographic model. New research initiated in FY 2010-11 focused on developing a proposal for the assessment of panther predation rates that will commence in the fall of 2011, and establishing the ability to complete genetic analyses in the FWC lab in St. Petersburg. FWC staff served as lead or co-authors on eight peer-reviewed publications and six abstracts presented at five different professional meetings.

An extensive collection of additional panther reports and publications on current panther management and research may be found at the following websites: http://wildflorida.tv/panther/index.html, http://www.floridapanthernet.org/index.php, and http://www.fws.gov/verobeach/ListedSpeciesMammals.html#fp.

**Gray Bat** (*Jeff Gore and Louis Lazure*)

The gray bat, a Federally-designated Endangered species, is a colonial cave-roosting species that occurs throughout much of the south-central U.S. The gray bat's range-wide population previously suffered severe declines due to disturbance of its cave roosts, but its population now appears to be increasing. In Florida, however, the gray bat roosts only in a few caves in Jackson County where the population appears to be declining in spite of the fact that the roost caves are protected.

Gray bats occupy different caves in summer and winter based on temperature, and some bats migrate out of Florida during winter. The size of the summer population of gray bats in Florida cannot be easily determined because the bats roost within large colonies of a similar bat species, the Southeastern myotis. Observations made in caves and during counts conducted in the evening as bats exit their roosts are not definitive because of the presence of other species. Regardless, no gray bats have been observed or captured at summer roosts in Florida since 1990. Between April and June 2011, FWC biologists visited 14 caves in North Florida and conducted emergence counts at ten of those caves. The caves are located in Alachua (one), Gilchrist (one), Jackson (eight), Marion (two), Washington (one), and Sumter (one) counties. These caves primarily serve as maternity roosts for the Southeastern myotis. In order to confirm species presence and determine reproductive status, a small sample of up to 22 bats was captured at each site during the emergence counts, for a total of 171 bats. In addition, 75 bats were captured one night at Judges Cave in Jackson County, an FWC-managed site and formerly the location of the largest maternity roost for gray bats in Florida. As expected, only the Southeastern myotis was captured at the caves. Although the sample size was small, no gray bats were captured at any site, which again suggests that the summer population of gray bats in Florida is small or nonexistent.

The gray bat winters in two Florida caves and the hibernating bats can be readily counted at both sites. Few gray bats have been observed in recent years during the annual census of the winter roosts conducted by biologists from FWC and the Florida Park Service. In February 2011, biologists found three gray bats in Old Indian Cave in Jackson County. No more than nine gray bats in a single year have been found hibernating in Florida since 2002. There has been no evidence of White Nose Syndrome, a deadly fungal disease, found among bats in Florida.

More frequent surveys or a more thorough census might provide a better estimate of the number of roosting gray bats, but surveys are limited to once annually to minimize disturbance of hibernating bats. Despite the apparent fluctuation, the number of gray bats in Florida remains critically low and the species may soon be absent from the state. Since the roost caves are protected, factors other than disturbance of roosts may be responsible for the decline. Gray bats occur in much larger numbers in other states such as Alabama, Georgia, and Tennessee, but White Nose Syndrome may soon adversely affect those populations.

**Key Largo Cotton Mouse** (*Jeff Gore and Dan Greene*)

The Key Largo cotton mouse is a Federally-designated Endangered subspecies endemic to Key Largo, the northernmost island in the archipelago of the Florida Keys. The Key Largo cotton mouse represents the southernmost subspecies of its genus and is restricted to about 2,102 acres (851 hectares) of tropical hardwood hammock. Habitat destruction on Key Largo in the late 19$^{th}$ century resulted in a loss of two-thirds of the original hardwood hammock habitat, contributing to population declines in many species. Because the small, nocturnal cotton mouse is seldom observed, land managers have little information about the status of the population or how current land management activities affect distribution and abundance.

Since 2007, a long-term monitoring plan based on live-trapping mice has been conducted to assess the population status of the Key Largo cotton mouse. During FY 2010-11, FWC, in conjunction with the USFWS, the Florida Park Service, and The Nature Conservancy evaluated this plan by surveying 12 locations in north Key Largo from December 30, 2010 to January 16, 2011. At each location, live-trapping was conducted for five consecutive nights. Eighty

individual mice were captured (among 176 total captures, including recaptures of some individuals). Cotton mice were captured on all trapping grids and the sex ratio of captured mice was 1.42 males per female (47 males per 33 females). Approximately 50% of the mice were first captured in the first two nights of trapping, with decreasing percentages for subsequent nights. The estimated size of the total population of Key Largo cotton mice in FY 2009-10 was around 10,100 individuals, based on extrapolation of mouse density from the trapping sites to all available habitats. Better estimates of population size can be made with estimation models that incorporate the probability of capturing a mouse. These detection probabilities are computed from the frequency at which an animal is captured, marked, released, and then recaptured. Unfortunately, of the 80 individuals captured, 54 mice (68%) were captured only once over the five-night trapping period. As a result, detection probabilities could not be precisely estimated and resulting density estimates had wide confidence intervals. Extrapolating these estimates to all habitats resulted in an estimate of total population size that had very large confidence intervals (range of potential values) and, therefore, was of no better value than the estimate of 10,100 mice described previously during FY 2009-10.

The total captures for FY 2010-11 are an increase from FY 2009-10, when 65 individual cotton mice were captured among 127 total captures. The sex ratio was less skewed this fiscal year than last, when total captures produced a ratio of 2.42 males per every female (46 males and 19 females). Such skewed ratios are not uncommon for surveys because males often are more likely to be captured than females. The estimated size of the population in FY 2010-11 was 11,500, which was approximately one-half the estimated size in 2007. Due to the overall low number of captures, error rates in the estimates were too high to determine if low captures were the result of a decrease in the population size or a consequence of low detection (capture) rates during this trapping period. Because cotton mouse populations fluctuate in size both seasonally and annually, multiple years of surveys will be needed to determine the range of variation in population size that cotton mice experience seasonally and annually.

**North Atlantic Right Whale** (*Leslie Ward-Geiger*)

The North Atlantic right whale is a Federally-designated Endangered species. The only known calving grounds for this species are off the coast of northeast Florida and southeast Georgia. The southeastern U.S. calving season for the North Atlantic right whale is approximately November 15 – April 15. FWC conducted aerial surveys to monitor seasonal presence of right whales, mitigate vessel-whale collisions, and assess population dynamics. Most of this work was supported by funds from National Oceanic and Atmospheric Agency's Marine Fisheries Service (NOAA-Fisheries). Photographs taken by aerial observers are used to identify individual right whales based on the callosity (a natural growth of cornified skin) pattern on their head as well as natural marks and human-related scars. Over time, population demographics, reproductive success, mortality, and trends in health are monitored, in part, through this photo-identification research. FWC is one of a handful of major contributors to the North Atlantic Right Whale Catalog – the central repository for archiving and maintaining photographs and sighting data on right whales. FWC has also worked closely with Federal, State, and non-governmental organizations to compile years of aerial-survey data into a geographic information system (GIS). Analyses of these spatial data help scientists and managers to evaluate right whale distribution patterns in the southeast calving grounds in relation to environmental factors, such as sea surface temperatures and water depth, and human activities,

such as vessel traffic. FWC also analyzes ship traffic data to help monitor compliance with vessel speed regulations.

Twenty mother/calf pairs were documented in the southeastern U.S. during FY 2010-11. An additional cow-calf pair was sighted in April 2011 off of Rhode Island. Preliminary photo analysis indicates FWC documented 115 individual right whales (excluding calves) during 97 aerial surveys conducted between December 1, 2010 and March 31, 2011. In addition, the teams sighted 27 humpback whales and one fin whale.

A total of five (possibly six) entangled right whales were documented in the southeastern U.S. during the FY 2010-11 calving season, four off of Florida. None of the five animals were known to be previously entangled. FWC, as well as the Georgia Department of Natural Resources, the New England Aquarium, NOAA-Fisheries, EcoHealth Alliance, Provincetown Center for Coastal Studies, and many others, participated in the documentation and disentanglement responses. Two right whale carcasses were sighted or stranded in the southeastern U.S. during the FY 2010-11 calving season. On February 1, 2011 the FWC aerial survey team located the floating carcass of a right whale off the coast of St. Augustine, Florida. A full necropsy was conducted on February 3, 2011. The primary cause of death was due to an entanglement related injury. FWC assisted with site preparation, necropsy, sampling, public outreach, clean-up, and reporting.

FWC, in collaboration with the Georgia Department of Natural Resources staff and NOAA-Fisheries conducted 22 right whale biopsy sampling trips that resulted in biopsy samples collected from 13 right whale calves, several previously unsampled juveniles and adult right whales, and two humpback whales. The skin samples will be used to generate information on kinship, individual identification and gender, stock identity, and genetic variability within the population. The blubber portion of the samples will be used to determine contaminant levels and to gain information about feeding ecology and nutritional condition.

**Sherman's Fox Squirrel** (*Jim Garrison*)

The Sherman's fox squirrel is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the Sherman's fox squirrel met Threatened species listing criteria. It was determined that there was not enough information to conduct the review. FWC will place a high priority on gathering data to fill gaps in information needed to conduct the review and better understand the status of the species so that the species may be reevaluated. The species will remain a Species of Special Concern until more data has been gathered and another status review can be completed. The Sherman's fox squirrel biological status review may be accessed at http://myfwc.com/media/1351628/Sherman's%20fox%20squirrel%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352350/Shermans%20Fox%20Squirrel%20Supplemental%20Information.pdf.

A lack of basic population and natural history information has been identified as an essential research need by the biological status review team for the Sherman's fox squirrel. During FY 2010-11, FWC assisted the University of Florida with a cooperative study testing several methods for estimating populations of the Sherman's fox squirrel. Methods tested included infrared triggered cameras, wooden box traps, and walking survey transects. FWC

staff built 20 box traps and assisted with camera set up and walking transects. This study is ongoing and results will be reported in the future.

**Sherman's Short-tailed Shrew** (*Melissa Tucker*)

The Sherman's short-tailed shrew is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the Sherman's short-tailed shrew met Threatened species listing criteria. It was determined that the Sherman's short-tailed shrew did meet Threatened species status listing criteria due to a severely fragmented (less than ten locations), continual declining extent of occurrence (typically less than 7,722 square miles, or 20,000 square kilometers) and area of occupancy (typically less than 772 square miles, or 2,000 square kilometers). The listing status of the Sherman's short-tailed shrew will not change until a management plan has been approved for the species. The Sherman's short-tailed shrew biological status review may be accessed at http://myfwc.com/media/1351631/Sherman's%20short-tailed%20shrew%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352353/Shermans%20Short-tailed%20Shrew%20Supplemental%20Information.pdf.

The Sherman's short-tailed shrew has a range limited to the western portion of Lee and Collier counties. The first specimen of this species was captured in the 1950s in Lee County north of the Caloosahatchee River, and this area has since undergone extensive development. Additional attempts have been made to capture Sherman's short-tailed shrews, with the most recent survey effort yielding a capture in 1982. Because the Sherman's short-tailed shrew has a very small range and has not been confirmed in many years, it is highly vulnerable to extinction. As a first step toward implementing conservation actions to protect the species, in 2011 FWC conducted surveys to document the species' continued existence.

Conservation properties containing suitable habitat for the Sherman's short-tailed shrew were identified in Lee, Collier, and southern Charlotte counties. Properties in Lee County included County-owned and managed sites (Old Bridge Preserve, Imperial Marsh Preserve, Wild Turkey Strand Preserve, Caloosahatchee Creeks Preserve, Prairie Pines Preserve, and Six Mile Cypress Slough Preserve), a South Florida Water Management District owned and FWC managed site (CREW Wildlife Management Area), and a Department of Environmental Protection owned and managed site (Estero Bay Preserve State Park). Properties in Collier County included a County-owned and managed site (Red Maple Swamp Preserve) that was surveyed, along with a Florida Department of Agriculture and Consumer Services' Florida Forest Service property (Picayune Strand State Forest), and a Florida Department of Environmental Protection property (Collier Seminole State Park). The only property surveyed in Charlotte County was a property managed by FWC (Babcock-Webb Wildlife Management Area). At the 12 properties, a total of twenty-four sites were surveyed, representing seven habitat types. The surveys were conducted using pitfall traps along drift fences and live traps set near natural landscape features such as fallen logs. A minimum of ten traps were set for five consecutive days at each site, for a total trapping effort of 1,170 trap nights. No Sherman's short-tailed shrews were captured during the trapping efforts. Previous survey efforts through the 1990s included approximately 5,300 trap nights; the current survey effort of 1,170 trap nights adds substantially to this overall effort. Even without captures, the information gained is beneficial because it allows FWC to document effort and use that information to develop future

surveys. Without these efforts and documentation, it is impossible to assess the likelihood that Sherman's short-tailed shrew is extinct.

## BIRDS

**Bald Eagle** (*Josephine Barnhart, Robin Boughton, Janell Brush, Matthew Hortman, Valerie Sparling, Morgan Wilbur, Angela Williams, and Michelle van Deventer*)

Outstanding conservation efforts led to the bald eagle being removed from the USFWS Endangered Species List in August 2007 and the FWC Endangered and Threatened Species List in April 2008. FWC, however, will continue reporting work on bald eagles for the five-year post-delisting period established by the USFWS. Even though the bald eagle is no longer listed by the State or Federal government, it is still afforded protection under the Federal Migratory Bird Treaty Act and Bald & Golden Eagle Protection Act, as well as FWC's bald eagle rule (F.A.C. 68A-16.002.). FWC continues to issue permits (mostly disturbance) for bald eagles.

Management Plan Implementation and Permitting – The FWC Commissioners approved a final management plan for the bald eagle in April 2008. The first five-year management plan review is scheduled for 2013. A public website is maintained to accommodate all current information including the management plan, technical guidance, permitting information, and locations of nesting territories. This website may be accessed at http://myfwc.com/wildlifehabitats/managed/bald-eagle/.

FWC is working with the USFWS to coordinate permitting efforts between the two agencies and ultimately develop a single permitting process. FWC provides assistance to the public and other agencies on minimizing the potential for disturbance to nesting bald eagles that may result from activities near nests, recommending permits when the guidelines cannot be followed, reviewing disturbance and nest removal permit applications, and issuing State bald eagle permits. Population monitoring is ongoing to ensure that Florida is achieving the management plan goal of maintaining a stable or increasing population of bald eagles throughout Florida in perpetuity. FWC also engages in educational programs, local government coordination, and assistance to law enforcement officers responding to public alerts of possible eagle rule violations.

Nesting Surveys – Florida supports one of the largest populations of breeding bald eagles in the lower 48 states. FWC and others have monitored bald eagle nesting territories in Florida since 1972. FWC anticipates that without continued protection of eagle nesting habitats, the number of nesting territories in Florida could decline by 10% or more over the next 24 years, which could trigger a relisting effort. In addition to acquiring current information about the status of eagle nests, surveys enable biologists to characterize the habitat and land-use changes within each nesting territory in Florida. This information may help to identify the factors that affect population changes, movement patterns, habitat changes, and other trends that can be applied in an adaptive management approach to implementing conservation measures.

FY 2010-11 was the third year using a new survey method based on sampling 1/3 of the known nesting territories in the state each year. This sub-sample approach allowed FWC to survey each nesting territory multiple times during the nesting season. The result was a confident estimate of statewide productivity that is not biased. Using these data, a statewide

population estimate was also determined. This sub-sample survey protocol will be continued this nesting season.

Results of the FY 2009-10 statewide survey were reported in December 2010 and are available online at http://myfwc.com/media/931802/eagle_monitoring_annualreport0910.pdf. The estimated number of active bald eagle nesting territories in Florida was 1,362. Polk and Osceola counties have the greatest number of active eagle nesting territories, and live pine trees are the most common nesting materials for eagle nests in Florida. This data indicates that the number of nesting pairs of bald eagles in the state and their reproductive performance continues to exceed the minimum needed to meet population goals, and the first two management plan objectives were met last year. Results of FY 2010-11 are currently being analyzed and will be available online at http://myfwc.com/wildlifehabitats/managed/bald-eagle/monitoring/.

Nesting surveys for bald eagles were conducted in December 2010 and again in February 2011 on the Apalachicola River Wildlife and Environmental Area (WEA) and the Box-R Wildlife Management Area (WMA) in Gulf and Franklin counties to monitor the relative success of nesting eagles. Systematic aerial transects are flown on the WEA, WMA, and the surrounding area, as well as St. Vincent Island National Wildlife Refuge. All nests were recorded as either active or inactive and the number of eggs/nestlings was recorded for all nests. During the FY 2010-11 aerial survey, 29 eagle territories were visited. Of these, 25 were active territories. During the final flight in February, three nests were being incubated, one had eggs present, and 13 had chicks or fledglings present. Twenty-nine adult eagles were observed during the flight in December. The total amount of active eagle nests remained the same as in the previous reporting year.

Nesting surveys for bald eagles were conducted during December 2010 on the Aucilla WMA in Jefferson and Taylor counties and the L. Kirk Edwards WEA in Leon county. The only known eagle nest on Aucilla WMA was not active from 2007 – 2009, although adult eagles were observed in the area during the nesting season. In December 2009, area staff conducted an aerial nest survey in an attempt to identify another active nest on Aucilla WMA. Systematic aerial transects were flown along the Wacissa River basin on the WMA and a previously unrecorded active nest was found further south. Additionally, during the annual wading bird nest colony survey, what appeared to be a previously unrecorded nest was found on Aucilla WMA in late April 2010. Both of these nests were monitored in early December 2010. The nest recorded in December 2009 was active, with an adult eagle present on the nest. There was no activity at the nest identified in April 2010, however, this nest was monitored again in April 2011 and a well-developed eagle chick was observed at the nest. One eagle nest located on private property adjacent to Aucilla WMA was also monitored and determined to be active. While there are no eagle nests located directly on L. Kirk Edwards WEA, there is one on private property adjacent to the WEA. This nest was monitored and an adult eagle was observed flying from the nest. There were no eggs at the time of monitoring.

Aerial nest surveys for bald eagles were conducted in January and March 2011 as well as ground surveys throughout the breeding season at John G. and Susan H. Dupuis, Jr. WEA and J. W. Corbett WMA in Palm Beach County. The initial helicopter surveys determined active nests and later surveys monitored success. Volunteers with Audubon's Eaglewatch program assisted with ground surveys. The status of nests (active or inactive) and number of young were recorded. Nine active nests monitored at Dupuis produced 13 fledglings. Three active nests at Corbett produced four fledglings.

Natural Resource Damage Assessment Nest Surveys – FWC participated in the National Resource Damage Assessment eagle nest surveys in response to the Deepwater Horizon oil spill. Bald eagles are particularly susceptible to oil impacts in coastal areas due to their dependence on fish, their scavenging along the shoreline, and their tendency to consume floating dead fish. Injury to bald eagle populations caused by the Deepwater Horizon oil spill could include reduced reproductive rates and survivorship (measured as mortality). FWC monitored 260 documented eagle nesting territories within 1.9 miles (three kilometers) of the Gulf Coast from Charlotte to Escambia counties. Data was submitted to the National Resource Damage Assessment and FWC received permission to include nest specific information in the statewide eagle nest locator and database, which may be accessed at https://public.myfwc.com/FWRI/EagleNests/nestlocator.aspx.

**Everglade Snail Kite** (*Zach Welch*)

The Everglade snail kite is a Federally-designated Endangered species. The Everglades and Francis S. Taylor Wildlife Management Area (WMA) in South Florida, consisting of South Florida Water Management District's Water Conservation Areas 2 and 3, are located in Broward and Miami-Dade counties, and are important habitat for the snail kite. In recent years, there has been a significant decline in snail kite nesting attempts and successes.

The Florida Cooperative Fish and Wildlife Research Unit at the University of Florida has been conducting snail kite monitoring since 1992. This monitoring is designed to provide information about population size, survival, movement, and reproductive success of the snail kite throughout its range in Florida.

Kissimmee Chain of Lakes in Central Florida – In coordination with the University of Florida, a project was developed to better understand factors contributing to successful snail kite nesting attempts in the Kissimmee Chain of Lakes. The Kissimmee Chain of Lakes has consistently supported the majority of Florida's snail kite nests over the last five years, as breeding concentrations have shifted from isolated areas of the Everglades to the more heavily-managed and highly-recreated lakes near urban Central Florida. Nesting in the Kissimmee Chain of Lakes may be impacted by the recent proliferation of exotic snails in the region, and the fact that snail kites usually nest in non-woody vegetation in lake habitats (cattail, bulrush) which is thought to result in higher failure rates due to collapse. This project assessed which factors play prominent roles in a nest's fate by employing nest cameras at randomly selected active nests, and monitoring radio-tagged nesting adults to estimate home range size and vegetation characteristics in nesting and foraging habitats.

During FY 2010-11, hundreds of thousands of images from 37 nests were analyzed for predation events, abandonment, feeding rates, etc. Correlated habitat characteristics (nest patch size, substrate, distance from shore, etc.) were tested for impacts to nest success. Surprisingly, only 55% of nest failures were due to predation and no failures were attributed to nest collapse. Snakes were by far the most common predator, but more nests failed from simple parental abandonment than from snake depredation. Abandonment may have been caused by disturbances, unusually cold spring temperatures, or a lack of food (effect of temperature).

There was a general trend of attentive adults having higher nest success; i.e., the longer an adult stayed on a nest during the egg-laying stage, and the shorter their forays away from the nest were, the better the chance for nest success. This highlights the extreme importance of

reducing disturbance around nests, as well as minimizing the distance between foraging area and nesting habitat. A minimum nest patch size of seven acres (three hectares) was identified as important for allowing kites to nest greater than 30 feet (ten meters) from the edge of the patch, which was associated with increased nest success. Nest patch is defined as the contiguous grouping of nesting substrate (e.g. a clump of cattail, willow, bulrush, etc.) that is surrounded by dissimilar, shorter stature vegetation or open water.

Home range sizes and characteristics were also documented for 22 radio-tagged, nesting snail kites by recording activity points. Snail kites with smaller home ranges had higher snail catch rates, indicating that if snails are readily available then snail kites need less area and capture snails more frequently. Egyptian paspalidium was the most common foraging substrate, though water grass and torpedograss were exceedingly important at times of higher water (late winter, early spring). Several snail kites foraged distances of up to two miles (three kilometers) from their nests, highlighting areas with poor foraging habitats that may benefit from management activities.

**Florida Grasshopper Sparrow** (*Michael Delany and Tina Hannon*)

The Florida grasshopper sparrow is a Federally-designated Endangered species endemic to the dry prairie communities of Florida. Florida's dry prairie is a distinct floristic region of the state characterized by flat, open expanses dominated by fire-dependent grasses, saw palmetto, and low shrubs. Following a status survey conducted by FWC, the Florida grasshopper sparrow was Federally listed as Endangered in 1986 because of its low numbers, restricted distribution, and habitat loss. The Federal recovery objective is to down-list the sparrow to Threatened when ten protected locations contain stable, self-sustaining populations of more than 50 breeding pairs each. Although the Florida grasshopper sparrow is known to exist at seven locations, only two populations meet recovery criteria: Three Lakes WMA in Osceola County and Kissimmee Prairie Preserve State Park in Okeechobee County. Only three populations of grasshopper sparrows persist on Florida's public lands; these include the Three Lakes WMA , Kissimmee Prairie Preserve State Park, and Avon Park Air Force Range in Highlands County. Florida grasshopper sparrows on protected lands are monitored by annual point count surveys, a standard method used to assess the relative abundance of bird populations. For additional information about the sparrow, please visit http://myfwc.com/research/wildlife/birds/florida-grasshopper-sparrow/.

Factors Affecting Abundance and Detection at Three Lakes Wildlife Management Area in Osceola County – Annual point count data (2003-2008) from 166 monitoring stations, records of land management activities, and landscape features at Three Lakes WMA were examined during FY 2010-11 for factors affecting the abundance and detection of Florida grasshopper sparrows. Abundance estimates adjusted for imperfect detection indicated a population of 498 male Florida grasshopper sparrows with a density estimated at 23.9 male sparrows per 247 acres (100 hectares). Abundance increased with mean elevation above sea level, distance from the non-prairie edge (usually the tree line around the grassland), and with growing-season burns. Abundance declined with time post-burn. Detection probability estimates, the chance that a sparrow is detected given that it is available, ranged from 0.041-0.101 detections depending on the observer. During the breeding season, detection probability declined with the time of day (two hours after sunrise) and day of the year (after mid-May). Patterns of Florida grasshopper

sparrow abundance appeared to be tied to habitat quality. The 7,410-acre (3,000-hectare) prairie grassland seems to be sufficiently large and suitable to maintain a viable population of Florida grasshopper sparrows (≥ 50 breeding pairs). The current burn regime (two to three year intervals) should be maintained and efforts to remove encroaching and intervening woody vegetation should be continued. Future monitoring should incorporate covariates of abundance and detection during the collection of data and in their analysis.

Monitoring on Three Lakes Wildlife Management Area in Osceola County – Point count surveys for grasshopper sparrows have been conducted on the Three Lakes WMA since 1991. The surveys are conducted each spring (April-June) and consist of a grid of 190 stations spaced 0.25 miles (0.40 kilometers) apart. Each station is surveyed for five minutes three times each spring and all grasshopper sparrows heard or observed are recorded. Beginning in 2002, 60 stations were established north of the main population on what is called "the island" to determine if translocations of 18 juvenile sparrows in 2001 and 2002 were successful. In 2011, surveys estimated there were at least 67 different male grasshopper sparrows at the main site, a sharp decline from 92 detected males in 2010. No males were detected on the island in 2011. Tree removal, in which oaks and cabbage palms that have encroached on the dry prairie as a result of past fire suppression were mulched to ground level, was conducted in 2007 and 2008 on an adjacent site to the main site and 18 survey stations were added to that area in 2008. In 2009 and 2010, a male was detected at the same point within the restored area. No birds were detected in the restored area during FY 2010-11. Overall, the FY 2010-11 surveys show a declining trend in detected male grasshopper sparrows. The five-year trend of detected males is of great concern to FWC. Monitoring will continue on the WMA in FY 2011-12. In an effort to maintain the dry prairie, oak resprouting within the removal areas are sprayed with herbicide to prevent re-encroachment into these areas and oaks outside of historic hammocks that have yet to be removed will be cut down by management area staff. In addition, an interagency working group is focusing on increasing monitoring efforts on all three properties where grasshopper sparrows are found in an attempt to determine causes for their declines.

**Florida Scrub-Jay** (*Travis Blunden, Chris Matson, Nicole Ranalli, Craig Faulhaber, Norberto Fernandez, Jim Garrison, Karl Miller, Brandon Schad, Steve Shattler, and David Turner*)

The Florida scrub-jay is a Federally-designated Threatened species that is endemic to Florida. Habitat loss and degradation have caused widespread declines throughout the scrub-jay's range. Despite protected status (land under public or private ownership that is dedicated for conservation) for three quarters of remaining scrubby habitats in Florida, scrub-jay numbers have continued to decline on conservation lands largely due to habitat degradation caused by decades of fire suppression and inadequate habitat management. Most of the remaining protected scrub-jay habitat is owned by county, State, or Federal government. Conserving this species requires the efforts of multiple local, State, and Federal agencies as well as non-governmental organizations and private landowners. The Florida Scrub-Jay Conservation Coordination project assists these efforts by facilitating communication among partners, collecting and distributing information regarding monitoring and management, working with partners to establish priority management actions, and developing standards and guidelines for conservation efforts. Typical habitat management efforts include prescribed burning and mechanical treatments such as roller chopping and cutting of trees that have encroached on scrub-jay habitat to increase open areas.

Conservation Coordination – During FY 2010-11, the Florida Scrub-Jay Conservation Coordination project continued to facilitate communication and information exchange among partners and to help land managers and biologists overcome obstacles to managing this species and its habitat. The working groups provide an excellent opportunity for participants to network, share ideas and experiences, and learn about new developments. Four regional working groups continued to meet during FY 2010-11 and focused on management and monitoring for upland natural communities and scrub-jays. Working group meeting attendees included representatives from all major public land management entities: the U.S. Fish and Wildlife Service (USFWS), U.S. Forest Service, Florida Department of Agriculture and Consumer Services' (FDACS) Florida Forest Service, Florida Department of Environmental Protection (FDEP), FWC, Water Management Districts, and county governments, as well as non-governmental organizations, university staff, and private landowners. The format for working group activities included general meetings to promote partnerships and information exchange, workshops for continuing education, and land management field trips to enhance the effectiveness of management actions.

Project staff at FWC continued to facilitate the sharing of information among partners and stakeholders by maintaining the Florida Scrub-Jay SharePoint Site (http://share2.myfwc.com/scrubjay/default.aspx), a clearinghouse of information on upcoming events, working groups, funding opportunities, and options for habitat management and scrub-jay monitoring.

Project staff engaged in public educational opportunities, including presentations on scrub-jays and habitat management for local communities, festivals, and environmental organizations. Staff also responded to questions about scrub-jays and their habitat from both partners and stakeholders.

FWC worked with partners to help establish priority management actions and monitoring for scrub-jays and their habitat. Activities during FY 2010-11 included 15 site visits to discuss scrub-jay habitat management with land managers and biologists from FDACS Florida Forest Service, Florida Park Service, St. Johns River Water Management District, USFWS, Archbold Biological Station, several county governments, non-governmental organizations, and private landowners. Project staff participated in setting monitoring and management priorities at the Wildlife Conservation, Prioritization, and Recovery workshop for the Lake Wales Ridge WEA. FWC worked with Highlands County, Archbold Biological Station, and The Nature Conservancy to prepare a land acquisition grant proposal to benefit scrub-jays. FWC also worked with USFWS to identify needs for USFWS grant opportunities and coordinated with USFWS on a field trip to evaluate habitat management needs for both scrub-jays and sand skinks. FWC worked with partner organizations to promote continuation of The Nature Conservancy's highly successful Jay Watch monitoring program. While working toward securing Jay Watch's long term future, FWC helped organize and implement an interim strategy to keep Jay Watch running for the 2011 field season. FWC also partnered with the U.S. Forest Service to plan and implement a monitoring program for scrub-jays in Ocala National Forest in Central Florida, which contains the largest scrub-jay population, and assisted partners with questions regarding monitoring methods for scrub-jays.

Finally, FWC worked with the USFWS and other partners to finalize the USFWS/FWC Florida Scrub-Jay Translocation Guidelines. When approved, these guidelines should help partners conduct successful translocations that involve moving scrub-jays to areas of suitable habitat for conservation purposes. FWC assisted USFWS with the development of best management practices for a memorandum of understanding about prescribed fire, and

participated on the Florida Scrub-Jay Recovery Team, which is improving and updating the Federal Recovery Plan for the species.

For more information on the Florida Scrub-jay Conservation Coordination project, please visit http://share2.myfwc.com/scrubjay/default.aspx.

Ocala National Forest in Central Florida – The Ocala National Forest supports the largest remaining Florida scrub-jay population. The status and trend of scrub-jays in this crucial population remain uncertain, however, because of unique challenges stemming from forest management practices and monitoring limitations. Harvest rotations for sand pines sustain the scrub-jay population by continually creating openings in the scrub but also limiting the potential carrying capacity for the region. The sheer size of the region (> 300,000 acres; 125,000 hectares) limits the applicability of traditional color banding and monitoring methods used with scrub-jays elsewhere in the state.

During April-May 2011, FWC worked with the Ocala National Forest on a new scrub-jay monitoring protocol. FWC recruited, trained, and supervised a team of 18 individuals from FWC, the U.S. Forest Service, the USFWS, and the University of Florida to conduct a post-reproductive survey during June-July 2011. Twenty-seven stands of zero to eight-year-old sand pine scrub were surveyed. Fifty scrub-jay family group territories, containing 119 adults and a minimum of 23 juveniles, were delineated. Preliminary data suggest that scrub-jays in the Ocala National Forest occur at high densities with relatively low productivity. The project will continue in FY 2011-12 with increased sampling effort and with analysis of habitat parameters that may affect scrub-jay productivity.

Arbuckle and Walk-in-the-Water Wildlife Management Areas in Polk County – The Arbuckle and Walk-in-the-Water WMAs are part of the Lake Wales Ridge State Forest (LWRSF) and encompass nearly 20,000 acres (8,094 hectares) of various habitat types, including scrub and sandhill. Scrub habitat contains a mix of oak trees and shrubs, herbaceous plants, and bare patches of sand, while sandhill habitat contains a mix of vegetation types, including wiregrass and native pines. Both tracts are managed using prescribed fire and nearly half of these habitats are potentially suitable for Florida scrub-jays. The FDACS Forest Service is the lead management agency on these areas and FWC is a cooperating agency. Due to phenological events, scrub-jay surveys take place mid-June through mid-July, therefore crossing fiscal years. For this reason, data are reported on a calendar year basis.

Past scrub-jay monitoring and banding was conducted by Archbold Biological Station under contract with FDACS Florida Forest Service from February 2003–February 2006. FWC initiated scrub-jay monitoring in 2008 using a pilot survey by Jay Watch, The Nature Conservancy's citizen science program. This pilot survey work was followed by comprehensive monitoring at Arbuckle WMA in FY 2009-10, during which six scrub-jay family groups (27 adults, 19 juveniles) were observed in the 2008 pilot study area. Twenty additional scrub-jays in four families were found during monitoring of the expanded area at Arbuckle WMA in 2009; therefore, the locations where birds were observed in 2009 were included in the 2010 monitoring. The number of individuals per group decreased from 4.6 in 2009 to 3.2 in 2010. Furthermore, the number of juveniles per group was 1.5 in 2008, 1.9 in 2009, and 1.5 in 2010. Since a mean family group of three birds and the mean number of juveniles per group of one is considered a normal population, the current groups appear to be relatively stable. The number of groups declined from 15 in 1997 to ten in 2009 but rebounded to 12 during 2010 monitoring.

Monitoring in 2011 will be based on data from 2010, with additional locations surveyed based on incidental observations.

In 2010, FWC worked with The Nature Conservancy and FDACS Division of Forestry for the third year of Jay Watch at the LWRSF Walk-in-the-Water tract with a limited pilot area surveyed along the eastern third of the tract. In 2009, six scrub-jay family groups were located at Walk-in-the-Water WMA totaling 19 birds (12 adults, five juveniles, two unknowns). This is down from seven family groups totaling 25 birds (17 adults, seven juveniles, one unknown) in 2008 in the same monitoring area. In 2010, eight scrub-jay family groups were located at Walk-in-the-Water WMA totaling 31 birds (21 adults, ten juveniles). This is an increase from six family groups totaling 19 birds (12 adults, five juveniles, two unknowns) in 2009 and seven family groups totaling 25 birds in 2008 in the same survey area.

In 2002, the FDACS Florida Forest Service initiated a Scrub-Jay Management Plan on the LWRSF. Since then, more than 2,500 acres (1,012 hectares) at Arbuckle WMA have been treated with prescribed fire, mechanical treatments, or a combination thereof and more than 4,400 acres (1,781 hectares) have been treated at Walk-in-the-Water WMA to benefit scrub-jays. However, no scrub-jay habitat was burned on Arbuckle or Walk-in-the-Water WMAs during FY 2010-11. FWC plans to continue monitoring scrub-jays on Arbuckle and Walk-in-the-Water WMAs using the Jay Watch program and protocol, which may be accessed at http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/florida/volunteer/jay-watch-volunteer-to-monitor-florida-scrub-jays.xml.

Camp Blanding Wildlife Management Area in Clay County – Monitoring activities were conducted during March 2011 by playing tape-recorded calls to attract scrub-jays. During FY 2010-11, one scrub-jay was found in the portion of the cantonment area called the Kingsley Scrub when the area was surveyed.

Cedar Key Scrub Wildlife Management Area in Levy County – FWC currently assists the lead-managing agency, FDEP, in the monitoring and management of Florida scrub-jays on the Cedar Key Scrub WMA. During FY 2010-11, there were four family groups of scrub-jays documented on Cedar Key Scrub WMA, consisting of 13 individuals. The monitoring program includes monthly monitoring of scrub-jays at specific sites along a route set up by The Nature Conservancy's Jay Watch program, banding chicks-of-the-year (chicks born that year), and sexing the adults through territorial and nesting behavior.

Fisheating Creek Wildlife Management Area in Glades County – FWC initiated scrub-jay surveys on Fisheating Creek WMA in FY 2008-09 using a pilot survey by Jay Watch. The Jay Watch surveys were conducted for the third time on Fisheating Creek WMA in FY 2010-11, during which three adult, two juvenile, and two unknown scrub-jays were observed.

In April 2011, approximately 25 acres (ten hectares) of overgrown scrub habitat were treated to reduce fuel loads, decrease vegetation height, and facilitate regular prescribed burning. Funding for the rental of the equipment was obtained via a grant provided by The Nature Conservancy. The treated sites are planned for a follow-up prescribed burn in FY 2011-12 with the plan to put them on a regular burn rotation thereafter.

Half Moon Wildlife Management Area in Sumter County – FWC continued to monitor Florida scrub-jays on the 9,500-acre (3,845-hectare) Half Moon WMA during FY 2010-11.

Individuals are color banded to better track the population. In FY 2010-11, no juveniles were banded, however reproduction improved this year, with a total of ten juveniles recorded from only three of the seven to eight family groups found on Half Moon WMA. These ten juveniles will be banded in FY 2011-12. The present population on the WMA is estimated at 25-30.

Lake Wales Ridge Wildlife and Environmental Area in Highlands and Polk Counties – The Lake Wales Ridge Wildlife and Environmental Area (LWRWEA) consists of nineteen tracts in Highlands and Polk counties, twelve of which contain known groups of Florida scrub-jays. FWC monitors scrub-jay populations on select tracts on the LWRWEA in cooperation with Archbold Biological Station and The Nature Conservancy's Jay Watch program. During FY 2010-11, tracts surveyed by Archbold Biological Station included Gould Road, Highland Park Estates, Leisure Lakes, Holmes Avenue, Lake Placid Scrub, Royce Unit, Clements, and McJunkin. The Nature Conservancy's Jay Watch program staff surveyed at Gould Road, Silver Lake, Sun'n Lake Sebring, Clements, and Holmes Avenue.

According to Archbold Biological Station results, the number of scrub-jay groups decreased at all locations except two (Lake Placid Scrub and Sun'n Lake Sebring) from the FY 2009-10 survey for that particular area. The number of juveniles per group decreased on one tract (Highland Park Estates) and increased or remained stable on the remaining tracts. All but two tracts contain a stable group size (Leisure Lakes and Holmes Avenue), and two properties have fewer young per group (Leisure Lakes and McJunkin).

Six of the LWRWEA tracts containing scrub-jays are platted subdivisions. These sites (Carter Creek, Henscratch, Leisure Lakes, Holmes Avenue, Sun 'n Lake Sebring, and Highland Park Estates) contain a checkerboard pattern of State and private ownership, which limits FWC's ability to employ necessary habitat management actions on State-owned property. One of the populations most at risk occurs at the Leisure Lakes subdivision site. This population has steadily declined from 57 groups in 2000 to 22 groups in 2009, and down to 18 groups in 2010, and will likely continue to decline if current management constraints (i.e. inability to burn due to housing, not allowed to manage private property) persist. Florida scrub-jay monitoring results are used as a tool to prioritize management actions.

Controlled burns during FY 2010-11 included roughly 929 acres (376 hectares) of potential or occupied scrub-jay habitat. This acreage included 204 acres (83 hectares) adjacent to current groups of scrub-jays on the Carter Creek tract, as well as scrub and scrubby flatwoods at two tracts (Sunray and Tubbs) that have the potential to support scrub-jays from adjacent locations. Controlled burns are planned for FY 2011-12 to aid existing scrub-jays and to attract new individuals.

Salt Lake Wildlife Management Area in Brevard County – As part of FWC's Wildlife Conservation, Prioritization, and Recovery program, which focuses on strategic management of at risk wildlife species on WMAs, approximately 100 acres (41 hectares) of scrub, scrubby flatwoods, and mesic flatwoods were targeted for specific management during FY 2010-11 to benefit scrub-jays. Salt Lake WMA supports six family groups with an estimated population of 20 birds. There was documented recruitment among three of the six families during FY 2010-11. Recruitment totaled six individuals, with two individuals in three separate family groups. All six scrub-jay family groups are located in proximity to the WMA's boundaries and each family group has territories that extend onto adjacent public and private properties. Continued monitoring and additional banding efforts are scheduled into FY 2011-12.

Scrub-jay habitat management focused on roller chopping 63 acres (25 hectares) and prescribed burning of 36 acres (15 hectares) of potential scrub-jay habitat. Management activities slated for FY 2011-12 include the continued use of roller chopping and prescribed fire on approximately 209 acres (85 hectares) of potential scrub-jay habitat.

Mitigation Parks – The goal of mitigation parks is to provide an off-site alternative for resolving certain wildlife resource conflicts. Most mitigation park facilities are developed by cooperation among other local, State and Federal agencies, usually following the signing and execution of a Memorandum of Understanding. The Memorandum's function is to establish an orderly process for administering monetary transactions and to provide a process for land acquisition and management. The responsibility for the management of lands acquired through the mitigation park program rests with FWC. These parks are managed primarily to enhance listed species populations, particularly those animals for which State and Federal approvals are required prior to their being impacted by new land development. All mitigation parks are designated by FWC as WEAs.

Annual monitoring of Florida scrub-jays during FY 2010-11 occurred at three mitigation parks. Moody Branch WEA in Manatee County was monitored using a private contractor. Three groups comprised of ten total birds were recorded at the site and one single bird was observed as a floater (disperses between populations) within the population. There was an overall decrease of one bird from the previous year.

Scrub-jay monitoring at Hickey Creek WEA in Lee County revealed three groups of scrub-jays consisting of ten individuals, with two juveniles observed after the nesting season. There was one additional floating bird that was observed on the site several times. Although the number of individuals has fluctuated over time, the number of groups has remained unchanged for many years and the population appears to be stable. Scrub-jay habitat management included 48 acres (19 hectares) of growing-season controlled burns.

The scrub-jay population at Platt Branch WEA in Highlands County consists of 14 individuals among five groups, which is lower than the previous year by one group. Four juveniles were identified post-nesting season. One new territory of scrub-jays appears to be forming in habitat that was enhanced by mechanical treatments during the previous year. Habitat management efforts during this reporting period focused on reducing vegetation heights in overgrown scrub and maintaining existing high-quality habitats, including the controlled burning of 58 acres (23 hectares) during the growing-season and the felling of large oaks in overgrown habitat.

**Marsh Birds** (*James A. Rodgers and Carolyn M. Enloe*)

Both species of marsh wren (Worthington's and Marian's) and both species of seaside sparrow (Scott's and Wakulla) found in Florida are currently listed as Species of Special Concern. Biological status reviews were conducted by FWC and external experts to determine whether or not these species met Threatened species listing criteria. It was determined that all four species of marsh bird did meet the required criteria to meet Threatened species status. The species' listing statuses will not change until management plans have been developed and approved.

- The Marian's marsh wren met Threatened species status listing criteria due to a severely fragmented (less than ten locations), continual declining extent of occurrence (smaller than 7,722 square miles, or 20,000 square kilometers); and a very small or restricted population (area of occupancy that is typically less than eight square miles, or 20 square kilometers, and found in five or fewer locations). The Marian's marsh wren biological status review may be accessed at http://myfwc.com/media/1351592/Marian's%20marsh%20wren%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352317/Marians%20Marsh%20Wren%20Supplemental%20Information.pdf.
- The Worthington's marsh wren met Threatened species status listing criteria due to a severely fragmented (less than ten locations), continual declining extent of occurrence (smaller than 7,722 square miles, or 20,000 square kilometers); a continual declining population size and trend (less than 10,000 mature individuals all in one subpopulation); and a very small or restricted population (area of occupancy that is typically less than eight square miles, or 20 square kilometers, and found in five or fewer locations). The Worthington's marsh wren biological status review may be accessed at http://myfwc.com/media/1351664/Worthington's%20Marsh%20Wren%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352392/Worthingtons%20Marsh%20Wren%20Supplemental%20Information.pdf.
- The Scott's seaside sparrow met Threatened species status listing criteria due to a severely fragmented (less than ten locations), continual declining extent of occurrence (smaller than 7,722 square miles, or 20,000 square kilometers); a continual declining population size and trend (less than 10,000 mature individuals all in one subpopulation that is fluctuating severely); and a very small or restricted population (area of occupancy that is typically less than eight square miles, or 20 square kilometers, and found in five or fewer locations). The Scott's seaside sparrow biological status review may be accessed at http://myfwc.com/media/1351625/Scott's%20Seaside%20Sparrow%20Final%20BSR.pdf , with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352347/Scotts%20Seaside%20Sparrow%20Supplemental%20Information.pdf.
- The Wakulla seaside sparrow met Threatened species status listing criteria due to a severely fragmented (less than ten locations), continual declining extent of occurrence (smaller than 7,722 square miles, or 20,000 square kilometers); a continual declining population size and trend (less than 10,000 mature individuals that is fluctuating severely); and a very small or restricted population (area of occupancy that is typically less than eight square miles, or 20 square kilometers, and found in five or fewer locations). The Wakulla seaside sparrow's biological status review may be accessed at http://myfwc.com/media/1351655/Wakulla%20seaside%20sparrow%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public

comments and peer reviews being available at http://myfwc.com/media/1352383/Wakulla%20Seaside%20Sparrow%20Supplemental%20Information.pdf.

Monitoring in Coastal and Freshwater Habitats of Florida – Many species of marsh birds are designated as Species of Conservation Concern, due to steady declines in their populations especially in the Midwest and Southeast U.S., including many populations of the clapper rail, black rail, and king rail. Because many marsh birds are notoriously difficult to detect, the exact population status of many of these marsh birds is unknown. FWC received funding from the U.S. Fish and Wildlife Service (USFWS) for a study that involved conducting surveys for marsh birds in Florida during FY 2010-11. The goal of this study is to estimate the presence/absence and relative abundance of secretive marsh bird species in freshwater and marine-estuarine habitats in Florida. This is a cooperative project involving the FWC, biologists from other State and Federal agencies, and volunteers.

The surveys employed the use of broadcasting recordings of bird calls to elicit responses from marsh birds. FWC surveyed 38 sites (18 freshwater, 20 estuarine) throughout the entire state in 2011. Within each site, there were five to eight count stations and all surveys were conducted from March 15 – May 28. Eleven species for a combined total of 1,604 individual birds were detected (auditory and visual) among all the survey sites, whereas, from zero to 257 individual birds were detected within the individual count stations. Clapper rails (56%), seaside sparrows (19%), common moorhens (15%), and marsh wrens (10%) were the detected species. Black rails were only detected on two occasions: one bird each at two sites in Dixie County. At this point of the study, FWC does not know if this reflects the rare status or lack of response by black rails to broadcast recordings. No king rails were detected in the surveys. Marsh wrens were detected at multiple sites from Waccasassa Bay in Levy County to St. Vincent Island in Franklin County. Seaside sparrows were detected at multiple sites from St. Marks in Wakulla County to St. Vincent Island in Franklin County. Surveys at one estuarine (Amelia Island in Nassau County) and two freshwater sites (Flying Eagle Wildlife Management Area in Citrus County and Yalaha in Lake County) resulted in no targeted bird detections.

**Peregrine Falcon** (*Robin Boughton*)

The peregrine falcon was delisted by the U.S. Fish and Wildlife Service (USFWS) in 1999. Following a biological status review, the Florida Peregrine Falcon Management Plan was developed and then approved by FWC's Commissioners at their June 2009 meeting and the peregrine falcon was subsequently removed from the State's Endangered and Threatened Species List. The Management Plan may be accessed at http://myfwc.com/media/1355287/5A4PeregrinePlan_final.pdf. FWC will continue reporting work on peregrine falcons for the five-year post-delisting period established by the USFWS. Peregrine falcons do not breed in Florida and are only present as migrants or uncommon winter residents. The conservation actions in the plan are to manage and continue to acquire habitat for the peregrine falcon, and to conduct a migration count.

- *Habitat Management* – Ongoing land management practices on wildlife management areas (WMAs) and other public lands that benefit other species also benefit peregrine falcons.

- *Habitat Acquisition* – Coastal properties are of particular importance to both migrating and overwintering peregrine falcons. Acquisition of coastal land is included in the Florida Forever program. Of particular importance is the high priority "Florida Keys Ecosystem" Florida Forever project. The narrowness of the Middle Keys serves to concentrate migrating peregrine falcons and therefore, preservation of roosting and foraging habitat in this area is essential. Important parcels have been identified including Boot Key, Lower Matecumbe, and other large, relatively undeveloped parcels in the Middle Keys. Acquisition of lands identified in the Florida Forever program is not possible at this time due to a lack of funding.
- *Monitoring* – FWC funded a monitoring project for peregrine falcon in the Keys for ten years. The grant programs that funded this migration count in the past are not intended to fund long-term projects. Although FWC places a high value on migration count monitoring, continued funding has not been secured. A private citizen group, the Florida Keys Hawkwatch, is organizing volunteers to continue the monitoring program in the fall of 2011.

**Red-cockaded Woodpecker** (*Barbara Almario, Michael Baranski, Robin Boughton, Mary Dowdell, Jim Garrison, Matthew Hortman, Norberto Fernandez, Ross Scott, Steve Shattler, Valerie Sparling, Adam Warwick, and Wendy Wilsdon*)

Conservation Planning – The red-cockaded woodpecker is a Federally-designated Endangered species. Statewide conservation planning for the red-cockaded woodpecker continued in FY 2010-11. At the close of FY 2006-07, implementation of most of the conservation actions identified in Florida's Red-cockaded Woodpecker Management Plan was complete. Progress on the remaining conservation actions in the plan are ongoing and are outlined below:

- *Establish and convene a meeting of the Florida red-cockaded woodpecker working groups.* One red-cockaded woodpecker working group currently meets. Agenda items relevant to the Florida Red-cockaded Woodpecker Management Plan have been incorporated into working group meetings and will continue as needed in the future.
- *Coordinate with the U.S. Fish and Wildlife Service (USFWS) to develop a statewide Safe Harbor program for red-cockaded woodpeckers in Florida.* The statewide Red-cockaded Woodpecker Safe Harbor program (http://myfwc.com/conservation/terrestrial/safe-harbor/) was initiated in November 2006 through an agreement between the USFWS and the FWC under the Federal Endangered Species Act. Red-cockaded woodpeckers are protected under the Endangered Species Act, meaning landowners have a legal obligation to protect the birds and their habitat. Safe Harbor Agreements make sense whenever landowners are interested in restoring or enhancing habitats that may benefit this species but are concerned about incurring additional regulatory restrictions on the use of their land. It effectively freezes a landowner's Endangered Species Act responsibilities as long as the owner agrees to restore, enhance, or create habitat that benefits red-cockaded woodpeckers. The program had a full-time coordinator funded by the Wildlife Foundation of Florida's Conserve Wildlife Tag, but the position was discontinued in June 2010. However, the program continues to enroll landowners and is maintained by FWC staff. By the end of FY 2010-11, there were 15 signed agreements (a total of 18

properties enrolled) in the program with a total of 64,572 acres committed for habitat management by the landowners.

At the close of the 2011 red-cockaded woodpecker breeding season, Florida red-cockaded woodpecker populations continued on a track to achieve and in many cases, exceed the year 2020 population and metapopulation goals outlined in Florida's Red-cockaded Woodpecker Management Plan. Field visits to red-cockaded woodpecker populations have confirmed that large red-cockaded woodpecker populations in Florida are well-managed and that fire suppression, reliance on dormant season prescribed fire, and low availability of old-growth pines remain the greatest threats to red-cockaded woodpecker recovery in Florida.

The activities above will continue until the species meets its conservation goals. These activities include meetings of the red-cockaded woodpecker working groups and implementation of the statewide Red-cockaded Woodpecker Safe Harbor program.

Babcock/Webb and Yucca Pens Unit Wildlife Management Area in Charlotte and Lee Counties – The annual tree cavity survey on Babcock/Webb Wildlife Management Area (WMA) in Charlotte County revealed 38 active red-cockaded woodpecker clusters in 2011. This is an increase of five new active clusters since 2009. Four new recruitment clusters were installed and two of these are now active. Three inactive clusters were augmented with cavity inserts and two of these are now active. One captured cluster now has a separate breeding pair. Since 2009, FWC has replaced 20 old cavity inserts in active clusters, and all active cavity trees were protected from snake predation.

Annual roost checks conducted in 2011 confirmed 31 potential breeding groups, an increase from 27 in 2009. During FY 2010-11, twenty-eight potential breeding pairs attempted nesting (90% attempt) and 22 pairs successfully fledged 26 young (an increase from 15 pairs successfully fledging 15 young in 2009).

Habitat improvements for the past two years included a total of 43,524 acres (17,614 hectares) of prescribed burning, including 7,436 acres (3,009 hectares) in the growing season. FWC ground treated 17,139 acres (6,936 hectares) of exotic flora and roller chopped 11,772 acres (4,764 hectares).

Blackwater Wildlife Management Area in Okaloosa and Santa Rosa Counties – The Florida Department of Agriculture and Consumer Services' (FDACS) Florida Forest Service and FWC have cooperatively managed the red-cockaded woodpecker population on Blackwater WMA since 1996. The population is monitored using leg bands, banding of nestlings and unmarked adults, fledge checks, translocations, and installation of artificial cavities where appropriate. FDACS Florida Forest Service has been responsible for reporting the banding of nestlings. During the winter of 2009, FWC helped install 12 artificial cavities to fulfill translocation requirements. During FY 2010-11, FWC continued the habitat improvement program initiated in 2006 by assisting FDACS Florida Forest Service with habitat management activities within red-cockaded woodpecker clusters.

Camp Blanding Wildlife Management Area in Clay County – FWC's role at Camp Blanding WMA is to assist with habitat improvement and restoration for the red-cockaded woodpecker population. A total of seven red-cockaded woodpecker clusters and surrounding foraging areas were cooperatively burned by Camp Blanding Forestry and FWC personnel during FY 2010-11. Two aerial burns totaling 2,540 acres (1,027 hectares) were conducted and

included four of the seven clusters. Six artificial cavity inserts were installed during March 2011.

Citrus Wildlife Management Area in Citrus County – FWC, in cooperation with FDACS Florida Forest Service, continued monitoring the red-cockaded woodpecker population on the 49,317-acre (19,959-hectare) Citrus tract of the Withlacoochee State Forest. Of the 75 active red-cockaded woodpecker clusters in 2011, 58 nested and 54 of these were successful, fledging 74 young.

Color banding continued with 82 nestlings banded during the 2011 nesting season. Three adult birds were also color banded.

Habitat management included prescribed burns on 6,094 acres (2,466 hectares), hardwood control, and artificial cavity inserts. Encroaching oak trees were cut and treated with herbicide in 39 clusters that did not receive fire. FWC and volunteers protected 215 cavity trees in 30 clusters from fire by mechanical means and raking. Three damaged inserts were replaced in established clusters while ten new inserts were installed in established clusters.

Monitoring and habitat management for this population has allowed it to become a donor for smaller populations. Twelve subadults were translocated from Citrus WMA to Corbett WMA in Palm Beach County on October 19, 2010; 75% of these birds were observed in their new location during the 2011 nesting season.

J. W. Corbett Wildlife Management Area in Palm Beach County – J.W. Corbett WMA is owned and managed by FWC, and all monitoring and management of the red-cockaded woodpecker population is conducted by FWC. During FY 2010-11, FWC determined the number of active clusters, monitored active clusters for nests, color-banded nestlings, determined fledging success, and installed artificial cavities in existing and recruitment clusters. Habitat management included maintaining a three-year, growing-season burn rotation within red-cockaded woodpecker habitat and treating 31,000 acres (12,545 hectares) of exotic plant species. A total of nine artificial cavities were installed while creating two new recruitment clusters.

There were 18 active clusters and 16 potential breeding groups during the 2010 nesting season, a record high since the area began intensive monitoring. Nine out of 16 potential breeding groups attempted nesting, with six clusters successfully fledging six birds.

Corbett received six pairs of birds from the Citrus County Tract of Withlacoochee River State Forest in Palm Beach County in the fall of 2010. Of the twelve birds translocated, nine have been observed since the move resulting in a 75% retention rate. One of the females dispersed to the John G. and Susan H. Dupuis, Jr. WEA and is currently part of a potential breeding group. Corbett is scheduled to receive five pairs of birds from Osceola National Forest in northeast Florida in the fall of 2011.

Coupled with nine potential breeding groups in Dupuis, the Corbett/Dupuis metapopulation has reached its goal of 25 potential breeding groups by year 2020 in accordance with Florida's Red-cockaded Woodpecker Management Plan.

Three Lakes, Triple N Ranch, and Bull Creek Wildlife Management Areas in Central Florida – The red-cockaded woodpeckers inhabiting the Three Lakes, Triple N Ranch, and Herky Huffman Bull Creek WMAs are all part of the same Central Florida (Osceola County) metapopulation as determined by the Florida Red-cockaded Woodpecker Management Plan.

On the Three Lakes WMA, FWC has been intensively monitoring the red-cockaded woodpecker population since 2001. The population decreased after the 2004 hurricanes but has finally returned to its pre-hurricane numbers. The number of potential breeding groups on the Three Lakes WMA consisted of 50 in 2010 and 44 in 2011. During the 2010 breeding season, 34 of the 48 nesting attempts were successful, 63 nestlings were banded and 47 of those chicks survived to fledge the nest. FWC installed 22 cavity inserts to augment established clusters. Eleven old and damaged inserts were replaced and 15 inserts were cleaned and maintained. Habitat management activities performed to enhance red-cockaded woodpecker habitat included prescribed fire on 5,799 acres (2,347 hectares), roller chopping and mowing on 229 acres (93 hectares), and invasive plant control. To protect red-cockaded woodpecker cavity trees during prescribed fires, FWC pre-burned around each tree.

The Herky Huffman Bull Creek WMA and the Triple N Ranch WMA have been actively managed as a single, small, red-cockaded woodpecker population since 2003 and supported seven potential breeding groups in FY 2010-11. This number has been steadily increasing since 2005 when the FWC began yearly translocations of birds to the property. This year, five of the six nesting attempts were successful, seven nestlings were banded and six of those chicks survived to fledge the nest. FWC installed seven cavity inserts to augment existing clusters and to create two new recruitment clusters. Eleven inserts were cleaned and maintained. Habitat improvements that aid red-cockaded woodpeckers included prescribed fire on 11,035 acres (4,466 hectares), roller chopping on 499 acres (202 hectares) and invasive plant control on 278 acres (113 hectares). To protect red-cockaded woodpecker cavity trees during prescribed fires, FWC pre-burned around each tree.

Big Cypress National Preserve in South Florida – In cooperation with the National Park Service, Corbett biologists designed a plan in 2007 to assist with management and monitoring of red-cockaded woodpeckers at Big Cypress National Preserve (BCNP). Due to limited resources and difficult field conditions, the southern-most population of red-cockaded woodpeckers located on BCNP had never been precisely documented and monitored. Accurate information from this red-cockaded woodpecker population, the largest in South Florida slash pine, would assist in determining population status in reference to recovery goals.

Annual monitoring and management by FWC continued in the fall of 2010 with tree/cavity surveys to determine cluster status and activity. Nineteen artificial cavities were installed in nine cavity limited clusters. Twelve adults were banded prior to the 2011 breeding season, and six new clusters were discovered throughout the year. Monitoring continued into the 2011 breeding season with nest monitoring, nestling/adult banding, fledge checks, and roost checks.

BCNP experienced drought conditions resulting in numerous wildfires, the largest being the Jarhead Incident, which burned over 40,000 acres (16,187 hectares) and damaged at least 17 red-cockaded woodpecker cavity trees. In response to the fire damage, FWC installed an additional 23 artificial cavities to counter cavity loss.

FWC monitored 51 of 100 potential clusters for productivity based on access and cluster activity. This included 39 clusters accessible by ATV and 12 by helicopter. Out of 51 potential breeding groups, 42 attempted nesting with 28 successful nests. Twenty-one chicks made it to banding age (six days) and 15 fledged. Helpers were observed in ten of the monitored clusters. Additional clusters were surveyed for signs of activity during the breeding season and totals show at least 82 active clusters on BCNP. FWC also completed the first red-cockaded

woodpecker translocation from BCNP to John G. and Susan H. Dupuis, Jr. WEA in Palm Beach and Martin counties.

FWC will continue to survey BCNP for new cluster locations as well as to augment cavity-limited clusters. Monitoring of fire effects on individual red-cockaded woodpecker trees will be continued and documented. FWC also plans to augment additional cavity-limited clusters and continue to closely monitor clusters in the 2012 breeding season.

An FWC biologist spoke on the management and status of red-cockaded woodpeckers in the BCNP at the BCNP Research Symposium in September 2010.

Goethe State Forest in Levy County – FWC currently assists FDACS Florida Forest Service in monitoring and managing the red-cockaded woodpecker population on the Goethe State Forest. During FY 2010-11, there were 43 active clusters of red-cockaded woodpeckers of which 35 produced chicks. The annual monitoring program at the Forest includes roost checks, cavity and tree inventories, search for new cavities, cavity tree maintenance, the banding of chicks-of-the-year, any un-banded adults that are found, and sexing the chicks when fledged.

One hundred and twenty-two acres were mowed in a red-cockaded woodpecker cluster to improve forage habitat and to advance that cluster to a growing season burn regime. The cavity trees are protected by mowing or burning within a 30-feet (nine meter) buffer of trees prior to conducting a prescribed burn on the stand.

Tate's Hell State Forest in Franklin and Liberty Counties – FWC conducts inventory and monitoring projects for red-cockaded woodpeckers on Tate's Hell State Forest. The primary objective is to provide for the long-term perpetuation of red-cockaded woodpeckers, accomplished by searching for unknown red-cockaded woodpecker clusters (colonies), monitoring reproductive success, supervising mechanical treatments in clusters, and determining timber and fire management impacts.

FWC conducted eight hours of aerial surveys for new trees, discovering five new cavity trees and many potential recruitment sites. FWC also established four new recruitment clusters by contracting the installation of 20 artificial cavity inserts. FWC mechanically treated 74 acres (30 hectares) to reduce the hardwood midstory surrounding both new and existing clusters. From March-June 2011, 52 clusters were monitored for active resin wells. If maintained resin wells occurred on a tree, it was considered to be active. FWC found 99 active trees in 33 active clusters. The active trees were then observed throughout the nesting season to watch for returning adults or listen for chicks calling from the cavity. Thirty-three potential breeding groups established 28 nests, and these nests were "peeped" (using a special camera designed for use in red-cockaded woodpecker cavities) to confirm that the nest was active and determine the number of eggs or chicks present. FWC banded 58 nestlings in 2011 and 42 in 2010. From June-August 2011, FWC performed sunrise checks in which red-cockaded woodpecker calls were played to keep birds near the cluster until bands could be read. Of the 58 banded chicks, so far, 20 have been re-sighted foraging, for a survival rate of 34% (fledged).

Apalachicola River Wildlife and Environmental Area in Franklin County – Both natural and artificial clusters within the Apalachicola River Wildlife and Environmental Area (ARWEA) in Franklin County were monitored throughout the breeding season. There are currently a total of ten known clusters being monitored on the ARWEA. Two additional recruitment clusters were created in the winter of 2009. ARWEA now has three natural and seven artificial red-

cockaded woodpecker clusters. During FY 2010-11, eight of the ten clusters showed signs of activity. Seven of the eight active clusters contained nests. Two nests occurred in the natural clusters, four nests were in artificial cavities within the recruitment clusters that were established in March 2005 and January 2008, and one nest occurred in one of the 2009 artificial recruitment clusters. The two nests in the natural clusters produced five total fledglings this past breeding season. The five active recruitment clusters with artificial cavities produced seven total fledglings (three nests with two fledglings, one nest with one fledgling, and one nest was depredated). The number of active clusters increased by three from the previous year, and the number of fledglings produced increased from nine in 2010 to 12 in 2011. Eleven of the 12 chicks were banded by FWC. Management activities to enhance habitat included roller chopping approximately 214 acres (87 hectares) and gyro-tracing (mulching/tree chipping) 232 acres (94 hectares) to enhance foraging habitat by reducing woody midstory growth. Monitoring and management efforts will continue.

John G. and Susan H. Dupuis, Jr. Wildlife and Environmental Area in Palm Beach County – Before translocations began in 2006, red-cockaded woodpeckers were last observed on the John G. and Susan H. Dupuis, Jr. WEA (Dupuis) in 1989. FWC, in conjunction with the South Florida Water Management District and the USFWS, developed a plan to reintroduce red-cockaded woodpeckers to the area. Prior to releasing birds, FWC biologists identified habitat improvement activities critical for reintroduction, which included mechanical clearing of understory, frequent prescribed burning, and installation of artificial nest boxes, and coordinated these activities with the South Florida Water Management District. Since 2006, 50 red-cockaded woodpeckers have been captured and translocated from public lands in Florida and Georgia to Dupuis. Of the eleven birds released in the fall of 2010, four remained on the area. Ten of the translocated red-cockaded woodpeckers came from Apalachicola National Forest in north-central Florida and one female was from BCNP in South Florida (the first translocation from BCNP).

In 2011, nine potential breeding groups produced seven fledglings. In addition, a female bird translocated to the J. W. Corbett WMA in 2010 was found paired with a male on Dupuis. Coupled with Corbett's 16 potential breeding groups, the Corbett/Dupuis metapopulation has reached its goal of 25 potential breeding groups by year 2020 as set in Florida's Red-cockaded Woodpecker Management Plan.

As part of the plan, FWC will release an additional ten woodpeckers on the area during fall 2011. Additional cavities were installed to bring the total number of cluster locations to 23. During the next breeding season, clusters will continue to be monitored for nests, nestlings will be banded, and fledging success determined. In addition, habitat management activities to reduce midstory height and enhance red-cockaded woodpecker habitat will continue.

Restoration of the woodpecker at Dupuis will provide an important additional population in southeast Florida as part of the Federal Red-cockaded Woodpecker Recovery Plan. The only other group of red-cockaded woodpeckers in southeast Florida is at Corbett.

Platt Branch Mitigation Park Wildlife and Environmental Area in Highlands County – Monitoring the Fisheating Creek (part of the Platt Branch Mitigation Park WEA) population of red-cockaded woodpeckers has been conducted by FWC on an intensive level since 2002. Eight active clusters currently compose the population within Platt Branch WEA and on adjacent private properties, portions of which are protected by conservation easements.

Surveys in FY 2010-11 revealed four potential breeding pairs and four solitary males prior to nesting season. Nesting success was monitored during the spring of 2011, with two pairs each producing a single hatchling, both of which survived to fledging.

FWC completed growing season controlled burns on 58 acres (23 hectares) of suitable habitat. Mechanical fuel reduction was completed around all active clusters.

**Roseate Tern** (*Ricardo Zambrano*)

The roseate tern is a Federally-designated Threatened seabird. This species is only found in extreme South Florida and in a limited number of colonies. After the hurricane season of 2005, the roseate tern's main nesting island, Pelican Shoal Critical Wildlife Area, was submerged under one to two feet of water and thus no longer available as a nesting site for roseate terns.

In the spring of 2006, FWC biologists attempted to provide the birds displaced from Pelican Shoal with an alternative nesting area. In cooperation with the National Park Service, biologists placed plastic tern decoys along with a sound system and speakers broadcasting tern calls on Long Key at Dry Tortugas National Park. These techniques, known as "social attraction," have been used around the world to attract colonial-nesting birds to nesting areas and to restore seabird colonies. These techniques have been successful the last five years. During the 2011 nesting season, it was decided not to place the equipment at the Dry Tortugas National Park in order to determine if the terns would nest there without the use of the equipment and decoys. Only twelve nests were recorded this year, which is down from the previous years. In the main Florida Keys, FWC biologists surveyed four colonies on gravel roofs to conduct nest, egg, juvenile, and adult counts. A total of 171 nests were recorded between the four roofs. The total roseate tern population for Florida is estimated to be 183 pairs. This year, a sample of 76 chicks was captured, banded, and released at the roof colonies in the Florida Keys.

**Shorebirds** (*Naomi Avissar, Janell Brush, Bobbi Carpenter, Nancy Douglass, and Amy Schwarzer*)

Two species of shorebirds in Florida are currently listed as State-designated Threatened (snowy plover and least tern) and two species are currently listed as Species of Special Concern (black skimmer and American oystercatcher) found. The snowy plover and least tern listed as Threatened under Florida's old rules, became a State-designated Threatened species in November 2010 after a new listed species rule and Threatened species management system was passed by the FWC Commissioners (see page 1). Biological status reviews were conducted by FWC and external experts to determine whether or not these species met Threatened species listing criteria. It was determined that all four species of marsh bird did meet the required criteria to meet Threatened species status. The species' listing statuses will not change until management plans have been developed and approved.

- The snowy plover met Threatened species status listing criteria due to a severely fragmented (less than ten locations), continual declining extent of occurrence (smaller than 7,722 square miles, or 20,000 square kilometers) and area of occupancy (less than 722 square miles, or 2,000 square kilometers); a continual population size and trend reduction (less than 10,000 mature individuals all in one subpopulation); and a very small

or restricted population (estimated to number less than 1,000 mature individuals). The snowy plover biological status review may be accessed at http://myfwc.com/media/1351640/Snowy%20Plover%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352365/Snowy%20Plover%20Supplemental%20Information.pdf.

- The least tern met Threatened species status listing criteria due to a continued population size reduction (at least 30% over the last ten years or three generations; suspected to be met within the next ten years or three generations; or where the time period includes both the past and the future, whichever is longer up to a maximum of 100 years);where the reduction or its causes may not have ceased or may not be understood or may not be reversible); and the probability of extinction in the wild is at least 10% within 100 years. The least tern biological status review may be accessed at http://myfwc.com/media/1351577/Least%20Tern%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352305/Least%20Tern%20Supplemental%20Information.pdf.
- The black skimmer met Threatened species status listing criteria due to a continued population size reduction (at least 30% suspected to be met within the next ten years or three generations, or where the time period includes both the past and the future, whichever is longer up to a maximum of 100 years); continual declining, severely fragmented (exists in less than ten locations) extent of occurrence (smaller than 7,722 square miles, or 20,000 square kilometers) and area of occupancy (less than 722 square miles, or 2,000 square kilometers); and a continual population size and trend reduction (less than 10,000 mature individuals all in one subpopulation). The black skimmer biological status review may be accessed at http://myfwc.com/media/1351505/Black%20Skimmer%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352230/Black%20Skimmer%20Supplemental%20Information.pdf.
- The American oystercatcher met Threatened species status listing criteria due to a continual population size and trend reduction (less than 10,000 mature individuals all in one subpopulation), and a very small or restricted population (estimated to number fewer than 1,000 mature individuals). The American oystercatcher biological status review may be accessed at http://myfwc.com/media/1351490/American%20oystercatcher%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352218/American%20Oystercatcher%20Supplemental%20Information.pdf.

Florida's wildlife habitats are facing unprecedented challenges ranging from climate change to a rapidly expanding human population. The population of Florida's coastal counties is predicted to double from 12.3 million to more than 26 million by 2060. Currently, more than

half of Florida beaches are experiencing erosion problems, most of which is due to anthropogenic factors. These problems will be exacerbated in the near future by climate change. The culmination of beach erosion and climate change will require an increase in the management of coastal systems in the form of habitat modifications.

Survival of Florida's vulnerable seabirds and shorebirds (e.g. snowy plover, least tern, roseate tern, black skimmer, and American oystercatcher) are dependent on community-based conservation that recognizes both the economic and wildlife values of coastal habitats. This type of conservation cannot be accomplished by any one agency and requires the skills, experience, and resources only a broad spectrum of partners can marshal. Realizing this, FWC initiated a conservation approach for shorebirds and seabirds, which relies extensively upon partnership development and support. This project, the Florida Shorebird Partnership Coordination, which began in 2007, is funded through Florida's Wildlife Legacy Initiative (Congressional State Wildlife Grants program). FWC helped cultivate numerous local and regional partnerships to improve conservation through cooperative efforts between key agencies, organizations, and individuals involved with the management, monitoring, and stewardship of shorebirds and seabirds. In addition, a statewide partnership network entitled the Florida Shorebird Alliance was created to facilitate information exchange between partners, improve coordination statewide, and add more consistency to monitoring and management of Florida's shorebirds and seabirds.

To date, eight active regional partnerships coordinate monitoring and protection across Florida. The partnerships include the Suncoast Shorebird Partnership, Florida Panhandle Shorebird Working Group, Nature Coast (Taylor to Hernando County) Shorebird Partnership, Collier County Shorebird Partnership, St. John's Shorebird Partnership, Timucuan Shorebird Partnership, Volusia County Shorebird Partnership, and Lee County Shorebird Partnership.

In August 2009, the Florida Shorebird Alliance website was launched and may be accessed at www.flshorebirdalliance.org. This website functions as an online resource for information and materials on Florida's shorebirds and seabirds, and as a tool to improve the level of coordination and information sharing between the various regional partnerships. The Florida Shorebird Alliance also publishes a newsletter and maintains an email list-serv of 550 partners. Together with continued expansion and development of the Alliance network, these changes will enable FWC to assess status and trends for many shorebirds and seabirds in Florida, information that is critical to conservation planning for coastal habitats.

Florida Shorebird Database – Managers and permit reviewers need real-time information to help them respond to situations involving nesting shorebirds and seabirds. In early 2010, FWC began developing a new and improved online shorebird/seabird database that includes standardized protocols for monitoring and a section for non-breeding species. The Florida Shorebird Database was created to serve as the central repository for data collected on shorebirds and seabirds in Florida. The Database is an online tool with a data entry interface that allows users to submit and manage observations. FWC and partners developed the Database and an accompanying protocol for monitoring beach-nesting shorebirds and seabirds. The Database was launched in spring 2011 and to date, 114 registered users from throughout the state are entering locations and nesting data on these birds. These data are now available online to anyone, thereby allowing researchers, managers, conservationists, and permit reviewers to use information to help conserve shorebirds and seabirds. The Database may be accessed at www.flshorebirddatabase.org.

The Effects of Human Induced Habitat Modifications on Shorebirds and Seabirds in Florida – A State Wildlife Grant funded project was initiated during FY 2009-10 (and will be completed in FY 2011-12) to study the effects of human-induced habitat modifications on shorebirds and seabirds in Florida. Monitoring the effects these habitat changes have on shorebirds requires a statewide cooperative effort between the FWC and its partners. Standardized statewide monitoring protocols allow for the collection of quantitative information about habitat use patterns and how these patterns are influenced by invertebrate prey availability, disturbance, and site-specific variables. Understanding the interrelationship among site variables will allow FWC to define habitat quality for migratory and wintering shorebirds and seabirds in Florida, and provide a better foundation upon which to formulate management recommendations.

Assessing the Importance of Horseshoe Crab Eggs in the Diets of Migrating Red Knots During Refueling Stops on Selected Florida Beaches – The red knot is a large sandpiper that is known for its long-distance migrations and large flocks. The red knots consist of at least six subspecies worldwide, representing both long-distance and short-distance migrants. In the Americas, two subspecies exist: *Calidris canutus roselaari* and *Calidris canutus rufa*. The *rufa* subspecies is subdivided into three distinct over-wintering populations found in southern South America (Tierra del Fuego), Brazil, and the southeastern U.S. The bulk of the *rufa* population winters in Tierra del Fuego (approximately 14,000 – 16,000 individuals). Smaller groups are found in Brazil (approximately 3,000) and the U.S. (approximately 2,000 in Florida).

Populations of red knots have declined an estimated 80% in the last 25 years. Declines are primarily attributed to dwindling food resources (i.e. horseshoe crab eggs) in Delaware Bay, but other factors such as breeding habitat quality and lower recruitment have been suggested. The declining trend has also been documented in Florida, prompting the need to determine their status and local factors, which may contribute to the decline. FWC banded and re-sighted wintering and migrating red knots to determine annual survival, residency, and movement patterns. Plasma metabolites and body mass was analyzed to assess energetic status of knots. FWC also conducted sediment and stomach sampling to estimate abundance of shorebird prey items and prey preferences. Adult annual survival rates were similar to those reported for red knots passing through Delaware Bay. Body mass of Florida red knots was greater than that of knots wintering in South America. Plasma metabolites suggest that knots lowered their food intake from early winter to middle and late winter and did not experience severe energetic stress. Local conditions were not a major contributor of population fluctuations or declines in recent years. Red knots remained in traditionally used areas unless conditions (e.g., human recreation) changed markedly. FWC examined the mean length of stay between core sites in the Tampa Bay Area. The number of days varied from 28 – 64 days. Although FWC did not measure human disturbance directly, smaller mean length of stay corresponded with higher anthropogenic development and vice versa. Transition probabilities between areas were minimal, indicating that knots at a specific site did not view the alternate sites as refuges.

**Southeastern American Kestrel** (*Barbara Almario, Jim Garrison, Allan Hallman, Randy Havens, Anni Mitchell, Karl Miller, and Jennifer Myers*)

The Southeastern American kestrel, listed as Threatened under Florida's old rules, became a State-designated Threatened species in November 2010 after a new listed species rule

and Threatened species management system was passed by the FWC Commissioners (see page 1). A biological status review was conducted by FWC and external experts to determine whether or not the Southeastern American kestrel met Threatened species listing criteria. It was determined that the Southeastern American kestrel did meet the required criteria to meet Threatened species status. The Southeastern American kestrel met Threatened species status listing criteria due to a continual declining, severely fragmented (exists in less than ten locations) area of occupancy (less than 722 square miles, or 2,000 square kilometers); and a declining population size and trend (less than 10,000 mature individuals) with no more than 1,000 mature individuals in each subpopulation. The Southeastern American kestrel biological status review may be accessed at http://myfwc.com/media/1351643/Southeastern%20American%20Kestrel%20Final%20BSR.pdf . Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352368/Southeastern%20American%20Kestrel%20Supplemental%20Information.pdf.

The Southeastern American kestrel is a non-migratory falcon closely tied to sandhills in the southeastern U.S. This subspecies has undergone a marked range contraction and population decline throughout its range in recent decades. In July 2008, FWC initiated a long-term effort to develop a regional Southeastern American Kestrel conservation partnership within and across agencies by: 1) identifying suitable but unoccupied kestrel habitat; 2) establishing population targets for kestrels on FWC's Wildlife Management Areas (WMAs) and other public lands, 3) building and installing new nest boxes and repairing old nest boxes; 4) providing standardized data collection protocols to monitor kestrels and establishing a database to manage annual monitoring data on public lands; 5) monitoring nest boxes during the breeding season; 6) educating biologists, land managers, bird watchers, and others through talks, web sites, and printed media; and 7) conducting additional research on kestrel breeding habitat requirements.

During FY 2010-11, FWC coordinated kestrel monitoring with partners – Florida Department of Environmental Protection, FDACS Florida Forest Service, and private citizens. More than 520 nest boxes were monitored during spring/summer 2011. Nest boxes were located in 11 counties in north-central Florida (Alachua, Citrus, Clay, Columbia, Gilchrist, Hernando, Levy, Madison, Marion, Sumter, and Suwannee) and four counties in south-central Florida (Highlands, Glades, Lake, and Polk). Annual occupancy rates were greater than 41%. Nest boxes were not inspected frequently enough to determine nesting outcome in many cases, but the majority of nesting attempts produced at least one fledgling. The three public lands with the most Southeastern American kestrel nest boxes were Camp Blanding WMA in Clay County (59 nest boxes), Mike Roess Gold Head Branch State Park in Clay County (18 nest boxes), and Withlacoochee State Forest in Citrus County (18 nest boxes). The longest-running nest-box monitoring program for Southeastern American kestrels in Florida is located at Ichetucknee Springs State Park in Columbia and Suwannee counties. Ichetucknee Springs State Park maintains 13 nest boxes and three to four are consistently used by kestrels each year since the 1990s. FWC collected and analyzed data from selected sandhill sites in north-central Florida to determine habitat requirements for kestrels. Southeastern American kestrels preferred nest boxes that were located in sites with an open tree canopy (0-25% canopy closure) where the ground cover was dominated by grasses (40-80% grassy cover). Larger, contiguous patches of open habitats were more likely to be occupied than landscapes where open habitats were interspersed with densely forested habitats.

In FY 2010-11, 54 Southeastern American kestrel nest boxes were maintained and monitored by FWC on FWC-managed lands in southwest Florida. Four of the 54 boxes were installed during FY 2010-11; the remainder were installed during previous fiscal years. FWC-managed lands with kestrel nest boxes include: Chassahowitzka WMA, Perry Oldenburg Mitigation Park WEA, and Janet Butterfield Brooks Preserve WEA, which are all in Hernando County; Hilochee WMA and Hilochee WMA-Osprey Unit in Lake County; Lake Wales Ridge WEA in Highlands and Polk counties; Kissimmee Island Cow Company (KICCO) WMA in Polk County; Hickory Hammock WMA in Highlands County; Kissimmee River Public Use Area in Highlands and Okeechobee counties; Crooked Lake WEA in Polk County; and Platt Branch WEA in Highlands and Glades counties. Nest boxes were maintained and monitored by FWC during the spring breeding season. Nine nest boxes were used by breeding kestrels. Chassahowitzka WMA had four active boxes, Perry Oldenburg Mitigation Park WEA had two active boxes, and the Lake Wales Ridge WEA had three active boxes. Seven boxes were used by great-crested flycatchers, nine by Eastern screech owls, two by red-bellied woodpeckers, three by Eastern bluebirds, one by an Eastern gray squirrel, and one was occupied by bees. The remaining 22 boxes were not used.

During FY 2010-11, 95 boxes were maintained and monitored by FWC on FWC-managed lands in north-central Florida. On Big Bend WMA in Taylor County, ten nest boxes were installed during March 2011. No kestrel nests or eggs were found. Other animals utilizing the boxes were great-crested flycatchers throughout the nesting season. On Camp Blanding WMA in Clay County, 56 nest boxes were cleaned prior to nesting season. All boxes were then checked for usage and maintained monthly during March – June. Twenty-two nest boxes were verified as having been or currently being used by kestrels and 56 kestrel eggs were identified. Other wildlife utilizing the nest included: southern flying squirrels, great-crested flycatchers, Eastern bluebirds, Eastern screech-owls, Eastern gray squirrels, and fox squirrels. On Jennings State Forest WMA in Clay and Dual counties, 26 existing boxes were cleaned and maintained in February and March of 2011. FWC conducted four visits during nesting season (April–June). No kestrel activity was noted. Other wildlife utilized boxes, including nine boxes with southern flying squirrels, two boxes with Eastern gray squirrels, eight boxes with great-crested flycatchers (laid a total of 12 eggs and hatched nine young), and five boxes with Eastern screech-owls (laid 11 eggs total). On Twin Rivers WMA in Madison County, three nest boxes were replaced during February 2011. All boxes were then checked for usage and maintained monthly during March–June. No kestrel eggs were found. Other animals utilizing the boxes were Eastern bluebirds, southern flying squirrels, tufted titmice, and great-crested flycatchers throughout the nesting season. Active kestrel pairs were frequently seen hunting in the vicinity of the three nest boxes. In June 2011, two recently fledged kestrels (one male and one female) were seen within 82 feet (25 meters) of one nest box that had been used by great-crested flycatchers. There are many natural cavities near the box and the kestrels most likely used one of these spaces for nesting.

During FY 2010-11, FWC continued to monitor kestrel nest boxes on Blackwater WMA in northwest Florida. In March 2009, FWC worked with a local Eagle Scout candidate and his crew to build and install ten kestrel nest boxes in open fields and establish wildlife openings throughout the WMA. While the boxes were placed late in the season, evidence of nesting was found by a local National Audubon Society member who documented two adults tending to a juvenile near a nest box location in June 2009. Nest box checks in 2011 revealed one box was used by owls and two boxes were used by kestrels (one box contained eggs and the other

contained hatchlings). Nest box checks and maintenance will continue during FY 2011-12. FWC will also continue to assess the need to add more nest boxes or move existing nest boxes in an attempt to increase use by kestrels.

**Wading Birds** (*Michael Baranski, Pamela Boody, Justin Davis, Justin Ellenberger, Matthew Hortman, Alex Pries, Valerie Sparling, and Morgan Wilbur*)

Eight species of wading bird in Florida are currently listed as Species of Special Concern – the snowy egret, little blue heron, tricolored heron, roseate spoonbill, reddish egret, limpkin, osprey, and white ibis. Biological status reviews were conducted by FWC and external experts to determine whether or not these species met Threatened species listing criteria. It was determined that four species of wading bird (little blue heron, reddish egret, roseate spoonbill, and tricolored heron) did meet the required criteria to meet Threatened species status, three did not (snowy egret, limpkin, and white ibis), and one (osprey) should remain a Species of Special Concern until further data can be gathered to verify that the Southern Coastal population is distinct and warrants listing as a sub-population. The species' listing statuses will not change until management plans have been developed and approved.

- The little blue heron met Threatened species status listing criteria due to a continued population size reduction (at least 30% over the last ten years or three generations; suspected to be met within the next ten years or three generations; or where the time period includes both the past and the future, whichever is longer up to a maximum of 100 years; and where the reduction or its causes may not have ceased or may not be understood or may not be reversible). The little blue heron biological status review may be accessed at http://myfwc.com/media/1351583/Little%20blue%20heron%20final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352311/Little%20Blue%20Heron%20Supplemental%20Information.pdf.
- The snowy egret did not meet Threatened species status listing criteria. The snowy egret biological status review may be accessed at http://myfwc.com/media/1353783/Snowy%20egret%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352362/Snowy%20Egret%20Supplemental%20Information.pdf.
- The tricolored heron met Threatened species status listing criteria due to a continued population size reduction (at least 30% over the last ten years or three generations; suspected to be met within the next ten years or three generations; or where the time period includes both the past and the future, whichever is longer up to a maximum of 100 years; and where the reduction or its causes may not have ceased or may not be understood or may not be reversible). The tricolored heron biological status review may be accessed at http://myfwc.com/media/1353786/Tricolored%20heron%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments

and peer reviews being available at http://myfwc.com/media/1352380/Tricolored%20heron%20Supplemental%20Information.pdf.

- The white ibis did not meet Threatened species status listing criteria. The white ibis biological status review may be accessed at http://myfwc.com/media/1351658/White%20Ibis%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352386/White%20Ibis%20Supplemental%20Information.pdf.
- The reddish egret met Threatened species status listing criteria due to an estimated 10% continued decline in population size and trend (less than 10,000 mature individuals) in less than ten years or three generations, whichever is longer (up to 100 years) with no more than 1,000 mature individuals that are all in one subpopulation; and a very small or restricted population that contains fewer than 1,000 mature individuals in a restricted area of occupancy (eight square miles, or 20 square kilometers) or number of locations (typically less than five locations). The reddish egret biological status review may be accessed at http://myfwc.com/media/1351607/Reddish%20egret%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352332/Reddish%20Egret%20Supplemental%20Information.pdf.
- The limpkin did not meet Threatened species status listing criteria. The limpkin biological status review may be accessed at http://myfwc.com/media/1351580/Limpkin%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352308/Limpkin%20Supplemental%20Information.pdf.
- The roseate spoonbill met Threatened species status listing criteria due to a very small or restricted population with an area of occupancy of less than eight square miles (20 square kilometers) typically in less than five locations. The roseate spoonbill biological status review may be accessed at http://myfwc.com/media/1353780/Roseate%20Spoonbill%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352338/Roseate%20Spoonbill%20Supplemental%20Information.pdf.
- The osprey will remain a Species of Special Concern until further data can be gathered to verify that the Southern Coastal population is distinct and warrants listing as a sub-population. The osprey biological status review may be accessed at http://myfwc.com/media/1351595/Osprey%20Final%20BSR.pdf, with supplemental information for the biological status review that includes public comments and peer reviews being available at http://myfwc.com/media/1352320/Osprey%20Supplemental%20Information.pdf.

Aucilla Wildlife Management Area in Jefferson and Taylor Counties – Aucilla WMA consists of numerous wetlands that provide habitat for several listed species of colonial wading birds, including the little blue heron, snowy egret, tricolored heron, white ibis, and wood stork (a Federally-designated Endangered species). In order to monitor the relative success of wading bird populations in the area, an annual aerial nest colony survey is conducted in the spring of each year. Aerial transects were flown in late April 2011 and late May 2011. Transects are 0.5 miles apart and are flown at an altitude of 300-400 feet and an air speed of approximately 40 knots. Of six previously identified wading bird colonies, one was active, down from three the previous year. Of the six colonies, no more than five have ever been active at the same time. No new colonies were found during the aerial survey. The Aucilla WMA experienced extreme drought conditions during the spring of 2011 and many of the wetlands where colonies are located were dry or nearly dry during the nesting season, possibly explaining the absence of nesting birds. The wading bird colonies are typically mixed with listed species and non-listed species such as yellow-crowned night-herons.

Fitzhugh Carter Tract of Econfina Creek Wildlife Management Area in Washington County – Numerous water bodies and associated wetlands present on the Fitzhugh Carter Tract of Econfina Creek WMA (Carter Tract) in Washington county provide excellent nesting and foraging habitat for the many species of wading birds found in the Florida Panhandle, most of which are listed or at risk for listing. In particular, one colony has been observed supporting nests for various species of colonial-breeding wading birds. Species of Special Concern that have used this colony in previous years include the little blue heron and tricolored heron. This colony is monitored annually from April–July to document species use, number of individuals present, and estimated nest success. No little blue or tricolored herons were observed using the colony during 2010 surveys. However, 2011 surveys documented 53 little blue herons (20 adults and 34 chicks) and two tricolored herons (one adult and one chick). Wood storks (a Federally-designated Endangered species) were documented throughout the year foraging on area ponds. Four wood storks were observed during a breeding bird point count in early May 2011; this was the most wood storks observed at one time on the property. Individual wood storks were also incidentally observed during spring/summer 2011 foraging in multiple water bodies throughout the property. White ibis (a Species of Special Concern) were also observed at multiple locations throughout the property during May 2011 breeding bird point count surveys. The colony at the Carter Tract will continue to be monitored annually during the nesting season (April–July). Additionally, incidental observations of listed wading bird species throughout the property will be documented.

Guana River Wildlife Management Area in St. Johns County – During FY 2010-11, FWC continued to monitor the richness, spatial distribution, and relative abundance of wading bird species on the 2,400-acre (971-hectare) Guana Lake impoundment within Guana River Wildlife Management Area (WMA). Several State and Federally-listed species including limpkin, reddish egret, snowy egret, little blue heron, tricolored heron, white ibis, wood stork, roseate spoonbill, and osprey are known to use Guana Lake either seasonally or throughout the year. Monthly transect surveys quantified these species and other wading birds occurring on Guana Lake. Density estimates of light-colored wading birds (including listed species like the wood stork and roseate spoonbill) on Guana Lake were 9.9 individuals per 100 acres (40 hectares) in spring 2010, 26 individuals per 100 acres in fall 2010, 31.6 individuals per 100 acres

in winter 2011, and 5.4 individuals per 100 acres in spring 2011. Density estimates for dark-colored wading birds (including listed species such as the little blue heron and tricolored heron) were 9.4 individuals per 100 acres (40 hectares) in spring 2010, 18.2 individuals per 100 acres in fall 2010, 11.8 individuals per 100 acres in winter 2011, and 12.4 individuals per 100 acres in spring 2011. In addition to providing habitat for wading bird species, Guana Lake also provides wintering habitat for migratory waterfowl and foraging habitat for migratory shorebirds during the spring and fall months.

J.W. Corbett Wildlife Management Area in Palm Beach County – Aerial wading bird surveys were conducted for active colonies on J.W. Corbett WMA during FY 2010-11. No active colonies were documented, down from two documented active colonies in FY 2009-10. Only one active colony was reported in FY 2007-08, and no activity was reported for FY 2008-09.

Apalachicola River Wildlife and Environmental Area in Gulf and Franklin Counties – The Apalachicola River Wildlife and Environmental Area (ARWEA) and Box-R Wildlife Management Area in Gulf and Franklin counties consists of a matrix of upland, wetland, and riverine habitats that potentially contain several rare or at risk species. The numerous wetlands on these areas provide habitat for several species of colonial wading birds, including the tricolored heron, little blue heron, snowy egret, white ibis, and wood stork. In order to monitor the relative success of wading bird populations in the area, an annual aerial colony survey is conducted in the spring of each year. Aerial transects were flown within the lower Apalachicola River basin on March 23, 2011 and April 21, 2011. There were a total of six colonies located during FY 2010-11, which is two less than last year. During the early flight in April it appeared that the wading birds were just beginning to develop the nesting colonies for this year. Fourteen large congregations of wading birds were marked as points of interest during the early fight and checked during the later flight; four of those points were later determined to be colonies. Observation of some colonies is difficult because the birds tend to nest below the tree canopy, making detection difficult unless the transect being flown is directly above the colony. All of the colonies had egrets and herons nesting; one colony also had wood storks and anhingas present. The long-term trend for wading birds in the Apalachicola River basin has been a decline in the number of colonies and the number of nests in the colonies.

John C. and Mariana Jones/Hungryland Wildlife and Environmental Area in Martin and Palm Beach Counties – During FY 2010-11, an aerial survey was conducted to identify wading bird colonies and solitary nesting locations and to document rookery use on the John C. and Mariana Jones/Hungryland WEA. Due to drought conditions there was little to no water in the marshes and no wading bird colonies were observed.

John G. and Susan H. Dupuis, Jr. Wildlife and Environmental Area in Palm Beach County – The 2,500-acre (1,012-hectare) marsh on the John G. and Susan H. Dupuis, Jr. WEA provides good habitat for many species of wading birds in Florida. Monthly roadside visual surveys have been conducted since 1996 to monitor wading bird use of this area. The most common wading birds observed have been great egrets, great blue herons and little blue herons. Numerous other wading birds have been seen feeding in the area, including tricolored herons, snowy egrets, white ibis, and wood storks. The marsh and other wetland areas will continue to

be surveyed monthly to document wading bird activity.

**Whooping Crane** (*Marty Folk*)

Non-Migratory Population – The whooping crane is a Federally-designated Threatened Nonessential Experimental Population in Florida. Non-migratory whooping cranes are no longer being released in Florida. Low productivity and high mortality limit the likelihood of achieving a self-sustaining population. However, FWC continues to monitor and study the remaining 20 birds in this flock. Research projects are primarily focused on behaviors of the birds during the breeding season. Biologists are studying behavioral differences between successful and unsuccessful nesting pairs and between whooping cranes and the more successful Florida sandhill crane. Results from the research are expected to: 1) allow a better understanding of the challenges for whooping cranes in Florida; 2) provide knowledge regarding the basic biology of these species; and 3) provide information of value for future reintroductions of whooping cranes.

Eastern Migratory Population – A separate reintroduction of whooping cranes is taking place in the Eastern U.S. These birds breed in Wisconsin and migrate to Florida (and other southeastern states) in the winter. There are currently 97 birds in this population. Like the non-migratory flock, the migratory flock is encountering reproductive challenges and research is underway to identify the limiting factors. FWC's involvement with this project is primarily an advisory role, with some field monitoring.

**Wood Stork** (*Morgan Wilbur*)

The wood stork was once a common breeding species throughout the southeastern U.S., but declines in the species range and population occurred during the mid 1900s. The U.S. population was listed as a Federally-designated Endangered species in 1984.

L. Kirk Edwards Wildlife and Environmental Area in Leon County – Lower Lake Lafayette located within the L. Kirk Edwards (WEA) in Leon County is home to the Chaires wood stork colony. In an effort to monitor whether the colony is active or inactive from year to year and determine the approximate number of nests, FWC conducts an annual flyover of the colony. The flyover, first implemented in June 2009, was conducted in late April and again in late May 2011 from a helicopter at an altitude of approximately 600 feet (183 meters) to avoid disturbing the nesting birds. It was estimated that there were more than 200 wood stork nests in the colony (counted using an image-stabilizing binocular). Due to the structure and size of the nesting material, it is difficult to count the number of nests. The use of an image-stabilizing binocular suggests that the estimate of 300–350 nests in April 2010 may have been over-estimated by as many as 100 nests. Two additional wood stork colonies (Ochlocknee North and Ochlocknee South) that occur on private property in western Leon County were also monitored in May 2011. There were no nests observed at the location of the Chaires North colony and 108 nests were observed at the Chaires South colony.

**AMPHIBIANS**

**Flatwoods Salamander** (*Barbara Almario, Kevin Enge, Fred Robinette, and Bill Turner*)

Flatwoods Salamander Taxonomic Change and Endangered Species Act Designation by U.S. Fish and Wildlife Service – The U.S. Fish and Wildlife Service (USFWS) officially sub-divided the flatwoods salamander into two species in 2009. Flatwoods salamanders in the population west of the Apalachicola River are now reticulated flatwoods salamanders (Federally-designated Endangered) and populations to the east are now frosted flatwoods salamanders (Federally-designated Threatened). This taxonomic change is widely accepted by the scientific community. For more information on the flatwoods salamander's taxonomic change, please visit http://www.gpo.gov/fdsys/pkg/FR-2009-02-10/pdf/E9-2403.pdf#page=1 .

Dipnet Surveys for Flatwoods Salamander Larvae and Disease Sampling – Habitat loss, intensive forestry practices, insufficient fire, and droughts have contributed to the decline of the frosted flatwoods salamander. During FY 2010-11, a dry winter made dipnet surveys for larvae pointless. FWC and the U.S. Forest Service surveyed the breeding pond in Osceola National Forest (Baker County) where the species was last documented in the peninsula in 1998, which turned out to be unsuccessful. FWC visited Apalachicola National Forest in northwest Florida to sample larvae for *Batrachochytrium dendrobatidis* or *Bd* (a chytrid fungus) as part of a State Wildlife Grant surveying for amphibian and bat diseases. Of the approximately 60 known breeding ponds in Apalachicola National Forest, the species bred successfully in only two ponds in Liberty County because of insufficient rainfall. All ten larvae captured from one pond tested negative for *Bd.*

Aucilla Wildlife Management Area in Jefferson and Taylor Counties – Aucilla WMA contains thousands of small, isolated wetlands. Historically, these ephemeral (short-lived) wetlands were fire-maintained, natural communities with fire frequencies that varied according to the periods of time during which the sites were wet. The edges of these wetlands had a higher fire frequency than the interior. These ephemeral wetlands were critical breeding habitat for the frosted flatwoods salamander. Past land management practices have severely degraded ephemeral wetlands across the WMA. Disturbances include rutting from logging activity, deposition of logging debris (i.e. windrows and push piles), and fire suppression. During FY 2010-11, in an effort to restore ephemeral wetlands, FWC had mixed results when conducting prescribed fire.

Pine Log and Point Washington Wildlife Management Areas in Bay, Washington and Walton Counties – FWC sampled potential breeding ponds on Point Washington and Pine Log WMA from November 2010 to April 2011 in an effort to re-confirm the two known breeding sites and document any new breeding populations. These two WMAs received enough rainfall during the FY 2010-11 breeding season to inundate most of the potential breeding ponds, although ponds on Pine Log did not contain water for the full season.

Ponds were mapped and ranked as "highly likely," "potential," "unlikely," or "unsuitable". These breeding site rankings were based primarily on a suitable hydroperiod (holding enough water to support amphibian larvae for at least three months) and the presence of wiregrass or other grasses at the edge of the pond.

Survey methods used in FY 2010-11 included drift fences set parallel to the edges of ponds, as well as sampling the ponds with dip nets and/or minnow traps. Drift fences were employed on 18 ponds classified as "highly likely" or "potential" flatwoods salamander habitat:

eight fences on eight ponds on Point Washington and ten fences on nine ponds on Pine Log. Traps were set ahead of rain fronts, for a total of 125 fence-nights (nights using drift fences in search of flatwoods salamanders) on Point Washington and 137 fence-nights on Pine Log. Small, shallow ponds were sampled with minnow traps or dip-netted throughout the pond. Larger ponds were dip-netted near edges and in any areas where grass grew in the water. Using dip nets, FWC and volunteers spent approximately 36 hours sampling a total of 41 ponds on Point Washington, and approximately 14 hours sampling 11 ponds on Pine Log. The highest priority ponds were re-sampled in late March and April where water levels allowed. Minnow traps were used in 11 small "highly likely" ponds on Point Washington, with a total of 25-75 traps set for two to five nights in each pond. All amphibian and reptile species captured were recorded. No flatwoods salamanders were captured in FY 2010-11.

The recent taxonomic change has elevated the conservation priority of these salamanders and highlights the need for more active management to avoid extinction. In 2009, the species received critical habitat designation by USFWS. FWC continued to work with the FDACS to improve potential breeding pond habitat through prescribed fire, mowing, thinning, and chopping. The Management Plan for the Flatwoods Salamander on Point Washington was developed by FWC in 2005, and FWC has also provided recommendations for mitigation (mowing, burning, or a combination of both) on the eastern section of Point Washington. These recommendations continue to be employed.

Blackwater Wildlife Management Area in Okaloosa and Santa Rosa Counties – FWC has surveyed for reticulated flatwoods salamanders within Blackwater WMA over the past several years. As of April 2011, there were no confirmed flatwoods salamander breeding ponds on the WMA. A three-year sampling protocol designed to survey and monitor 118 pond sites throughout the WMA was implemented in early 2007. Priority ponds are sampled annually, while potential breeding sites are sampled on a three-year cycle.

Property containing a known flatwoods salamander breeding site and managed as the Yellow River WMA was incorporated in the Blackwater River State Forest in 2008. FWC samples this pond twice a year. During FY 2009-10, FWC located two more potential flatwoods salamander breeding ponds on Yellow River WMA and one additional pond during FY 2010-11. These ponds are also sampled twice annually. In November 2010 and April 2011, FWC used herbicide on the margins of the known breeding pond to control re-sprouting following the cooperative effort between FWC, FDACS, and USFWS to remove undesirable woody species from the pond in April 2010. FWC will continue to work with FDACS to manage and improve habitat around all potential flatwoods salamander breeding ponds.

**Florida Bog Frog** (*Barbara Almario*)

The Florida bog frog is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the Florida bog frog met Threatened species listing criteria. It was determined that the Florida bog frog did meet the required criteria to meet Threatened species status due to a very small or restricted population with an area of occupancy of less than eight square miles (20 square kilometers) typically in less than five locations. The listing status of the Florida bog frog will not change until a management plan has been approved for the species. The Florida bog frog biological status review may be accessed at

http://myfwc.com/media/1351532/Florida%20bog%20frog%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352260/Florida%20Bog%20Frog%20Supplemental%20Information.pdf.

Yellow River and Escribano Point Wildlife Management Areas in Santa Rosa and Okaloosa Counties – The Florida bog frog is a Species of Special Concern that is only found in western Florida in shallow ponds or creeks. FWC began call surveys for the Florida bog frog on the recently acquired Yellow River Ravines Tract and the Escribano Point Parcels of Yellow River WMA in 2009 and continued those surveys during FY 2010-11. FWC surveyed ten points distributed along three creeks in Yellow River Ravines and six points in Escribano Point in May, June and July. Survey protocols were similar to those used by the U.S. Geological Survey North American Amphibian Monitoring Program. FWC documented bog frogs at one survey point in May of 2010 in Yellow River Ravines. During FY 2010-11, no bog frogs were documented on Escribano Point although ten other frog species were detected.

**Gopher Frogs** (*Kevin Enge and Jan Landsberg*)

The gopher frog is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the gopher frog met Threatened species listing criteria. It was determined that gopher frog did not meet the required criteria to meet Threatened species status and was recommended by staff to be removed from the Endangered and Threatened Species List. The gopher frog will not be removed from the list until a management plan has been approved to prevent the species from becoming listed again. The gopher frog biological status review may be accessed at http://myfwc.com/media/1351559/Gopher%20Frog%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352287/Gopher%20Frog%20Supplemental%20Information.pdf.

The gopher frog is an “explosive breeder” (all or most of the population congregates to breed during a short period of time) that travels during heavy rainfall events from burrows in surrounding uplands (sometimes from more than a mile away) to temporary wetlands lacking predatory fish. Breeding often occurs from October through April, after tropical storms, hurricanes, or winter cold fronts, but breeding may occur any month of the year. Tadpoles remain in ponds for three to seven months before transforming and leaving ponds in search of burrows in which to live. Ponds on public lands were sampled for gopher frog tadpoles as part of two State Wildlife Grant projects: Survey of Winter-breeding Amphibian Species in the Peninsula and Disease Surveillance in Selected Species of Greatest Conservation Need – Bats and Amphibians.

Insufficient rainfall in winter and spring resulted in many temporary wetlands remaining dry, and most areas consequently could not be surveyed. In north-central Florida, dipnet surveys for gopher frog tadpoles were conducted at Camp Blanding Military Reservation, Gold Head Branch State Park, Jennings State Forest, and the Spring Creek Unit of Big Bend WMA. In northeast Florida, surveys were conducted at Etoniah Creek State Forest, Ocala National Forest, Ordway-Swisher Biological Station, Rock Springs Run State Reserve, and Seminole State

Forest. In southwest Florida, surveys were conducted at Archbold Biological Station, Avon Park Air Force Range, Catfish Creek Preserve State Park, and two units of the Lake Wales Ridge Wildlife and Environmental Area (Sun N Lakes Sebring and Sunray). Only Jonathan Dickinson State Park was surveyed in South Florida and Blackwater WMA in northwest Florida. Gopher frogs were found only at Camp Blanding (one known and one new pond), Etoniah Creek State Forest (one known pond), Gold Head Branch State Park (one known pond), and Ocala National Forest (two known and four new ponds in Marion County). In addition, driving surveys detected calling gopher frogs at one new pond in Goethe State Forest in Levy County, and one new pond on private land in Marion County adjacent to Ocala National Forest.

In Florida, there are several recently discovered diseases that have been associated with die-offs of amphibians including *Batrachochytrium dendrobatidis* (Bd), a fungal pathogen, and ranavirus, a viral pathogen. A third pathogen that has no official name, although some have proposed *Anuraperkinsus emelandra* (Ae), has been implicated in amphibian disease mortality in St. Marks National Wildlife Refuge and other areas in Florida. To determine the extent of these diseases in Florida, FWC has partnered with the Central Florida Zoo and the Florida Museum of Natural History to test amphibian populations. Tadpoles from some of the sites above were tested for Bd or ranavirus. To collect samples for Bd, DNA was collected by swabbing tadpoles with a cotton swab and then testing the material on the swab for signs of Bd; for ranavirus testing, liver tissue was used. An adult gopher frog from Highlands County was also swabbed for Bd. All tests for the disease were negative except from Pebble Lake in Gold Head Branch State Park. When Pebble Lake was visited in April, a die-off of American bullfrog and Southern leopard frog tadpoles was observed, although younger gopher frog tadpoles appeared to be healthy. An assortment of tadpoles were collected for testing and some bullfrog and leopard frog tadpoles tested positive for ranavirus and the little-understood pathogen, Ae. The only gopher frog tadpole examined was found to have Ae. Amphibians using this pond will continue to be monitored.

## REPTILES

### American Crocodile (*Lindsey Hord and Eric Tosso*)

The American crocodile is currently a Federally-designated Threatened species in Florida. Documented nests have increased from 20 in 1975, when it was listed Federally as Endangered, to more than 170 in 2009. Crocodile sightings have been documented as far north as Cocoa Beach (Brevard County) on the east coast and Ellenton (Manatee County) on the west coast.

With the increasing crocodile population (currently estimated at 1,500 to 2,000 non-hatchlings), a commensurate increase in crocodile-human conflicts has been documented. FWC manages these conflicts on a case-by-case basis, giving human safety the highest priority, while recognizing the needs of a recovering species. During FY 2010-11, FWC received 103 complaints regarding the American crocodile, most of which were resolved through education via telephone calls and site visits.

Eleven non-hatchling crocodiles (eight males, three females) were captured in FY 2010-11 due to complaints. The males averaged 7.2 feet (2.2 meters) in length. The range for individual males was 3.9–11.2 feet (1.2–3.4 meters). The females ranged from 4.9–8.2 feet (1.5–2.5 meters) in length, averaging 6.9 feet (2.1 meters). Eight of the eleven captured animals were

translocated. One female [7.2 feet (2.2 meters)] was captured and translocated twice from within the same swimming pool. Another female [8.2 feet (2.5 meters)] had been captured and translocated from the same site during the previous fiscal year. Two crocodiles were released at or near the capture location.

FWC was involved in the recovery of two American crocodile carcasses in FY 2010-11. Both animals were discovered floating in the water. One was a male measuring 8.5 feet (2.6 meters). The other animal was badly decomposed and missing its tail; no length or sex information could be collected.

In June 2011, FWC responded to a report of crocodiles hatching from a nest located in the front lawn of a Key Largo residence. Upon arriving on scene, one hatchling had emerged from the nest, but subsequently died. One hatchling was discovered dead in the nest. Both deaths are thought to have been caused by fire ant stings. Twelve eggs were removed from the nest and incubated off-site. Three hatchlings eventually emerged. Those three surviving hatchlings are in FWC possession awaiting disposition.

**Alligator Snapping Turtle** (*Kevin Enge and Matthew Hortman*)

The alligator snapping turtle is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the alligator snapping turtle met Threatened species listing criteria. It was determined that alligator snapping turtle did not meet the required criteria to meet Threatened species status and was recommended by staff to be removed from the Endangered and Threatened Species List. The alligator snapping turtle will not be removed from the list until a management plan has been approved to prevent the species from becoming listed again. The alligator snapping turtle biological status review may be accessed at http://myfwc.com/media/1351487/Alligator%20Snapping%20Turtle%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352215/Alligator%20Snapping%20Turtle%20Supplemental%20Information.pdf.

The alligator snapping turtle is the largest freshwater turtle species in North America and can be found in the Suwannee River drainage west through the Florida Panhandle. Newly established FWC turtle regulations now prohibit the harvest of this species in Florida and possession of a pet alligator snapping turtle requires an FWC permit. Differences in genetics and the bone structure of shells and skulls of alligator snapping turtles from the Suwannee River drainage compared to those from other drainages suggest that they may represent a new species. A Conserve Wildlife Tag Grant was received to determine the population status and distribution of alligator snapping turtles in the Suwannee River. This project will not start until FY 2011−12, but planning and some purchasing of supplies was conducted during FY 2010−11.

Population Survey on the Apalachicola River Wildlife and Environmental Area – Trapping and biological data collection continued for the third consecutive year. During FY 2009-10, six turtles were captured in a little over three weeks of trapping. Basic biological data were recorded and the turtles were marked and released. During FY 2010-11, two additional turtles were captured in two weeks of trapping. The largest turtle trapped weighed 40 pounds (18 kilograms) and the smallest was 34 pounds (15 kilograms). On average, captured turtles

weighed about 40 pounds (18 kilograms). Both turtles captured during FY 2010-11 were females. Trapping in 2010 continued in the same locations as 2008 and 2009 but no recaptures were discovered. All turtles appeared healthy, but in 2009 two turtles were caught with only three legs. In both cases, they appear to be old injuries; in neither case did the turtles seem hindered by the amputated limb. FWC continues to inform the citizens of Florida concerning the new turtle regulations prohibiting harvest of alligator snapping turtles.

**Barbour's Map Turtle** (*Matthew Hortman*)

The Barbour's map turtle is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the Barbour's map turtle met Threatened species listing criteria. It was determined that the Barbour's map turtle did meet the required criteria to meet Threatened species status due to a continual declining, severely fragmented (exist in less than ten locations) area of occupancy (772 square miles, or 2,000 square kilometers); and a very small or restricted population (with an area of occupancy of less than eight square miles, or 20 square kilometers) typically in less than five locations. The listing status of the Barbour's map turtle will not change until a management plan has been approved for the species. The Barbour's map turtle biological status review may be accessed at http://myfwc.com/media/1351496/Barbour's%20map%20turtle%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352224/Barbours%20Map%20Turtle%20Turtle%20Supplemental%20Information.pdf.

The Apalachicola River Wildlife and Environmental Area (ARWEA) in Franklin and Gulf counties is within the Apalachicola River basin. This bio-diverse area is home to an endemic species of the map turtle known as the Barbour's map turtle. Approximately 52 miles (84 kilometers) of river are surveyed for Barbour's map turtles each year in late summer. The survey route consists of the following rivers: Apalachicola, Brothers, St. Marks, East, and Chipola Rivers. On September 17, 21, and 29 of 2010, surveys were conducted and 807 total Barbour's map turtles were recorded, 693 of those being on the Chipola River. A spring survey was conducted for the first time on May 2, 2011 in the Chipola River. During this survey, FWC detected 854 Barbour's map turtles. During the spring, gravid (pregnant) females bask more frequently than in the late summer months, increasing detection, therefore increasing the number of individuals sighted. There is a possibility that the Barbour's map turtle already qualifies for listing but population data are lacking. Annual surveys conducted by FWC continue to monitor the population and assess the threats facing the turtle.

**Eastern Indigo Snake** (*Kevin Enge*)

The Eastern indigo snake is a Federally-designated Threatened species that once occurred throughout Florida but has experienced significant population declines in some areas, particularly the Panhandle and heavily populated areas. In 2008, FWC started compiling historic and recent sightings of indigo snakes to determine its current status in Florida. Additional sightings were received in FY 2010−11 and the database of observations was provided to the

U.S. Fish and Wildlife Service (USFWS). FWC is collaborating with The Orianne Society (a privately funded organization to conserve indigo snakes), Georgia Department of Natural Resources, and the USFWS to publish a paper on the current status of the species throughout its range.

**Gopher Tortoise** (*Barbara Almario, Shane Belson, Deborah Burr, Justin Davis, Allan Hallman, Jennifer Myers, Allie Perryman, Alex Pries, Jennifer Roberts, Fred Robinette, Paul Scharine, Kristen Sommers, and Jason Slater*)

Management – The gopher tortoise is a State-designated Threatened species. The gopher tortoise did not undergo a biological status review since one was completed recently on the species. The Gopher Tortoise Management Plan was approved in September 2007 and may be accessed at http://myfwc.com/wildlifehabitats/managed/gopher-tortoise/management-plan/. The overarching conservation goal of the management plan is to restore and maintain secure, viable populations of gopher tortoises throughout the species' current range in Florida by addressing habitat loss. Specific objectives include increasing the amount of protected habitat; conducting appropriate vegetation management to maintain gopher tortoise habitat (e.g. prescribed burning); restocking tortoises to protected, managed, suitable habitats where densities are low; and decreasing tortoise mortality on lands proposed for development. Each objective provides benchmarks and measurements against which progress toward the plan's goal can be assessed. A suite of conservation actions is proposed for the plan's first five-year cycle. The extensive conservation actions outlined in the plan fall under the following broad categories: permitting, local government coordination, law enforcement, habitat preservation and management, population and disease management, landowner incentives, monitoring and research, and public awareness.

Originally approved in April 2008, the Gopher Tortoise Permitting Guidelines were revised based on stakeholder and staff input and approved by the FWC Commissioners in June 2011. The guidelines, which may be accessed at http://myfwc.com/license/wildlife/gopher-tortoise-permits/, includes revisions to the monitoring and reporting requirements for long-term protected recipient sites, a new option for relocating tortoises from public projects to contiguous public conservation lands, and a new pre-application opportunity for potential recipient sites. Since the Gopher Tortoise Management Plan was implemented in 2007, the FWC has continued to work with stakeholders to discuss and explore possible solutions to challenges encountered with gopher tortoise permitting and conservation issues. The continued participation of stakeholders is vital to the long-term conservation of the species.

Through the recipient site permit program (a program in which landowners may use their lands to receive gopher tortoises from other sites), approximately 6,585 acres (2,665 hectares) of gopher tortoise habitat have been protected through conservation easements and are currently managed for and receiving gopher tortoises. Twenty one recipient sites with a capacity for 14,632 tortoises have been permitted. An additional 18 permit applications are currently under review with potential capacity for more than 6,340 tortoises on 3,244 acres (1,313 hectares) of gopher tortoise habitat. During FY 2010-11, 4,638 tortoises were relocated under the relocation permits.

An FWC team called "Gopher Tortoise 3" meets monthly to ensure that the management plan activities are implemented according to the proposed timeline. The team coordinates with the stakeholder Gopher Tortoise Technical Assistance Group. In FY 2010-11 the Gopher

Tortoise Policy Team (a high-level staff team) was created to address policy issues affecting the implementation of the Gopher Tortoise Management Plan and Permitting Guidelines.

In FY 2010-11, FWC continued to coordinate with public and private stakeholders to develop guidelines for land managers to use when considering restocking tortoises onto public conservation lands where populations have been depleted.

FWC also continues to work closely with public and non-profit organizations to identify and provide incentives for gopher tortoise conservation on private lands. FWC regularly participates in workshops that promote conservation opportunities and incentives and encourage participation by private landowners in wildlife management on their property. In addition, FWC continues to use Geographic Information Systems (GIS) to help identify areas and determine acreages of potential tortoise habitat throughout Florida. During FY 2010-11, FWC developed a conservation blueprint for gopher tortoises using GIS and landscape analysis.

During FY 2010-11, FWC provided $100,000 in funding assistance for gopher tortoise habitat management activities that benefited more than 1,000 acres (405 hectares) under local government ownership. Through coordination with public and non-government organizations, and the utilization of The Nature Conservancy's Fire Strike Team program and contracted vendors, over 50,000 acres (20,234 hectares) of gopher tortoise habitat was conserved through prescribed fire and other methods on public and private lands during FY 2010-11, which exceeds FWC's annual target by 40,000 acres (16,187 hectares).

To enhance the protection and conservation of gopher tortoises and gopher tortoise habitat statewide, FWC implemented a new training manual for FWC Law Enforcement officer recruits. These tools will help FWC officers address wildlife complaints related to gopher tortoises in an effective and consistent manner statewide.

Wildlife Management Area (WMA) and Wildlife and Environmental Area (WEA) Activities – Currently, habitat conditions within Aucilla WMA (Jefferson and Taylor counties) are not ideal for gopher tortoises as a result of former land use practices and past fire exclusion that greatly reduced habitat quality. Since acquisition, FWC has initiated timber thinning activities and has applied prescribed fire in a manner that has allowed for significant improvement of habitat conditions. Recognizing the potential for continued habitat management activities to benefit this State listed species, FWC designated a Strategic Management Area for the gopher tortoise through the Wildlife Conservation, Prioritization, and Recovery program. The Strategic Management Area identified individual management units containing habitats that, if fully restored, would provide the greatest benefit to gopher tortoises. In order to determine the effectiveness of habitat management within these management units, it was determined that a baseline burrow survey was necessary. Therefore, during May 2011, FWC contracted with the Florida Natural Areas Inventory to conduct a baseline burrow survey for gopher tortoises on approximately 1,200 acres (486 hectares) of potentially suitable habitat within Aucilla WMA. Using a standardized survey protocol established through the Wildlife Conservation, Prioritization, and Recovery program, Florida Natural Areas Inventory surveyed the area by systematically establishing linear transects that contained approximately 22% of the 1,200 acres (486 hectares). In total, 13 burrows were found, of which seven were determined to be active. Future surveys will be conducted using the same methods to determine if habitat management activities have been successful in increasing the number of gopher tortoise burrows on the area.

During FY 2010-11, FWC continued a multi-year comprehensive burrow survey of the gopher tortoise population, designed to evaluate the entire 200,000 acres (80,937 hectares) of

Blackwater WMA (Okaloosa and Santa Rosa counties). The purpose of the survey was to provide the FDACS Florida Forest Service, the lead land manager on the area, with habitat improvement recommendations. Burrow activity was defined by FDACS Florida Forest Service compartments, so that habitat improvement recommendations could be more easily translated into management actions. During FY 2010-11, FWC surveyed more than 1,800 acres (728 hectares) of suitable gopher tortoise habitat and located 213 burrows. To date, 77,000 acres (31,161 hectares) of habitat have been surveyed and 2,418 burrows have been located of which 1,678 were classified as active. FWC worked with The Nature Conservancy to procure funding from the Multi-State Sandhills Ecological Restoration Project for gopher tortoise surveys on the Hutton Unit of Blackwater WMA.

As part of Caravelle Ranch WMA's (Putnam County) Wildlife Conservation, Prioritization, and Recovery plan, FWC completed a baseline survey of the area's gopher tortoise population. Efforts were focused on 140 acres (57 hectares) of continuous scrubby and mesic flatwoods, which represents the best potential habitat for this species on-site. The survey area contained 118 acres (48 hectares) of mesic flatwoods and 22 acres (9 hectares) of scrubby flatwoods. The intention is for these surveys to be repeated on a five to ten year interval (pending resource availability) to track the relative abundance and general status of gopher tortoises on the WMA. FWC surveyed transects covering 47 acres (19 hectares), which is 33.7% of the total acreage. A total of 62 potentially occupied and 21 abandoned tortoise burrows were observed. Of these there were 64 large or adult (greater than eight inches), 17 medium or sub-adult (between five and eight inches), and two small or juvenile burrows (smaller than five inches). Burrow densities were 0.72 burrows per acre (.29 hectares) in mesic flatwoods and 3.64 burrows per acre (.29 hectares) in scrubby flatwoods. Extrapolations of these densities provide an estimate of 84.8 total burrows within mesic flatwoods and 79.4 total burrows within scrubby flatwoods.

Gopher tortoise surveys and monitoring continued May–June 2011 on the Fitzhugh Carter Tract of Econfina Creek WMA (Carter Tract) in Washington County. The 2,155-acre (872-hectare) tract contains approximately 1,200 acres (487 hectares) of sandhill uplands. For logistical and accounting purposes, gopher tortoise burrows on the area are grouped into five clusters and sampling follows the monitoring protocol established for Point Washington WMA in Walton County. The 2011 surveys yielded 462 total burrows; 84 more burrows than were documented in 2010. Twenty-six percent of burrows were classified as active or possibly active. This is 27 more active or possibly active burrows compared to 2010 survey results. **Table 3** indicates that since 2009 all burrow status types have increased annually. Habitat improvements including removal of sand pine and slash pine plantations and planting of longleaf pine and wiregrass were implemented in 2007. Restoration activities designed to continue to improve and/or maintain habitat include prescribed burning, scrub oak reduction, herbicide application, and planting of native groundcover types (i.e. wiregrass, toothache grass, etc.). These improvements focus on retaining the open overstory and herbaceous understory that are indicative of the longleaf-wiregrass ecosystem, and will allow for future expansion of gopher tortoise populations. Surveys will continue to be conducted annually on the area May–July. Future work will provide comparative data on tortoise population trends following land management and mitigation strategies.

**Table 3**. Gopher tortoise burrow count and status by year at the Fitzhugh Carter Tract of Econfina Creek WMA, Washington County, FL.

| | Year | | | | | | |
|---|---|---|---|---|---|---|---|
| **Burrow Status** | **2005** | **2006** | **2007** | **2008** | **2009** | **2010** | **2011** |
| Active | 12 | 53 | 12 | 26 | 17 | 73 | 76 |
| Possibly Active | 10 | 12 | 0 | 9 | 29 | 23 | 47 |
| Inactive | 58 | 95 | 63 | 40 | 49 | 64 | 99 |
| Abandoned | 7 | 34 | 131 | 182 | 176 | 214 | 240 |
| **Total** | **87** | **194** | **206** | **257** | **271** | **374** | **462** |

During FY 2009-10, approximately 89 acres (36 hectares) of gopher tortoise habitat at the Carter Creek tract of the Lake Wales Ridge Wildlife and Environmental Area (LWRWEA) in Highlands County were mechanically treated by a contractor through funding from a State Wildlife Grant. Chainsaws were used to fell select hardwood trees greater than five inches in diameter. Hardwoods three to five inches in diameter were girdled and treated with herbicide. This action opens the canopy and improves the suitability of this area for use by gopher tortoises. During FY 2010-11, LWRWEA staff and a contract prescribed fire crew applied fire to the treated acreage to maximize the effectiveness of the mechanical treatment.

In FY 2010-11, FWC contracted with the Florida Natural Areas Inventory to survey a total of 1,636 acres (662 hectares) out of 7,752 acres (3,137 hectares) considered suitable habitat for gopher tortoises at Chassahowitzka WMA in Hernando County, as recommended in the Wildlife Conservation, Prioritization, and Recovery plan. Previous surveys included a small 229-acre (93-hectare) restocking assessment in 2007. In the Florida Natural Areas Inventory surveys, transects were evenly spaced within all suitable habitat. This survey covered 21% of the suitable habitat on the area. Within transects, 582 potentially occupied burrows were counted. A total of 2,694 potentially occupied burrows were estimated for all suitable habitats on the area. In addition, burrows were categorized by size (juveniles are less than five inches; subadults are five to eight inches; and adults are larger than eight inches). The population was found to have a high percentage of juvenile and subadult burrows relative to other populations, indicating a growing population. Due to the gopher tortoise's specific habitat requirements and the number of species that are dependent on their burrows, it is important that Chassahowitzka WMA staff monitor the population. The baseline data provided by this survey will allow staff the ability to monitor the gopher tortoise population on the WMA over time.

As part of Guana River WMA's (St. John's County) Wildlife Conservation, Prioritization, and Recovery plan, a baseline survey of the area's gopher tortoise population was completed by the Florida Natural Areas Inventory. This baseline survey focused on 912 acres (369 hectares) of mesic flatwoods, 140 acres (57 hectares) of scrubby flatwoods, 270 acres (109 hectares) of scrub, and 332 acres (134 hectares) of xeric hammock. Burrows were also scoped to determine occupancy, which could be used to estimate the total number of tortoises (not just burrows) on-site. The intention is for these surveys to be repeated on a five to ten year interval (pending resource availability) to track the relative abundance and general status of gopher tortoises on the WMA. Florida Natural Areas Inventory staff surveyed transects covering 402 acres (162 hectares), which is 24% of the total 1,654 acres (669 hectares) of potential habitat. A total of 97 potentially occupied and 48 abandoned tortoise burrows were observed. Of these there were 133 large or adult, ten medium or sub-adult, and two small or juvenile burrows. Burrow densities were 0.06 burrows per acre (0.29 hectares) in mesic flatwoods, 0.35 burrows

per acre (0.29 hectares) in scrubby flatwoods, 0.69 burrows per acre (0.29 hectares) in scrub, and 0.24 burrows per acre (0.29 hectares) in xeric hammock. Extrapolations of these densities provide an estimate of 57 total burrows in mesic flatwoods, 49 total burrows in scrubby flatwoods, 186 total burrows in scrub, and 79 total burrows in xeric hammock. Occupancy rates for potentially occupied burrows were 54.5% in mesic flatwoods, 52% in scrubby flatwoods, 63.6% in scrub, and 73% in xeric hammock. These occupancy rates suggest an estimated population size of 238 tortoises on Guana River WMA.

Activities to enhance habitat for gopher tortoises on Jennings State Forest WMA in Clay and Duval counties consisted of three projects contracted out to private vendors. The first treated 125 acres (50 hectares) of sandhill habitat. All turkey oaks greater than four inches in diameter at breast height were mechanically cut down and immediately treated with herbicide in order to stimulate regeneration of ground cover plant species and restore wiregrass. The second and third projects treated 164 acres (66 hectares) of sandhill habitat by removing all sand pine trees in the designated area to within three inches of ground level in order to stimulate regeneration of ground cover plant species and restore wiregrass. A gopher tortoise survey was conducted on a 183-acre (74-hectare) area that has been surveyed on a five-year rotation since FDACS Florida Forest Service acquired the property in 1990. The survey counted 830 burrows, of which 651 burrows were active or inactive (78%), and 179 (22%) were abandoned. The estimated gopher tortoise population is 400 on Jennings State Forest WMA, an increase of 48% over the 2005 population estimate of 271.

FWC has annually surveyed, monitored, and assessed the status of the gopher tortoise on Point Washington WMA since 1993, and on Pine Log WMA in Bay and Washington counties since 2004. Aerial photos were used to identify suitable gopher tortoise habitat (primarily sandhill areas), and were divided into clusters for management purposes. Point Washington's sandhill habitat is grouped into 33 clusters, and scheduled for sampling on a three-year schedule so that approximately 1/3 of the area is surveyed each year. Pine Log is grouped into 14 clusters and the entire area is surveyed annually. These sandhill clusters are systematically searched for gopher tortoise burrows by staff each summer, on foot or using all-terrain vehicles. Burrows are classified as active, possibly active, inactive, or abandoned. Using burrow widths, the burrows are further grouped into size categories. Burrow locations are recorded using Global Positioning System (GPS) units, and the data points are downloaded into a Geographic Information System (GIS). Data collected each year provide practical comparative information used to determine population trends and demography of the gopher tortoise populations within the WMAs. Preliminary data from the 2011 survey suggest that the activity level has remained steady on both Pine Log and the western third of Point Washington.

Working in cooperation with FDACS Florida Forest Service, habitat improvements are being prescribed and implemented. Prescribed fire continues to be the preferred management tool, although herbicide has been effective in controlling encroaching scrub oaks on sandhill habitat where prescribed fire is impractical or ineffective. As recommended by FWC, the FDACS Florida Forest Service has removed the majority of sand pine plantings from Pine Log WMA, and replanted several of the resulting clearcuts in longleaf pine with re-growth of herbaceous groundcover. As a result, these areas are well on their way to becoming suitable habitat for gopher tortoises.

Mitigation Park Program – The FWC Mitigation Park Program began as a pilot initiative in 1988. It was developed with the primary goal of improving the biological effectiveness of

listed species habitat protection efforts required for new land developments by State and Federal regulations. The program increases the biological value of mitigation by consolidating habitat protection areas into larger tracts, implementing listed species habitat management plans, and providing for permanent management by endowing each facility with a dedicated funding source. Primary management emphasis at mitigation parks is gopher tortoise habitat enhancement and restoration. To date, 14 mitigation parks totaling 15,320 acres (6,200 hectares) have been established in Alachua, Clay, Duval, Gilchrist, Hamilton, Hernando, Highlands, Hillsborough, Lafayette, Lee, Manatee, Orange, Osceola, and Polk counties.

In north-central Florida during FY 2010-11, habitat management at Watermelon Pond WEA in Alachua County included wiregrass seeding on 47 acres (19 hectares) and herbicide treatment to 37 acres (15 hectares) of pasture grasses in preparation for subsequent ground cover restoration to benefit gopher tortoises. Growing season controlled burns were used to maintain sandhill habitat on 269 acres (109 hectares) at Branan Field WEA in Duval County and on 698 acres (282 hectares) at Suwannee Ridge WEA in Hamilton County. Growing and dormant season controlled burns were completed on 432 acres (175 hectares) of sandhills at Fort White WEA in Gilchrist County. At Lafayette Forest WEA in Lafayette County, a sandhill restoration project employing whole-tree chippers and herbicide treatment of stumps was completed on 165 acres (67 hectares) of degraded sandhills.

In Central Florida, exotic plants were treated on five acres (two hectares) of gopher tortoise habitat at Split Oak Forest WEA in Orange and Osceola counties. At Crooked Lake WEA in Polk County, 60 acres (24 hectares) of woody vegetation and saw palmetto were mowed, 50 acres (20 hectares) received growing season controlled burns, and exotic plants were controlled on 240 acres (97 hectares). Perry Oldenburg WEA in Hernando County received 64 acres (26 hectares) of dormant season controlled burning and one acre (0.4 hectare) of exotic plant control. Gopher tortoise management at Janet Butterfield Brooks Preserve WEA in Hernando County included the reduction of hardwoods on 58 acres (23 hectares) of fire-suppressed sandhills, control of exotic plants on one acre (0.4 hectare), and the construction of 2.1 miles of four-strand boundary fence to prevent illegal access.

In south-central Florida, growing season controlled burns were completed on 48 acres (19 hectares) of scrubby flatwoods at Hickey Creek WEA in Lee County. In addition, gopher tortoise monitoring was completed with assistance from volunteers and county staff, revealing an estimated density of one tortoise/acre (one tortoise/0.4 hectare), which is an 11% increase over the previous highest survey result. At Platt Branch WEA in Highlands County, 25 acres (ten hectares) of uplands were mechanically treated to improve habitat structure and controlled burns were completed on 65 acres (26 hectares) during the growing season.

**Sea Turtles** (*Beth Brost, Allen Foley, Anne Meylan, Robbin Trindell, and Blair Witherington*)

Management Activities – During FY 2010-11, FWC continued to work with stakeholders throughout Florida to implement the State's responsibilities under the Marine Turtle Protection Act (Section 379.2431(1). F.S.) and the U.S. Fish and Wildlife Service's (USFWS) Recovery Plans for five species of sea turtle (also known as marine turtles): loggerhead (Federally-designated Threatened), green, leatherback, hawksbill, and Kemp's ridley (all Federally-designated Endangered). FWC also worked closely with the Federal government, State regulatory agencies, volunteer conservation groups, and local governments on the protection of Endangered and Threatened sea turtles and their critical nesting beaches, developmental habitat,

and foraging habitat along Florida's coast. FWC continues to provide expertise for requests to conduct activities that could impact sea turtles and their nesting and foraging habitats. Public education concerning sea turtle biology and important conservation issues such as wildlife friendly lighting, the threats from marine debris, and the importance of protecting nesting beaches continues to be the major focus of FWC's educational efforts.

During FY 2010-11, FWC organized and participated in the response to multiple sea turtle cold-stunning events on both coasts of Florida. These events occurred in two counties on the west coast (Gulf and Pinellas counties) and two counties on the east coast (Brevard and Indian River counties) during December of 2010 and January of 2011. A total of 788 sea turtles were involved in these events. Most of the sea turtles were rescued alive, taken to rehabilitation or holding facilities, and then released a short time later when the coldest weather had passed.

FWC participated in assessment and restoration guidance, and in actual response and rehabilitation activities following the 2010 Deepwater Horizon oil spill. Involvement included organization and participation in nest relocation efforts as well as summarizing information for Unified Command; oversight of primary and secondary facility development; coordinating rehabilitation and release of sea turtles from other Gulf states; and transport of sea turtles within Florida.

During FY 2010-11, FWC provided comments on approximately 244 projects to the Florida Department of Environmental Protection's (FDEP) District Offices and Bureau of Beaches and Coastal Systems, Water Management Districts and the State Clearing House. Projects reviewed included coastal construction control line applications, environmental resource permit applications, and joint coastal permit applications. FWC participated in over 416 meetings and conference calls on these projects and on other issues involving sea turtles with staff from local governments, other State and Federal agencies, and stakeholders. FWC also participated in the development of two habitat conservation plans for Walton County and a statewide plan (in cooperation with FDEP). More than 70 site inspections were conducted as part of FWC's environmental commenting responsibilities, including lighting inspections conducted at the invitation of local governments and property owners. FWC also participated in one administrative hearing concerning an FDEP coastal construction control line permit that was challenged by a third party. The petitioners objected to a proposed beach nourishment due to sand quality.

No rule making activity occurred during FY 2010-11.

Approximately 190 applications for conservation activities with sea turtles, including nesting beach surveys, stranding and salvage work, research, public turtle walks, rehabilitation at captive facilities, and educational displays were reviewed and approved by FWC during FY 2010-11.

FWC authorized captive facilities to hold sea turtles for rehabilitation (14), educational display (17), or research (three). FWC coordinated transfer and release of sea turtles during rehabilitation and supervised public sea turtle releases.

Currently, FWC is administering three grants that involve sea turtles, including $416,000 from the USFWS for Walton County's Habitat Conservation Plan. All requirements of a grant ($25,000 for medical supplies for rehabilitation facilities) from the National Oceanic and Atmospheric Agency's Marine Fisheries Service (NOAA-Fisheries) were completed. All requirements of a grant from the FDEP Coastal Zone Management Program for improvements in coastal armoring designs to minimize impacts to sea turtles and their nesting habitat were completed. FWC is working with the Wildlife Foundation of Florida on another project funded

by the National Fish and Wildlife Foundation, (approximately $450,000) to assist two local governments with lighting improvements along sea turtle nesting beaches as well as a grant to develop a mobile sea turtle response unit to be able to respond quickly to catastrophic events such as cold stuns. Grant management includes oversight of contracts to local governments and vendors as necessary.

FWC was invited to participate as an expert for the USFWS and U.S. Army Corps of Engineers Team on the programmatic biological opinion for beach restoration. FWC served on the following teams, working groups, and committees: Archie Carr Sea Turtle Refuge Working Group, and the Florida Sea Turtle License Plate grants committee.

For more information on the FWC's Sea Turtle Protection Program, please visit http://myfwc.com/wildlifehabitats/managed/sea-turtles/protection/.

Research Activities – FWC coordinated the Florida portion of the Sea Turtle Stranding and Salvage Network (Network) an 18-state program administered by NOAA-Fisheries. The Network is responsible for gathering data on dead, sick, or injured (i.e., stranded) sea turtles. Documentation of stranded sea turtles provides information on mortality levels and is an important component of monitoring the status of sea turtle populations. The Network also identifies and monitors mortality factors for sea turtles.

A total of 1,783 dead or debilitated sea turtles was documented (896 green turtles, 643 loggerheads, 165 Kemp's ridleys, 29 hawksbills, 21 leatherbacks, and 29 sea turtles not identified by species). In addition, 788 cold-stunned sea turtles (732 green turtles, six loggerheads, 48 Kemp's ridleys, and two hawksbills) were documented during December 2010 and January 2011. FWC responded to 1,817 reports, through a pager system, regarding sea turtle concerns (primarily reports of dead, sick, or injured sea turtles), transported 157 sick or injured sea turtles (not counting cold-stunned sea turtles) to rehabilitation facilities, and conducted necropsies on 108 carcasses. Florida sea turtle stranding data were regularly uploaded to the Network's on-line database for use by NOAA-Fisheries, as well as FWC law enforcement and protected species personnel. FWC also continually worked to identify and characterize any unusual sea turtle mortality events as soon as possible.

The population-monitoring program involves collection of nesting and habitat information throughout the geographic range of sea turtles in Florida. Approximately 90% of the world's largest loggerhead nesting population occurs in Florida, and the green turtle and leatherback nesting populations are of regional significance. FWC assesses nesting abundance and reproductive output by coordinating a network of State, Federal, and volunteer permit holders who monitor sea turtle reproduction on Florida's beaches. FWC establishes scientifically sound monitoring designs, provides training, resolves data collection problems, assesses data collection error rates, analyzes data trends, and serves as a clearinghouse for information on sea turtle populations and habitats. Two overlapping monitoring programs, the Statewide Nesting Beach Survey Program (initiated in 1979) and the Index Nesting Beach Survey Program (initiated in 1989) have different objectives.

The Statewide Nesting Beach Survey Program provides nearly complete coverage of the State's nesting beaches to acquire data on total nest numbers, nest geographic distribution, and nesting seasonality for each species. Managers use results to minimize human impacts to turtles and nesting beach habitats, and to identify important areas for land acquisition or enhanced protection. In 2010, 203 survey areas were monitored, comprising 823 miles (1,324 kilometers)

of beaches. Statewide, in 2010, the program documented 73,703 loggerhead nests, 13,225 green turtle nests, 1,334 leatherback nests, and eight Kemp's ridley nests.

The Index Nesting Beach Survey Program collects more detailed data from a smaller set of index beaches. Surveyors identify each sea turtle track to species, identify the tracks as a nest or abandoned attempt, and locate nests within an approximate half-mile beach zone. Nests and nesting attempts have been monitored for 21 years at 478 index beach zones surveyed daily during each 109-day season (May–August), an effort that currently provides nearly six million records in the Index Nesting Beach Survey Program database. Annual survey or training, on-site verification, and consistency of the methods used during the 21 years of the program and among the 246 miles (396 kilometers) of index beaches, make the resulting database a representative assessment of sea turtle nesting. The program provides a reliable way to detect changes in the abundance of Florida sea turtles. In 2010, the program documented trends in nesting for loggerheads (declining), green turtles (increasing), and leatherbacks (increasing).

Most research on sea turtles has been conducted on the nesting beach although turtles spend only a small fraction of their lives there. Conservation efforts depend on a broad knowledge of population biology, life history, ecology, and migrations. Ongoing projects in the Western Florida Current, the eastern Gulf of Mexico, Florida Bay, and the Key West National Wildlife Refuge involve capturing live animals at sea. Studies target four species of sea turtles (loggerhead, green, hawksbill, and Kemp's ridley) and several life history stages, and address population structure (including gender ratios), growth rates, genetic identity (to which nesting population do turtles belong), life history, health, diet, habitat preferences, and migrations. FWC research on the first few months of a sea turtle's life is critical to understanding and managing threats to sea turtles as they leave Florida waters and circulate throughout the North Atlantic.

In March 2011, 13 adult-sized loggerheads were captured during a six-day sampling session in Florida Bay. This work was conducted as part of a study to determine the reproductive status, breeding behavior and periodicity (how often breeding occurs), and reproductive migration routes of adult loggerheads. After capture, these turtles were transported to the nearby Keys Marine Laboratory where their reproductive status was evaluated with ultrasound and laparoscopy. Of these turtles, nine were females and four were males. Only one of the females and three of the males were determined to be preparing to breed in 2011. These four turtles were outfitted with GPS-linked satellite transmitters to track their subsequent movements in an effort to discern their reproductive behavior. All turtles were released shortly after capture.

In June 2011, 89 loggerheads were captured during a nine-day sampling session in Florida Bay as part of a project that has been conducted continuously in the Bay since 1990. The primary elements of this study include assessments of relative and absolute abundances, health assessments and monitoring of fibropapillomatosis (a condition most likely caused by a herpes-type virus that causes growths or tumors on the skin), studies of growth, determinations of sex ratios and genetic identities, and studies of residency and movements. All captured turtles were measured and tagged. Forty of the turtles had been previously marked, providing data on growth and residency in Florida Bay. All turtles were released shortly after capture. Some individual turtles have now been captured numerous times over periods as long as fourteen years.

FWC studies the abundance, distribution, behavior, and diet of recent hatchlings and small juvenile sea turtles in open-ocean habitat off Florida's coasts. These sea turtles live in surface waters and occupy a pelagic stage (deep ocean water) in sea turtle development that precedes a time when as larger immature and adult sea turtles, they will live primarily along the

bottom of more shallow, coastal areas. Study objectives are to measure relationships between open-ocean habitat and pelagic sea turtle abundance, and to measure threats unique to this habitat such as mortality and morbidity from plastics and tar ingestion. FWC records physical oceanographic measurements, sea turtle behavior, their relationships to floating objects and other organisms, sea turtle weights and measures, and evidence of ingested plastics and tar. Twenty-three sampling trips were conducted during FY 2010-11. This effort is a continued study in which approximately 729 miles (1,173 kilometers) of search transects were sampled between 2004 and 2011. On these search transects, a total of 662 sea turtles were observed: 358 loggerheads, 153 green turtles, 145 Kemp's ridley, and six hawksbills. Survey locations included Gulf of Mexico waters offshore from Pensacola, Apalachicola, and Sarasota, and Atlantic waters offshore from Sebastian Inlet. Additional benthic-stage sea turtles recorded during this effort included 169 loggerheads, four green turtles, two Kemp's ridley, and two hawksbills between 2005 and 2011.

FWC served on several scientific advisory committees and governing boards during FY 2010-11, including the Carr Refuge Working Group, the National Academies/National Research Council Committee to review sea turtle population assessment methods, USFWS International Working Group for the Conservation of the Northwest Atlantic Loggerhead Populations, university graduate committees, and the International Union for the Conservation of Nature's Marine Turtle Specialist Group. FWC reviewed all research-related proposals submitted for consideration by the small grants program of the Florida Sea Turtle License Plate.

For more information on the Sea Turtle Research Program, please visit http://myfwc.com/research/wildlife/sea-turtles/.

## FISH

### Atlantic, Gulf, and Shortnose Sturgeon (*Jeffrey Wilcox*)

Atlantic Sturgeon Activities – Currently, the Atlantic sturgeon is listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the Atlantic sturgeon met Threatened species listing criteria. It was determined that the Atlantic sturgeon did meet the required criteria to meet Threatened species status due to an inferred population size reduction (at least 30% over the last ten years or three generations, whichever is longer, where the reduction or its causes may not have ceased or may not be understood or may not be reversible); a population size estimate to number fewer than 10,000 mature individuals with an estimated continuing decline of at least 10% in ten years or three generations, whichever is longer (up to a maximum of 100 years in the future); an estimated continuing decline in numbers of mature individuals (with no subpopulation estimated to contain more than 1,000 mature individuals and all mature individuals are in one subpopulation); a population estimated to number fewer than 1,000 mature individuals; and a very restricted area of occupancy (typically less than eight square miles, or 20 square kilometers) or number of locations (typically less than five). The listing status of the Atlantic sturgeon will not change until a management plan has been approved for the species. The Atlantic sturgeon biological status review may be accessed at http://myfwc.com/media/1351493/Atlantic%20sturgeon%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may

be accessed at
http://myfwc.com/media/1352221/Atlantic%20Sturgeon%20Supplemental%20Information.pdf.

The St. Marys River once supported a thriving commercial fishery for Atlantic sturgeon. However, there have been few reports of Atlantic sturgeon being seen or caught in the river in the past 50 years, until the winter of 2009-10. Nine Atlantic sturgeon were captured by the University of Georgia and twenty-one were trawled up in the estuary. Two juveniles were caught on hook-and-line in the St. Johns River in February 2011. FWC has been collaborating with multiple agencies to survey the river and develop a fishery restoration plan to return Atlantic sturgeon to the system. FWC has continued collaboration with the Georgia Department of Natural Resources, the U.S. Fish and Wildlife Service (USFWS), the St. Johns River Water Management District, and the National Oceanic and Atmospheric Agency's Marine Fisheries Service, as a member of the St. Marys River Fisheries Restoration Committee. FWC, in coordination with the St. Marys Fisheries Restoration Committee, drafted the St. Marys River Fishery Management Plan (management plan) for Atlantic sturgeon. The Management Plan has now been renamed the St. Marys River Diadromous Fishery Management Plan. The Management Plan was based on the initial assumption that shortnose and Atlantic sturgeon no longer occurred in this system, which included adaptive management options should the assumption of extirpation (ceasing to exist) prove to be incorrect.

Funding is being sought to tag and monitor the movements of the juvenile Atlantic sturgeon population in the St. Marys estuary to determine whether they are year-round residents or merely transients from the Altamaha or Satilla Rivers visiting a river (the St. Marys) devoid of a local sturgeon population. Long-term monitoring of water quality has been initiated by USFWS and side-scan sonar surveys of the river have been initiated by the U.S. Geological Survey to identify potential habitat restoration sites and to identify potential spawning or holding sites.

Staff represented FWC on the Atlantic States Marine Fisheries Commission Sturgeon Technical Committee.

Gulf Sturgeon Activities – The Gulf sturgeon is a Federally-designated Threatened species. Between November 13, 2000 and January 1, 2001, 46 tagged Gulf sturgeon were released into six separate habitat types in both reaches of the Hillsborough River at the head of Tampa Bay. It is presumed that by this time, all radio tags have reached the end of their battery life and are no longer transmitting, so only incidental live-capture or reported mortalities will reveal the future fate of the remaining released fish. In FY 2010-11, FWC received a tourist's report of sighting a group of Gulf sturgeons south of the Hillsborough River State Park, but no sturgeon were located subsequently.

FWC continues to monitor the proposed Wiregrass Reservoir Initiative in Dothan, Alabama, due to the potential water quality impacts of damming the Little Choctawhatchee River prior to its entering the Choctawhatchee River. The Choctawhatchee River is a Federally-designated critical habitat for Gulf sturgeon and is also critically important to the few remaining alligator gar in Florida.

Shortnose Sturgeon Activities – The shortnose sturgeon is a Federally-designated Endangered species in Florida. No shortnose sturgeons were caught in Florida during FY 2010-11.

**Other Listed Fish** (*Kate Harriger, John R. Knight, and Jeffrey Wilcox*)

Federal Wallop-Breaux Sport Fish Restoration Program – FWC conducted research funded through the Federal Wallop-Breaux Sport Fish Restoration Program during FY 2010-11 to monitor the status and trends of Florida's riverine sport fish populations and associated fish communities. While listed fishes were not specifically targeted during sampling, several species were collected and/or observed. All information gathered is critical for developing proper conservation and management strategies to protect Florida's sport fish populations and associated communities. Aside from research to monitor sport fish species such as the shoal and Suwannee bass, there is no species-specific research to determine the status and trends of listed fishes in Florida.

Blackmouth Shiner – The black mouth shiner, listed as Endangered under Florida's old rules, became a State-designated Threatened species in November 2010 after a new listed species rule and Threatened species management system was passed by the FWC Commissioners (see page 1). A biological status review was conducted by FWC and external experts to determine whether or not the blackmouth shiner met Threatened species listing criteria. It was determined that the blackmouth shiner did meet the required criteria to meet Threatened species status due to a severely fragmented area of occupancy that is less than 772 square miles (2,000 square kilometers) and exists in five or fewer locations. The listing status of the blackmouth shiner will not change until a management plan has been approved for the species. The blackmouth shiner biological status review may be accessed at http://myfwc.com/media/1351508/Blackmouth%20Shiner%20final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352233/Blackmouth%20Shiner%20Supplemental%20Information.pdf

Blackmouth shiners were not collected during FY 2010-11, although sampling was conducted within the known range of the species in the Blackwater and Yellow River watersheds of northwest Florida. This species is difficult to monitor and warrants an alternative monitoring strategy to properly assess the population status and trend of the species. Known locations of blackmouth shiners have not been recently sampled and no new blackmouth shiner populations have been discovered since 2003.

Bluenose Shiner – The bluenose shiner is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the bluenose shiner met Threatened species listing criteria. It was determined that the bluenose shiner did meet the required criteria to meet Threatened species status due to a continual declining area of occupancy that is less than 772 square miles (2,000 square kilometers) with extreme fluctuations. The listing status of the bluenose shiner will not change until a management plan has been approved for the species. The bluenose shiner biological status review may be accessed at http://myfwc.com/media/1351511/Bluenose%20Shiner%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352236/Bluenose%20Shiner%20Supplemental%20Information.pdf.

During FY 2010-11, bluenose shiners were collected in northwest Florida from five locations in Holmes Creek (a tributary to the Choctawhatchee River) and one location in Big

Escambia Creek (a tributary to the Escambia River). Collections during FY 2009-10 included specimens from several locations in the Yellow and Shoal Rivers, and Holmes Creek (data were not compiled in time for the FY 2009-10 report). The FY 2009-10 Holmes Creek collections represented one of the largest known records (408 individuals collected from 28 locations). It is currently unknown what factors contributed to this observed localized abundance, since the species was only occasionally encountered in previous sampling efforts. The bluenose shiner population appears to fluctuate yearly, presumably based on water level fluctuations. Sampling techniques used for Florida's River Monitoring project appear to be sufficient for collecting the species, and it is anticipated that a population status and trend assessment may be possible in the future.

Crystal Darter – The crystal darter, listed as Threatened under Florida's old rules, became a State-designated Threatened species in November 2010 after a new listed species rule and Threatened species management system was passed by the FWC Commissioners (see page 1). A biological status review was conducted by FWC and external experts to determine whether or not the crystal darter met Threatened species listing criteria. It was determined that the crystal darter did meet the required criteria to meet Threatened species status due to a population with a very restricted area of occupancy (typically less than eight square miles, or 20 square kilometers) or number of locations (typically five or fewer). The listing status of the crystal darter will not change until a management plan has been approved for the species. The crystal darter biological status review may be accessed at http://myfwc.com/media/1351517/Crystal%20darter%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352245/Crystal%20Darter%20Supplemental%20Information.pdf.

The crystal darter is known to occur in the upper section of the Escambia River system near Century, Florida. No individuals were collected during FY 2010-11. The most recent crystal darter collection was collected from the Escambia River in 2009, and it represents the first record of the species in Florida since 2004, despite extensive sampling being conducted within the known range of the species. The status and population trend of the species is currently unknown, warranting a need for an alternative monitoring strategy for the species.

Harlequin Darter – The harlequin darter is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the harlequin darter met Threatened species listing criteria. It was determined that there was not enough information to conduct the review. FWC will place a high priority on gathering data to fill gaps in information needed to conduct the review and better understand the status of the species so that the species may be reevaluated. The species will remain a Species of Special Concern until more data has been gathered and another status review can be completed. The harlequin darter biological status review may be accessed at http://myfwc.com/media/1356940/HarlequinDarterBSRfinal.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352290/Harlequin%20Darter%20Supplemental%20Information.pdf.

The harlequin darter is known to occur in the Escambia River watershed in northwest Florida. While restricted in range, the species is regularly collected from both tributaries and mainstream Escambia River when suitable habitats (submerged woody debris) are present.

Recent sampling indicated that the species is widely distributed throughout the Escambia watershed. The species was collected at one location from the mainstream Escambia River, and seven individuals were collected at multiple locations from Big Escambia Creek (a tributary) during FY 2010-11. The current population status and trend of this species is still unknown, which is why harlequin darters were retained as a Species of Special Concern until future research can be conducted.

Lake Eustis Pupfish – The Lake Eustis pupfish is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the Lake Eustis pupfish met Threatened species listing criteria. It was determined that Lake Eustis pupfish did not meet the required criteria to meet Threatened species status and was recommended by staff to be removed from the Endangered and Threatened Species List. The Lake Eustis pupfish will not be removed from the list until a management plan has been approved to prevent the species from becoming listed again. The Lake Eustis pupfish biological status review may be accessed at http://myfwc.com/media/1351574/Lake%20Eustis%20pupfish%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352302/Lake%20Eustis%20Pupfish%20Supplemental%20Information.pdf.

In May 2011, pupfish were collected from 30 random samples in Lake Beauclair in Lake County (15 fish collected) and Lake Griffin in Seminole County (14 fish collected), but none were collected from Lake Dora in Lake County. These were the only lakes of the Upper Ocklawaha basin that were sampled.

Mangrove Rivulus – The mangrove rivulus is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the mangrove rivulus met Threatened species listing criteria. It was determined that mangrove rivulus did not meet the required criteria to meet Threatened species status and was recommended by staff to be removed from the Endangered and Threatened Species List. The mangrove rivulus will not be removed from the list until a management plan has been approved to prevent the species from becoming listed again. The mangrove rivulus biological status review may be accessed at http://myfwc.com/media/1353792/Mangrove%20rivulus%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1353792/Mangrove%20rivulus%20Final%20BSR.pdf.

Saltmarsh Topminnow – The saltmarsh topminnow is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the saltmarsh topminnow met Threatened species listing criteria. It was determined that the saltmarsh topminnow did meet the required criteria to meet Threatened species status due to a continual declining, severely fragmented (typically exist in fewer than ten locations) geographic range (area of occupancy that is less than 772 square miles, or 2,000 square kilometers): and a population with a very restricted area of occupancy (typically less than eight square miles, or 20 square kilometers) or number of locations (typically five or fewer). The listing status of the saltmarsh topminnow will not change until a management plan

has been approved for the species. The saltmarsh topminnow biological status review may be accessed at http://myfwc.com/media/1351616/Saltmarsh%20topminnow%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352341/Saltmarsh%20Topminnow%20Supplemental%20Information.pdf.

Saltmarsh topminnows are only known to occur in the Escambia/Blackwater/Yellow River watershed in northwest Florida, although it is suspected to formerly range almost to the Apalachicola River. The species was not collected by FWC during FY 2010-11. Euryhaline species (species that tolerate varying levels of salinity), such as saltmarsh topminnows, are only occasionally encountered in freshwater habitats. Sampling was conducted in the vicinity of the species' known range, although no individuals were encountered. Additional research is needed to properly assess the distribution of the species in Florida.

Shoal Bass – The shoal bass, listed as a Species of Special Concern under Florida's old rules, was removed from the Endangered and Threatened Species List in November 2010 when the new State listing rules were enacted, since the species has harvest regulations (see page 1). Under the new rules, any species under a harvest management system will not be included on Florida's Endangered and Threatened Species List. Numerous research projects are currently investigating exploitation, spawning habitat use, genetic structure, and growth rate of this species. Shoal bass populations from the Chipola River (a tributary to the Apalachicola River in northwest Florida) appear locally abundant and secure, although fragmented from its source population (in Georgia and Alabama) due to Woodruff Dam. The dam represents a barrier to gene flow, making this species susceptible to catastrophic events since no other significant population exists in Florida.

Southern Tessellated Darter – The Southern tessellated darter is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the Southern tessellated darter met Threatened species listing criteria. It was determined that the Southern tessellated darter did meet the required criteria to meet Threatened species status due to a continual declining, severely fragmented (typically exist in fewer than ten locations) geographic range (extent of occurrence is less than 7,722 square miles, or 20,000 square kilometers; and the area of occupancy that is less than 772 square miles, or 2,000 square kilometers); and a population with a very restricted area of occupancy (typically less than eight square miles, or 20 square kilometers) or number of locations (typically five or fewer). The listing status of the Southern tessellated darter will not change until a management plan has been approved for the species. The Southern tessellated darter biological status review may be accessed at http://myfwc.com/media/1351646/Southern%20tessellated%20darter%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352371/Southern%20Tessellated%20Darter%20Supplemental%20Information.pdf.

Southern tessellated darters are known to occur in the Ocklawaha River watershed (a tributary to the St. Johns River) in north-central Florida. The species has not been found in

Florida since 2004. Sampling conducted during FY 2010-11 did not yield any individuals. Additional long-term monitoring is needed to assess the species.

Suwannee Bass – The Suwannee bass, listed as a Species of Special Concern under Florida's old rules, was removed from the Endangered and Threatened Species List in November 2010 when the new State listing rules were enacted, since the species has harvest regulations (see page 1). Under the new rules, any species under a harvest management system will not be included on Florida's Endangered and Threatened Species List. The Suwannee bass is known to occur in the Ochlockonee, Wakulla, and Suwannee River watersheds in north-central Florida. Suwannee bass appear to be locally abundant and secure in the Suwannee River watershed, but rare in the Ochlockonee River. To maintain stable Suwannee bass populations, research is currently being conducted to investigate age, growth, and catch rates for the species from the Withlacoochee River (a tributary to the Suwannee River). Sampling from the Withlacoochee collected 72 Suwannee bass and one individual from the Ochlocknee River during FY 2010-11. Continued monitoring is needed due to the species' highly endemic nature, which makes this species susceptible to catastrophic events.

**Smalltooth Sawfish** (*Phil Stevens and Gregg Poulakis*)

The smalltooth sawfish is a Federally-designated Endangered species that was once common in the coastal and estuarine waters of the southeastern U.S., but during the 20th century it became rare throughout its North American range. Smalltooth sawfish used to be found in the U.S. along the entire Gulf Coast, and from Florida up to North Carolina, but they are currently found only in Florida, primarily from Charlotte Harbor in Charlotte County to the Florida Keys in Monroe County. This decline is attributed to two main factors: 1) bycatch in commercial and recreational fishing, and 2) life history parameters that include late maturity and production of small numbers of young.

Conservation efforts directed toward smalltooth sawfish in the U.S. began with their protection by the State of Florida in 1992 and eventually led to Federal protection under the Endangered Species Act in 2003. These conservation measures were enacted on the basis of large scale declines in occurrence and a gross reduction of historical range. Despite the special concern for this fish, there was a lack of scientific information, making the implementation of conservation plans for this species difficult.

In November 2004, FWC initiated long-term monitoring specifically designed to collect data on the life history, biology, and ecology of the smalltooth sawfish. During FY 2010–11, two complimentary sampling methods were used to collect smalltooth sawfish in the Charlotte Harbor estuarine system, which is located on the southwest Gulf Coast of Florida. In FY 2010-11, monthly randomized sampling that targeted smalltooth sawfish was conducted in the Caloosahatchee River in Lee County and in upper Charlotte Harbor in Charlotte County using a multi-gear approach (*e.g.*, gill nets, seines).

Fifty-seven smalltooth sawfish were captured and released. A variety of data were taken on all sawfish (*e.g.*, lengths, rostral tooth counts), and each new animal was tagged and released. Total lengths ranged from about 2.3 to 9 feet (.7–2.7 meters); all of these sawfish were immature. Captured sawfish were tagged with a colored tag embossed with the FWC tagging hotline phone number, a PIT (Passive Integrated Transponder) tag (similar to electronic tags used for dogs and cats), and an acoustic tag, and were released at the site of capture. PIT tags remain with the

sawfish for life, and the PIT tag reader can be carried by researchers to detect recaptures. The acoustic tags are used by researchers to track sawfish movements using hydrophones (underwater listening devices). Data obtained have been used to define activity space, home range, and the abiotic (non-living chemical and physical factors in the environment) preferences of this species while it resides in the nurseries. This is part of a collaborative effort between the FWC and other scientists.

FWC is a member of the Smalltooth Sawfish Recovery Plan Implementation Team. This group includes members with Federal, State, academic, and non-profit affiliations and was assembled by the National Oceanic and Atmospheric Agency's Marine Fisheries Service to develop and implement the Federal Recovery Plan for this species. Sampling data are provided to the team as needed.

Information received via awareness efforts (*e.g.*, calls to FWC sawfish hotline from poster and permanent sign distribution) and research is compiled and archived as part of the National Sawfish Encounter Database. This database has been used by the Smalltooth Sawfish Recovery and Implementation Team in a variety of ways, including designation of critical habitat for the species. When citizens provide information on sawfish, FWC takes the opportunity to inform responders about the smalltooth sawfish and the FWC's role in its protection. For more information on the FWC's Smalltooth Sawfish Research and Monitoring, including access to publications on specific topics, please visit http://research.MyFWC.com/sawfish.

## INVERTEBRATES

### Black Creek Crayfish (*Paul Moler*)

The Black Creek crayfish is currently listed in Florida as a Species of Special Concern. A biological status review was conducted by FWC and external experts to determine whether or not the Black Creek crayfish met Threatened species listing criteria. It was determined that the Black Creek crayfish did meet the required criteria to meet Threatened species status due to a continual declining, severely fragmented (typically exist in fewer than ten locations) geographic range (extent of occurrence is less than 7,722 square miles, or 20,000 square kilometers; and the area of occupancy that is less than 772 square miles, or 2,000 square kilometers). The listing status of the Black Creek crayfish will not change until a management plan has been approved for the species. The Black Creek crayfish biological status review may be accessed at http://myfwc.com/media/1351502/Black%20Creek%20crayfish%20Final%20BSR.pdf. Supplemental information for the biological status review that includes public comments and peer reviews may be accessed at http://myfwc.com/media/1352227/Black%20Creek%20Crayfish%20Supplemental%20Information.pdf.

Black Creek crayfish have previously been recorded only from the Black Creek drainage in Clay and Duval counties, the Julington Creek drainage in Duval County, and Rileys Creek in Duval County. The next major drainage south of Black Creek is the Etoniah Creek – Rice Creek system, which enters the St. Johns River in Palatka, Florida. A survey during FY 2009-10 documented the occurrence of Black Creek crayfish in headwater streams of Etoniah Creek in Putnam County, and surveys in FY 2010-11 documented Black Creek crayfish in the lower reaches of Etoniah Creek.

**Freshwater Mussels** (*Gary Warren*)

During the past 50 years, the abundance and diversity of North American freshwater mussels has declined to the extent that mussels are now considered to be among the most at risk of all animal groups on the continent. Of the 297 mussel species known from North America, over 70 percent are considered by experts to be Endangered, Threatened, or Species of Special Concern. Currently, there are 71 U.S. species listed by the U.S. Fish and Wildlife Service (USFWS) as Endangered or Threatened. Florida freshwaters are inhabited by at least 59 mussel species. Of these, eight are Federally-designated Endangered or Threatened and another seven have been proposed as candidates for Federal listing (**Table 4**). These species were listed because they are extremely rare, their distributions are limited to small areas, and their preferred habitats are at risk. Primary threats to the continued existence of listed mussels in Florida include stream impoundment (dam construction), channelization, sedimentation, destabilization of stream banks and bottoms, and reduced stream flows and water levels. Contaminants such as pesticides, fertilizers, heavy metals, and acid mine drainage have also contributed to the decline of Florida mussels. All but one of Florida's listed or candidate species are restricted to streams in the Florida Panhandle. The lone species occurring east and south of the Ochlockonee River basin is the oval pigtoe, which is distributed as far south as the Santa Fe River in the Suwannee River basin.

**Table 4**. Florida mussel species listed or proposed for listing by USFWS under provisions of the Endangered Species Act. Status categories are: C = Candidate, E = Endangered and T = Threatened.

| Common Name | Scientific Name | Status | Year Listed | Critical Habitat Determined |
|---|---|---|---|---|
| fat threeridge | *Amblema neislerii* | E | 1998 | 2007 |
| Chipola slabshell | *Elliptio chipolaensis* | T | 1998 | 2007 |
| purple bankclimber | *Elliptoideus sloatianus* | T | 1998 | 2007 |
| tapered pigtoe | *Fusconaia burkei* | C | 2011 | 2011 |
| narrow pigtoe | *Fusconaia escambia* | C | 2011 | 2011 |
| round ebonyshell | *Fusconaia rotulata* | C | 2011 | 2011 |
| Southern sandshell | *Hamiota australis* | C | 2011 | 2011 |
| shinyrayed pocketbook | *Hamiota subangulata* | E | 1998 | 2007 |
| Alabama moccasinshell | *Medionidus acutissimus* | T | 1993 | 2007 |
| Gulf moccasinshell | *Medionidus penicillatus* | E | 1998 | 2007 |
| Ochlockonee moccasinshell | *Medionidus simpsonianus* | E | 1998 | 2007 |
| Choctaw bean | *Obovaria choctawensis* | C | 2011 | 2011 |
| oval pigtoe | *Pleurobema pyriforme* | E | 1998 | 2007 |
| fuzzy pigtoe | *Pleurobema strodeanum* | C | 2011 | 2011 |
| Southern kidneyshell | *Ptychobranchus jonesi* | C | 2011 | 2011 |

Healthy mussel populations are integral to the normal function of freshwater ecosystems. Mussels provide a food resource for a large number of predators including limpkins, otters,

raccoons, fish, and alligators, and are critical to the nutrient cycling and decomposition processes in streams, lakes, and marshes. Given this importance, and the extent of the imperilment of mussels, FWC's Freshwater Invertebrate Resource Assessment Unit implemented the Freshwater Mussels of Florida project, which was initially funded by the State Wildlife Grant program and is headquartered at the Gainesville Freshwater Research Laboratory. The initial goal of the project was to document the taxonomic composition and distribution of Florida freshwater mussels, thereby establishing a baseline for future reference of the health of the fauna. An FWC book entitled The Freshwater Mussels of Florida is to be the primary product of this initial phase of the project. The book will include descriptions of all Florida mussel species and will detail their distributions, abundances, and ecology.

During FY 2010-11, sampling was conducted at 59 sites and field work was completed for the book project. Sampling was focused on Panhandle and Suwannee River basin locations. Samples were obtained from several sites on the Santa Fe River in conjunction with habitat restoration and boat ramp construction projects. These Santa Fe River surveys documented the continued existence of the oval pigtoe in the Suwannee River basin. Live specimens of the oval pigtoe had not been encountered for many years prior to these collections. Results from the surveys were used in consultation with the USFWS to permit boat ramp modifications in the Santa Fe River near Worthington Springs (Union County).

In addition to completion of field work for the Florida mussel book, photography of museum-type specimens of all Florida mussel species was completed and all known electronic records of historical Florida mussel collections were georeferenced and archived for future reference. A total of over 9,000 records have now been verified and entered into the Florida mussel database. Additionally, examples of glochidia (larval mussel stage) from all Florida species were photographed using scanning electron microscopy. Work on the book manuscript neared completion in anticipation of the January 2012 deadline. Offers have now been received from both the University of Florida Press and the Johns Hopkins Press to publish the approximately 525-page book.

Also during FY 2010-11, a proposal was developed by the FWC Freshwater Fisheries Research Group to construct a freshwater mussel aquaculture system that would enable propagation of listed mussel species and determination of the fish host species for Florida's listed mussels. Work on this system and development of the propagation program will begin in the spring of 2012.

**Miami Blue Butterfly** (*David Cook and Ricardo Zambrano*)

The Miami blue butterfly, listed as Endangered under Florida's old rules, became a State-designated Threatened species in November 2010 after a new listed species rule and Threatened species management system was passed by the FWC Commissioners (see page 1). Currently, the Miami blue butterfly is being proposed for Endangered listing status with U.S. Fish and Wildlife Service (USFWS). The Miami blue butterfly did not undergo a biological status review because one was completed recently. The butterfly was formerly found from Hillsborough County to the Dry Tortugas on the Gulf Coast and from Merritt Island to the Florida Keys on the Atlantic Coast. Currently, it is only found at two sites in the Key West National Wildlife Refuge in extreme south Florida.

Over the last decade, FWC has partnered with several government agencies, non-governmental organizations, and the University of Florida to protect and conserve this species.

FWC has coordinated closely with the University of Florida, the National Park Service, and the Florida Department of Environmental Protection (FDEP) for previous captive propagation and reintroduction efforts. FWC, through the State Wildlife Grants program, funded the University of Florida to conduct Miami blue butterfly population surveys and to examine their genetic diversity at Key West National Wildlife Refuge, and assisted in the fieldwork for that study.

During FY 2010-11, progress on implementing the recently approved Miami Blue Butterfly Management Plan (which may be accessed at http://myfwc.com/wildlifehabitats/imperiled/management-plans/) was severely limited due to the loss of both the wild population at FDEP's Bahia Honda State Park and the captive population at the University of Florida. The wild population was apparently lost through a combination of severe drought, cold-weather, and incidental predation by non-native green iguanas eating the Miami blue's host plant, nickerbean. The captive population was lost due to the same severe cold-weather, which affected both butterflies and host plants, and because no wild Miami blues were available to supplement the captive population. Planned research to use captive-raised Miami blues to develop techniques to successfully reintroduce Miami blues has been postponed until a new captive population can be established, and until it can be determined that the remaining wild populations in Key West National Wildlife Refuge are robust enough to support collection from the wild. Relevant research may proceed, however, using surrogate species and support through a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida. FWC is working closely with the USFWS to coordinate ongoing and future conservation efforts for the Miami blue populations on the Wildlife Refuge. FWC will continue to support USFWS efforts to conduct a comprehensive survey on the Wildlife Refuge and consider the feasibility of establishing a new captive Miami blue population. Surveys for Miami blues elsewhere in the historic range will continue with assistance from FWC.

**Panama City Crayfish** (*David Cook and John Himes*)

The Panama City crayfish is a Species of Special Concern in Florida that did not undergo a biological status review because one had been completed recently. The historic range of the Panama City crayfish is restricted to 51 square miles (132 square kilometers) of the Bay County peninsula that includes Panama City and Lynn Haven. Urbanization and alteration of natural wetlands (e.g., pine flatwoods prone to seasonal flooding) have eliminated this crayfish from most of the western and central parts of its range. The species is now most commonly found in disturbed wetlands and roadside ditches that are vulnerable to continued habitat degradation. In accordance with the listing process, a draft management plan for the Panama City crayfish was submitted to FWC Commissioners for consideration at their June 2007 meeting. At their December 2007 meeting, the FWC Commissioners directed FWC to suspend further listing action on the Panama City crayfish until the listing process had been revised. The revision of the listing process was approved in November 2010. Resubmission and approval of the plan are now anticipated for 2012. The present draft, dated May 2007, is available at http://myfwc.com/media/1355365/Revised_Draft_PCC_Plan.pdf .

Highlights of the draft management plan include: 1) conservation objectives and strategies that, if achieved, will cause the Panama City crayfish to no longer meet the criteria for listing; 2) the inclusion of best management practices (BMPs) developed through considerable stakeholder input that enable road maintenance, development, silviculture, and other activities to proceed without the need for an incidental take permit if BMPs are followed; 3) a rule

establishing a no-cost permit for crayfish recreational harvest that will enable FWC to collect information on the possible impact of this activity on the species; and 4) an implementation strategy and schedule.

During FY 2010-11, FWC addressed questions involving developments and other activities with possible impact to the Panama City crayfish, and made site visits to evaluate potential crayfish presence or habitat. In particular, FWC reviewed a number of Environmental Resource and Wetland Dredge and Fill Permit applications. FWC consulted with the Florida Department of Environmental Protection and U.S. Army Corp of Engineers, to whom the applications had been submitted, and with environmental consultants, to provide guidance on proposed development projects and to prevent unauthorized taking of Panama City crayfish. FWC also led habitat restoration activities (e.g., prescribed burning, and removal and chemical treatment of invasive vegetation) for the Panama City crayfish on a conservation easement, and plans are currently underway to restore Panama City crayfish habitat on additional conservation easements. In conjunction with the U.S. Fish and Wildlife Service (USFWS), FWC is currently working to establish a mitigation bank to serve as an additional site to relocate Panama City crayfish. In addition, future efforts may include relocating Panama City crayfish to areas of suitable, but unoccupied habitat within the range of the species in order to increase its area of occupancy.

Finalization of a Candidate Conservation Agreement with Assurances between FWC, the USFWS, and the St. Joe Company is moving forward. When approved and implemented, this incentive-based conservation agreement will ultimately result in the establishment of a nearly 2,000-acre (809–hectare) “Panama City Crayfish Conservation Area” in the eastern part of the Panama City crayfish range, and will guide habitat restoration and management activities that will enhance the long-term survival of the species.

## WILDLIFE CONSERVATION, PRIORITIZATION, AND RECOVERY (*Dan Sullivan*)

FWC is taking a pro-active, science-based approach to evaluating management needs of at risk species on FWC managed lands. This approach is being implemented through the Wildlife Conservation, Prioritization, and Recovery Program. This program integrates geospatial analytical techniques to model potential habitat with conservation planning and population viability analysis results. Using this information, FWC determines where species conservation can be affected on each wildlife management area (WMA) or wildlife and environmental area (WEA). Staff integrates the outcome of the landscape level assessment with area-specific and expert knowledge to produce a Species Management Strategy/ies. Strategies are particular to each WMA/WEA and outline the role of the area in wildlife conservation. Each strategy contains measurable objectives for managing priority species and their habitat, a list of actions necessary to achieve these objectives, and monitoring to verify progress towards meeting the objectives. Implementing this program ensures FWC is efficiently meeting the needs of Florida's at risk species on lands managed by the agency.

During FY 2010-11, FWC completed four workshops covering four WMAs. The areas covered by a workshop included: Caravelle Ranch WMA in Putnam County; Corbett WMA in Palm Beach County; Big Bend WMA in Taylor and Dixie counties; and Lake Wales Ridge WEA in Polk and Highlands counties. FWC finalized Strategies for the L. Kirk Edwards WMA in Leon County; Hilochee WMA in Lake and Polk counties; Dinner Island Ranch WMA in Hendry County; Okaloacoochee Slough WMA in Hendry County; and Spirit of the Wild WMA in Hendry County. FWC initiated the drafting of Strategies for Corbett WMA, Big Bend WMA and Lake Wales Ridge WEA. These Strategies are anticipated to be completed during FY 2011-12.

The Program will continue to assess the changing needs of wildlife at the statewide level. FWC plans to update Strategies on a regular basis in conjunction with required updates to an area's management plan.

## COORDINATION AND ASSISTANCE (*Brad Gruver, Richard Kiltie, Erin Leone, Kristin Rogers, and Joseph Walsh*)

Coordination – Listed species coordination included overseeing, monitoring, facilitating, and otherwise organizing activities associated with listed species. It also included ensuring adherence to Federal and State reporting and documentation requirements and guidelines; implementing or facilitating protection through coordination of assistance, regulatory measures, and permit review; providing or facilitating consultation and assistance to private interests; and interacting with State and Federal agencies, conservation organizations, and others regarding a wide range of listed species matters. Funding for coordination was jointly provided by the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Agency's Marine Fisheries Service (NOAA-Fisheries) through Section 6 of the Federal Endangered Species Act of 1973, Florida's Nongame Wildlife Trust Fund, and the Florida Panther Research and Management Trust Fund.

Assistance on listed species was provided to State and Federal agencies, environmental-related consulting firms, private individuals, and local regulatory authorities through telephone calls, e-mails, written correspondence, and agency commenting. The Section 6 Cooperative Agreement with the USFWS and NOAA-Fisheries were administered, including preparing

emergency handling reports, preparing and executing Section 6 grants, and developing the renewal packets for the Cooperative Agreement.

The Threatened Species Website, http://myfwc.com/wildlifehabitats/imperiled/, includes, among other things, copies of previous legislative reports, the current lists of listed wildlife, information on listed species permits, and listed species management plans. During FY 2010-11, the site was maintained and information was added, updated, or removed as necessary.

Project Support – FWC provided statistical and data management support for numerous projects focused on Endangered, Threatened, and Species of Special Concern during FY 2010-11. FWC contributed to: population trend analysis, monitoring, or assessment of seabirds and shorebirds, American alligators, Florida black bears, Florida scrub-jays, Southeastern American kestrels, flatwoods salamanders, gopher tortoises, Florida grasshopper sparrows, and Florida panthers; habitat selection of Florida panthers and grasshopper sparrows; cataloging of Florida mussel DNA sequencing results; and loggerhead sea turtle nesting trends.

Reviews and Assistance for Transportation Projects – FWC performed a total of 85 reviews of highway projects during FY 2010-11, which included projects reviewed through the Florida Department of Transportation's Efficient Transportation Decision Making Process. Each review included a biological assessment of the direct and indirect effects of the transportation project on listed bird, mammal, amphibian, and reptile species and their habitats. Recommendations were provided to the Florida Department of Transportation's seven Districts and the Turnpike Enterprise on methods to avoid, minimize, or mitigate these effects on listed species. Recommendations were related to road design issues, locations and design of Florida black bear and Florida panther wildlife underpasses, wildlife species occurrence information and field survey methodologies, wetland and upland habitat restoration strategies and techniques, and suitability evaluations of a moderate number of land parcels for mitigation through public land acquisition. This assistance was designed to reduce the adverse effects of specific highway projects on listed fish and wildlife species.

Land Use Planning Activities – FWC provided 561 written assistance letters for public and private land and water use planning activities that had the potential to impact listed wildlife species and their habitats during FY 2010-11. The types of projects reviewed and commented on included Developments of Regional Impact, County Comprehensive Plan Evaluation and Appraisal Reports, proposed amendments and Sector Plans, regional visioning projects, various State and Federal permit applications, environmental assessments, and environmental impact statements. The content of consultations was based on established best management practices, species management guidelines, and GIS analysis.

## CRITICAL WILDLIFE AREAS (*Terry J. Doonan*)

Critical Wildlife Areas (CWAs) are established by FWC under rule 68A-14.001 of the Florida Administrative Code, to protect concentrations of listed and other important wildlife species from human disturbance during critical periods of their life cycles, such as nesting or maternity seasons. For each CWA, the boundaries and periods of time when portions of the area may be posted as closed to entry by people are defined in the CWA establishment order. FWC's regional species conservation biologists are responsible for evaluating needs for potential CWAs,

producing or revising establishment orders, and coordinating necessary management and monitoring activities for the wildlife populations using those areas each year. Management and monitoring activities are conducted with the participation of FWC law enforcement personnel and multiple partners including other State and Federal agencies, local governments, and nongovernmental organizations.

Managed areas within CWA boundaries are usually defined with posts and signs (posted) to identify the area, increase public awareness, and reduce disturbance to the fragile wildlife resources that are present there. During FY 2010-11, all active CWAs that could be posted were posted with appropriate signage as necessary.

Active CWAs were monitored in FY 2010-11 by FWC biologists and management partners. Monitoring protocols varied among sites, depending on the species present, but usually involved either direct counts or estimates of adults, nests, or young. Protection and monitoring efforts for listed species of shorebirds and seabirds at some CWAs have been improved through the work of partnership networks, which are organized through efforts by FWC and the activities of other member groups. FWC provides species expertise, assistance, and available management and educational materials when partnering with other groups in these efforts.

Thirteen of the 20 established CWAs supported populations of listed and other important wildlife species during FY 2010-11 (**Table 5**). The most notable and active CWAs that supported listed species included: Alafia Bank in Hillsborough County (several wading bird species, American oystercatchers and brown pelicans); ABC Islands in Collier County (little blue herons, snowy egrets, and reddish egrets); St. George Causeway in Franklin County (least terns, royal terns, and black skimmers); Big Marco Pass in Collier County (least terns, black skimmers, snowy plovers, and wintering piping plovers); Fort George Inlet in Duval County (royal terns); and Gerome's Cave in Jackson County (Southeastern myotis bat). Results show that CWA management is important for effective conservation of many species. For that reason, this project is expected to be an ongoing priority for FWC.

**Table 5**. Critical wildlife areas (CWAs) in Florida during FY 2010-11, with relevant information about each.

| FWC Region<br>CWA name | County | Closure period | Primary taxa | Status[a] | Area within the established CWA boundary |
|---|---|---|---|---|---|
| **Southwest** | | | | | |
| Alafia Bank | Hillsborough | 1 Dec. to 1 Sept. | Great blue heron, great egret, snowy egret, little blue heron, tricolored heron, reddish egret, cattle egret, green heron, black-crowned night heron, yellow-crowned night heron, white ibis, glossy ibis, brown pelican, roseate spoonbill, American oystercatcher, cormorant, willet | 9,650 nests total | 75 acres (ac)<br>(30 hectares [ha]) |
| Little Estero Island | Lee | 1 April to 1 Sept. | Least tern, Wilson's plover, snowy plover | 20, ~3, 0 nests | 25 ac (10 ha) |
| Anclote River Islands | Pasco/ Pinellas | 1 Feb. to 1 Sept. | Herons, egrets, brown pelican | Inactive[b] | 5 ac (2 ha) |
| Myakka River | Sarasota | 1 March to 1 Nov. | Wood stork, great egret, great blue heron, cattle egret, anhinga | 0, 28, 1, 6, 8 nests | 1 ac (0.4 ha) |
| **North Central** | | | | | |
| Amelia Island | Nassau | 1 April to 1 Sept. | Least tern, Wilson's plover | ~200, 18 nests | 10 ac (4 ha) |
| Bird Islands | Duval | 1 April to 1 Sept. | Black skimmer, gull-billed tern, least tern, American oystercatcher | 3, 0, 0, 1 nests | 6 ac (2.4 ha) |
| Fort George Inlet | Duval | 1 April to 1 Sept. | Royal tern, black skimmer, Wilson's plover, laughing gull | ~500, 0, 1, ~3,000 nests | 10 ac (4 ha) |
| **Northwest** | | | | | |
| Tyndall | Bay | Year-round | Least tern, black skimmer, snowy plover, Wilson's plover, American oystercatcher, willet, piping plover[c] | 52, 0, 50, 17, 2, 4 nests | 10 ac (4 ha) |
| Alligator Point | Franklin | 1 April to 1 Sept. | Snowy plover, Wilson's plover, American oystercatcher, least tern, willet | 4, 6, 1, 2, 2 nests | 145 ac (59 ha) |
| St. George Causeway | Franklin | 1 April to 31 Aug. | Least tern, laughing gull, Caspian tern, gull-billed tern, royal tern, American oystercatcher, black skimmer | 86, 2500, 113, 5, 957 0, 73 nests | 32 ac (13 ha) |
| Gerome's Cave | Jackson | 1 March to 1 Sept. | Southeastern myotis bat | ~2,000 individuals | 2 ac (0.8 ha) |
| **South** | | | | | |
| Deerfield Island Park | Broward | Year-round | Gopher tortoise | 7 individuals | 56 ac (23 ha) |
| ABC Islands | Collier | Year-round | Little blue heron, great blue heron, tri-colored heron, great egret, reddish egret, snowy egret, cattle egret | ~325 nests total | 75 ac (30 ha) |
| Big Marco Pass | Collier | Year-round | Least tern, black skimmer, snowy plover, Wilson's plover, wintering shorebirds[c] | 130 tern, 451 skimmer, 2 Wilson's plover nests | 60 ac (24 ha) |
| Caxambas Pass | Collier | 1 April to 1 Sept. | Least tern, black skimmer, Wilson's plover, wintering shorebirds[c] | Inactive | 1 ac (0.4 ha) |
| Rookery Island | Collier | Year-round | Herons, egrets, brown pelican | Inactive | 5 ac (2 ha) |

**Table 5** continued: Critical wildlife areas (CWAs) in Florida during FY 2010-11, with relevant information about each.

| FWC Region<br>CWA name | County | Closure period | Primary taxa | Status[a] | Area within the established CWA boundary |
|---|---|---|---|---|---|
| Bill Sadowski | Dade | Year-round | Shorebirds, herons, & egrets (foraging); great blue heron | ~1,000 individuals; 5 great blue heron nests | 700 ac (283 ha) |
| Pelican Shoal | Monroe | 1 April to 1 Sept. | Roseate tern, bridled tern | Inactive - not emergent now | 1 ac (0.4 ha) |
| **Northeast** | | | | | |
| Jennings Cave | Marion | 15 Feb to 31 Aug | Southeastern myotis bat | Inactive | 1.9 ac (0.8 ha) |
| Matanzas Inlet | St. Johns | 1 April to 1 Sept. | Least tern, Wilson's plover, willet | 65, 4, 0 nests | 28 ac (11 ha) |

[a]Counts or estimates of peak numbers of individuals and/or successful nests at each site during the closed period in FY 2010-2011.
[b]Inactive means the site was either not used, or not available for use, by wildlife during FY 2010-2011.
[c]Monitoring to count or estimate numbers of wintering shorebirds was not conducted.

## FLORIDA'S LAND OWNER ASSISTANCE PROGRAM (*Joe Prenger*)

FWC has been administering the Landowner Assistance Program (LAP), in cooperation with the U.S. Fish and Wildlife Service (USFWS), since October 2003. Florida's LAP promotes stewardship on private lands while also playing a fundamental role in the conservation of listed species. Florida's LAP is a voluntary program designed to provide wildlife-related assistance with land-use planning and habitat management to private landowners as well as financial support to those interested in improving habitat conditions on their property for the benefit of listed species. The Program's focal area approach ensures that Federally-funded dollars are being distributed in the most efficient and equitable manner on properties with the greatest potential benefits for listed species.

During FY 2010-11, FWC's LAP provided assistance to 617 landowners, including evaluation of effects from proposed agricultural practices to listed species on 463 projects (**Figure 1**). Many of the landowners also received financial assistance though State or Federal cost-share or easement programs such as the U.S. Farm Bill Conservation Programs. LAP staff worked in cooperation with the U.S. Department of Agriculture's Natural Resources Conservation Service, the USFWS, the Florida Department of Agriculture and Consumer Services, the University of Florida's Institute of Food and Agriculture Sciences, Florida Natural Areas Inventory, and various other conservation organizations, to assist Florida's private landowners. While private landowners represent the majority assisted by LAP staff, public conservation land managers including the U.S. Department of Defense, the USFWS, and the U.S. Department of Agriculture's Forest Service received assistance with management plan development or updates for their conservation lands.

For more information, please visit the LAP Website at http://myfwc.com/conservation/special-initiatives/lap/.

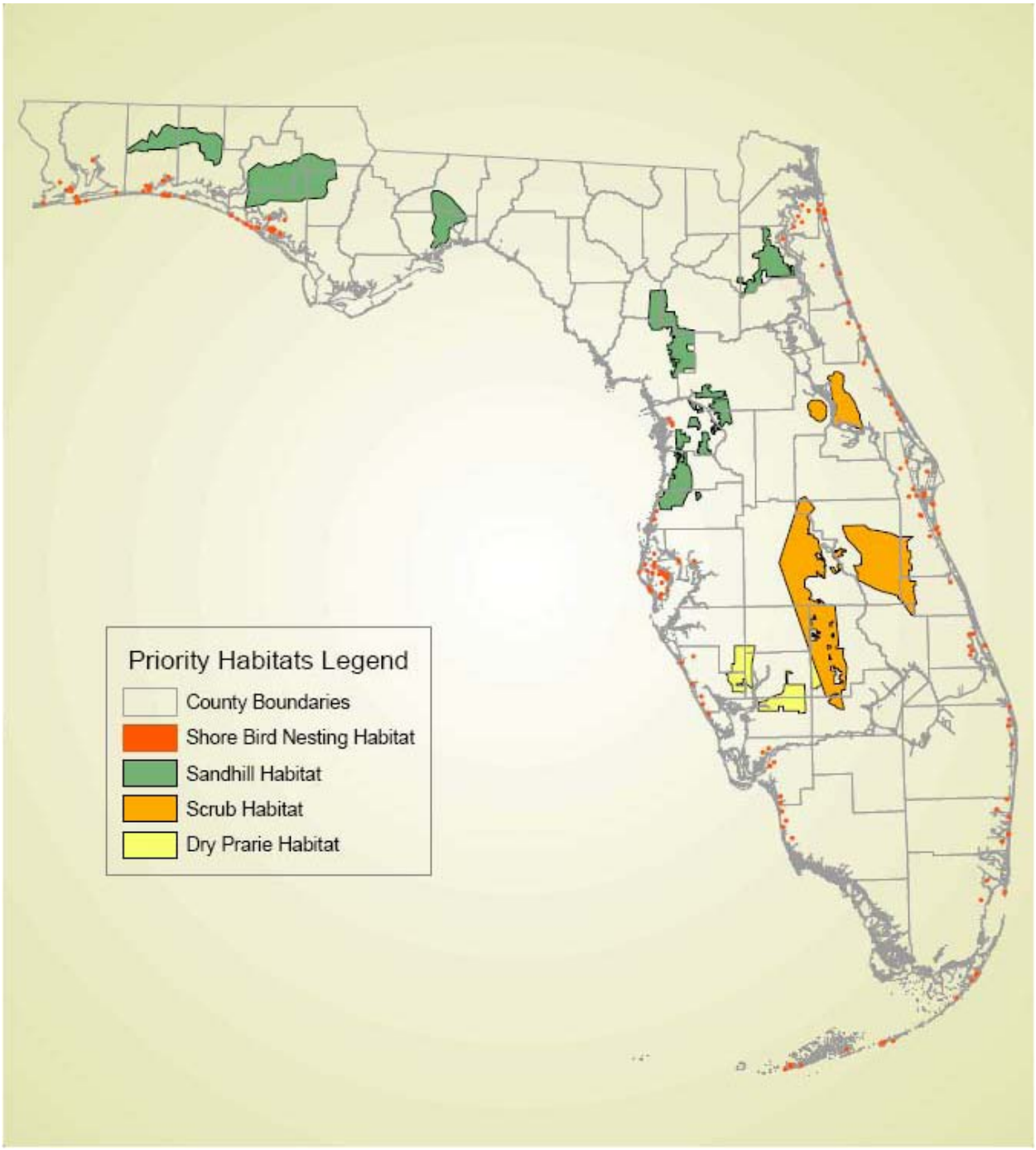



**Figure 1**. Landowner Assistance Program Focal Areas

LAW ENFORCEMENT (*Captain Rob Beaton and Lieutenant Colonel Mike Wiwi*)

FWC's Division of Law Enforcement continued statewide enforcement activities to protect specific Endangered and Threatened species during FY 2010-11. These activities

included:

- Regular patrols of the Florida panther reduced-speed zones in Lee and Collier counties to protect panther and prey species, and to provide public safety;
- Regular patrols in Monroe County as part of a multi-agency task force enforcing the Key deer speed zone on Big Pine Key;
- Patrol efforts targeting coastal nesting areas of sea turtles, to reduce nest destruction and unlawful egg removal or theft;
- Patrol efforts directed toward the enforcement of specific gear requirements (i.e., Turtle Excluder Devices) to protect sea turtles from becoming entrapped in shrimp trawl nets;
- Patrol efforts targeting coastal nesting areas of protected shore birds to reduce nest disturbance, nest destruction, and incidental take;
- Investigations by the Internet Crimes Unit targeting the unlawful sale and possession of protected species on the internet; and
- Enhanced statewide enforcement efforts directed towards utilizing radar and the Manatee Cam surveillance technology to ensure compliance with boat speed zones to prevent manatee vessel strikes and manatee harassment. More than 97,000 water patrol hours were dedicated to manatee enforcement, resulting in 1,665 citations and over 5,000 warnings.

The Division of Law Enforcement issued 14 additional citations separate from manatee citations, involving Endangered species, Threatened species, and Species of Special Concern. The majority of these were for illegal take or possession of gopher tortoises.

The Division of Law Enforcement continues to partner with other governmental agencies and citizen groups to work through issues concerning the Florida panther in southwest Florida. Law Enforcement also assisted in increasing public awareness of black bears, gopher tortoises, Perdido Key beach mice, sea turtles, and other species.

PERMITTING AND ASSISTANCE (*Angela T. Williams*)

During FY 2010-11, FWC provided Federal agencies, other State agencies, environmental consultants, and regional and local regulatory authorities with assistance and guidance regarding projects that impact protected and listed fish, bird, and land dwelling species on managed lands and lands slated for development. Many of these entities, as well as researchers, landowners, and educational facilities, utilized this assistance and guidance when applying for scientific collecting, captive possession, nest removal, wildlife relocation, and incidental take permits for protected and listed species.

Assistance for developers, environmental consultants, and regulatory agencies usually consisted of any combination of the following: 1) comments on species management plans submitted for review; 2) development of individual species management plans or guidelines; and 3) on-site visits to determine species management needs. Generally, the public was provided information regarding protected or listed species such as: 1) life history and other biological information; 2) locality and occurrence data; 3) listing status; and 4) solutions to nuisance situations (i.e., education on the species behavior and habitat requirements and suggestions for coexisting with the species).

Permits to handle or impact State and Federally protected and listed species occurring in Florida are issued in accordance with Rules 68A-5, 68A-9, 68A-12, 68A-16, 68A-25 and 68A-27 of the Florida Administrative Code (F.A.C.). Some permits require permit holders to carry out

an approved site or species-specific management plan. Others require permit holders to follow FWC species guidelines, policies, or management plans for the Florida burrowing owl, osprey, gopher tortoise, bald eagle, flatwoods salamander, peregrine falcon, red-cockaded woodpecker, and Miami blue butterfly. Scientific permits are generally conditioned on an approved research proposal. The permit review process usually involves coordination between FWC, environmental consultants, other State agencies, Federal agencies, and regional and local regulatory entities.

FWC staff made thousands of telephone calls and sent hundreds of emails and formal letters as a result of their assistance efforts. An estimated 370 protected and listed species scientific collection, captive possession, wildlife relocation, nest removal, disturbance, and incidental take permits (and permit amendments) were issued during FY 2010-11. The number of permits issued has decreased as a result of changes to the State listed species Rule (68A-27 F.A.C.) intended to avoid duplicate issuance of permits. Previous rules required both an FWC as well as a U.S Fish and Wildlife Service permit for species in Florida protected under the Federal Endangered Species Act. FWC no longer issues permits for Federally listed species (i.e. Eastern indigo snake, Florida scrub-jay, red-cockaded woodpecker, American crocodile, sand skink, blue-tail mole skink, piping plovers, and other listed migratory birds) over which the agency does not exercise regulatory authority, unless it has entered into a written agreement to receive regulatory delegation from USFWS.

Overall, FWC provided science-based and regulatory guidance to ensure that permitted activities would result in a net conservation benefit for the involved species. Additional information regarding species guidelines, policies, and applications may be accessed at http://myfwc.com/license/wildlife/protected-wildlife/. An online permit system was launched for scientific collecting, migratory bird nest relocation, and non-resident falconry permits, which may be accessed at http://myfwc.com/license/wildlife/protected-wildlife/#howToApply.

## COASTAL WILDLIFE CONSERVATION INITIATIVE (*Blair Hayman*)

Many species of wildlife are dependent on coastal ecosystems, including 17 State or Federally listed species and more than 100 at risk species. Coastal habitats are among those identified in Florida's Wildlife Action Plan as having the highest relative threats statewide. Habitat loss and degradation due to development, and commercial and recreational activities have led to declining wildlife populations and natural coastal ecosystems. The Coastal Wildlife Conservation Initiative (CWCI) is an FWC-led, multi-agency (Florida Department of Environmental Protection, Florida Department of Community Affairs, and the University of Florida Institute of Food and Agriculture Services) strategy that began in May 2007. The goal of the CWCI is to initiate a statewide, cooperative process to provide for greater consistency and coordination in protecting coastal wildlife populations, conserving and managing coastal ecosystems, and achieving balance between these efforts and human use of coastal areas. The CWCI's comprehensive approach focuses on wildlife and their habitat needs as well as socio-economic issues. Through this interactive process, agencies can improve coordination on coastal issues, address emerging issues, and work towards greater consistency statewide in the conservation of wildlife.

A full-time coordinator, hired in February 2010 with State Wildlife Grant funding, is responsible for creating the partnership network, developing and implementing the framework for a standing team and working groups, and coordinating actions between these groups and

FWC in addressing coastal issues. Engaging potential partners and stakeholders at the local level is an important component in achieving a cohesive partnership. A Conserve Wildlife Tag grant was awarded by the Wildlife Foundation of Florida in May 2010 for implementing the CWCI and developing the partnership network. A statewide series of 11 regional informational forums was initiated in June 2010 and will conclude in November 2011. Following each forum, efforts are made to assemble working groups in each region to focus on wildlife, habitat, and human interests in coastal areas. Working groups have currently been established in the Southwest, Indian River, and Tampa Bay regions (collectively including Sarasota, Charlotte, Lee, Collier, Volusia, Brevard, Indian River, Pinellas, Hillsborough, and Manatee counties), with additional groups slated to be added through 2011. Priorities include the continued development of a partner database, a web-based interface for coastal programs statewide, and a campaign on the importance of wrack (marine vegetation that washes up on the shore and is used as a source of food for many species including shorebirds) on beach habitats. Team members and the coordinator participate in other working groups to lend expertise and to strategize on how the CWCI and its partnership may assist with achievement of goals focusing on coastal conservation issues.

# CITIZENS AWARENESS PROGRAM

Compiled by *Diane Hirth.*

Contributors to this section: *Bonnie Abellera, Naomi Avissar, Scott Ball, Jessica Basham, Wendy Dial, Nancy Douglass, Samantha Dupree, Craig Faulhaber, Gabriella Ferraro, Judy Gillan, Lori Haynes, Diane Hirth, Gretchen Hochnedel, Cavell Kyser, Mark Lotz, Ann Morrow, Gary Morse, Wendy Quigley, Claire Sunquist, David Telesco, and Alicia Wellman.*

**Introduction** – Section 379.2291(5), Florida Statutes, requires FWC to provide a revised and updated plan for management and conservation of Endangered and Threatened species, including a description of relevant educational programs. Though FWC has no formal education program, staff often provide information to the public. FWC conducts citizen awareness programs throughout the agency to fulfill the Statute requirement. The following summarizes these efforts for listed species from July 1, 2010, to June 30, 2011:

**Media Relations** – FWC news releases reach regional, statewide, and national audiences, including more than 200 Florida newspapers and 400 television and radio stations, national wire services, magazines, newsletters, freelance writers, and stakeholders. During FY 2010-11, the FWC issued 98 news releases on Endangered and Threatened species. FWC news releases are posted online and archived at MyFWC.com/News. A selection of statewide and regional news releases sent out in July, August, and September of 2010 follows:

- "We must speak up for Florida's wildlife," by FWC Chairman Rodney Barreto, July 1, 2010
- "FWC, partners reach out to Collier residents living with panthers," July 10, 2010
- "Buy a decal to support manatee, sea turtle programs," July 15, 2010
- "FWC to present a new system for conserving Florida's listed species," July 30, 2010
- "Conservation education and the Deepwater Horizon oil spill," August 2, 2010
- "Living in bear country guest lecture August 22," August 6, 2010
- "FWC rescuing oil-impacted sea turtles with help from Gulf fishermen," August 6, 2010
- "Jarhead: The little bear that beat the odds," August 13, 2010
- "Scientists release the first rescued, rehabilitated sea turtles back into the Gulf," August 18, 2010
- "FWC approves new rules for conserving Florida's Threatened species," September 1, 2010

The on-going impact of the BP Deepwater Horizon oil spill in the Gulf of Mexico required major communications updates and outreach to the media and public regarding the rescue and rehabilitation of Endangered and Threatened species such as sea turtles and the monitoring of the conditions and effects of the spill on birds, sea turtles, mammals, and other marine life. Especially-low winter temperatures for Florida caused cold-stunning of animals such as sea turtles, which also generated media and public interest.

FWC responded throughout the year to numerous inquiries from media regarding Endangered and Threatened species. One of the FWC's regional public information coordinators, for example, fielded 150 inquiries in FY 2010-11 from newspapers, TV, and radio

in Miami-Dade, Broward, Palm Beach, Martin, St. Lucie, Okeechobee, Glades, Hendry, Collier, and Monroe counties. That led to stories on a wide range of species, including Florida panthers, Florida manatees, gopher tortoises, sea turtles, Florida black bears, shorebirds, Florida bonneted bats, American crocodiles, and bald eagles. FWC distributed over 10,000 pieces of Florida black bear literature to the public during FY 2010-11. In addition, 13 regional and five statewide news releases were sent out relating to bears.

FWC also organizes press conferences to bring attention to key issues. During FY 2010-11, the Southwest Regional (encompassing Hernando, Pasco, Pinellas, Hillsborough, Polk, Manatee, Sarasota, Charlotte, Lee, DeSoto, Hardee, and Highlands counties) public information coordinator coordinated three press conferences: one on nesting shorebirds (piping plover, black skimmer, oystercatcher, and least tern) with six media attendees; one on bald eagles with six media outlets represented; and one on Florida manatee protection with five media attendees.

**Social Media** – FWC began using social media extensively during the latter part of FY 2010-11. The goal is to engage the public in both FWC news and the "cool stuff' that people want to know about Endangered and Threatened species. A broad audience is interacting on a daily basis with FWC via two separate Twitter accounts, Facebook, YouTube, and a Flickr account. During FY 2010-11, there were:

- **91 Facebook posts**, including 11 on the Florida black bear, 20 on the Florida manatee, nine on the Florida panther, seven on the gopher tortoise, and one on sea turtles. FWC's Facebook page may be accessed at http://www.facebook.com/MyFWC.
- **117 "Tweets"** via @MyFWC on FWC-related news and information ranging from learning about the Federally-designated Endangered North Atlantic right whale to discussing changes to gopher tortoise permitting and announcing a colony of roseate terns at a new nesting site in the Florida Keys. The FWC Twitter account's largest audience is men ages 25-44. This FWC Twitter page may be accessed at http://twitter.com/#!/myfwc.
- **57 "Tweets"** on @MyFWClife, an informal and often fun glimpse at creatures and their interactions with people, aimed at appealing to women and parents with young children. Posts included SeaWorld Orlando's animal rescue team releasing three green sea turtles back into the waters of Florida's east coast and two third-graders raising money for the Save the Manatee Trust Fund. This FWC Twitter page may be accessed at http://twitter.com/#!/MyFWClife.
- **Nine videos on YouTube**, with the two most popular being a 12-minute step-by-step video on how to install an electric fence to protect food sources such as beehives from black bears, and a 14-minute video on "Living with Florida black bears." FWC's YouTube site may be accessed at http://www.youtube.com/user/MyFWCvideos.
- **Flickr** is an online photo management and sharing application. The FWC Flickr account may be accessed at http://www.flickr.com/photos/myfwc/, where visitors may view pictures taken by FWC.

**FWC Websites, Wildlife Alert, and Ask FWC** – The public's first instinct in today's internet-driven world is to seek information on the Web.

- FWC updated its website with input from staff and stakeholders in March 2011 at MyFWC.com. Designed to be comprehensive and user-friendly with easier access to

information, the website's home page includes news highlights, a featured video, and a link to a customer service survey.

- Panther Net (www.floridapanthernet.org) provides accurate and up-to-date information about the Federally-designated Endangered Florida panther. This website placed third in the recent Association for Conservation Information competition among websites. A section of PantherNet called *Field Notes* contains periodic entries by FWC panther biologists on panther births, deaths, capture activities, and other material of interest. Brochures, activities, and annual reports are also posted and available for download.
- The public is asked to call the Wildlife Alert Hotline at **888-404-FWCC (3922), or #FWC** or ***FWC** on their cell phones to report information such as sick or injured animals, illegal wildlife activities, nuisance alligators, or human-animal conflicts. FWC's Wildlife Alert hotline is a critical tool for receiving real-time information from the public about fish and wildlife-related emergencies.
- **Ask FWC** remains a popular feature on MyFWC.com. In FY 2010-11, more than 6,000 questions were submitted to Ask FWC about manatees, sea turtles, Florida black bears, and Florida panthers, with answers instantly available to most questions and the option to submit an unanswered question to staff. The most frequently asked questions were: "Are black bears dangerous?" (444 hits); "May I feed, give water to, touch or swim with manatees?" (392 hits); "I saw a wild cat (panther, bobcat, etc.)…what do I do?" (385 hits); "How do I scare a bear away when it is on my property?" (271 hits); and Manatee speed zones – maps, definitions and rules (222 hits).
- ***Wildlife 2060*: *What's at stake for Florida*** – This website, accessible at http://myfwc.com/conservation/special-initiatives/wildlife-2060/, addresses the potential future impacts of Florida's continued human growth and development, and promotes understanding of what this means for Florida's fish and wildlife.
- **The Manatee Mortality Database**, which is accessible at http://myfwc.com/research/manatee/rescue-mortality-response/mortality-statistics/, provides Internet users a way to search for data on manatee mortalities in Florida. The summary report allows users to search manatee mortality data by Florida county, probable cause of death, and month and year. The individual report allows users the same options as the summary report, and also provides more detailed information including sex, size, and region in which the death occurred. Web visitors can subscribe to receive a notification e-mail when the database has been updated or new or updated tables have been posted.

**Community Meetings, Workshops, and Presentations** – FWC responds and reaches out to local communities including homeowners, landowners, businesses, and stakeholders on a broad array of issues involved in living with Florida's Endangered and Threatened species. Highlights during FY 2010-11 included:

- **Living with Panthers** – FWC and partners visited a Collier County neighborhood on July 9, 2010 to offer tips on living with panthers. During the event, FWC connected with hundreds of people and distributed approximately 2,000 "Living with Panthers" brochures. The event was covered by local media.

- **Shorebirds and Seabirds** – A presentation pertaining to conservation and sharing the beach with Florida's beach-nesting birds was given to the Kissimmee Valley Audubon Society on October 26, 2010.
- **Working with Local Government and Businesses** – FWC participated in at least ten meetings discussing Florida manatee information and awareness with representatives from local government, law enforcement, natural resource administrators/scientists, nonprofit organizations, marine industries, and the Jacksonville Zoo.
- **Living with Bears** – Extensive efforts have been made by the FWC Bear Management Program to help people learn about bears. Programs provided information on bear ecology and natural history, as well as suggestions for successfully living in bear country. The programs included 106 public presentations, meetings and events offering information to more than 11,430 people about bears and ways to minimize bear-human conflict. FWC also distributed thousands of bear-related information materials. Through partnerships with local governments, businesses, and communities, Bear Program staff reduced bear access to garbage across the state. Results of those efforts include: shifting waste service pickup times so residents can more easily take garbage out the morning of pickup rather than the night before, and making bear-resistant equipment like cans, sheds, and electric fencing more readily available. The Bear Program has continued to train law enforcement officers on bear behavior and conflict response. Staff trained 94 personnel, including personnel from six local and State law enforcement and natural resource agencies. FWC black bear researchers also provided information to local government staff and officials at a meeting at Deltona City Hall in Volusia County and U.S. Forest Service staff and volunteers at Camp Ocala in Marion County.
- **How to Protect Marine Mammals** – FWC conducted at least 22 community activities in FY 2010-11 on protecting marine mammals such as Florida manatees and North Atlantic right whales and the importance of recycling monofilament fishing line. Presentations were made at State parks, marine centers, civic organizations, and summer camps.
- **Florida Grasshopper Sparrow** – FWC provided assistance to the U.S. Fish and Wildlife Service (USFWS) and the Florida Department of Agriculture and Consumer Services (FDACS) by providing information on habitat requirements of the Florida grasshopper sparrow. A field trip to Three Lakes Wildlife Management Area (WMA) and an adjacent private ranch was used to demonstrate suitable dry prairie grasslands and unsuitable improved pastures. FWC also contributed to a USFWS and the U.S. Department of Agriculture consultation document used for assessing the suitability of private lands for Florida grasshopper sparrows.
- **Sea Turtles** – FWC hosted the 2011 Sea Turtle Permit Holder Workshop in Melbourne Beach, Brevard County for approximately 350 Sea Turtle Permit Holders, volunteers, and staff from local, State, and Federal governments. This two-day event included approximately fifteen presentations by agency management and research staff, conservation organizations, and local governments as well as summaries of sea turtle grant projects. At the request of local governments, FWC participated in public workshops hosted in southwest, Central, and northeast Florida. Upon request, FWC also conducted educational presentations concerning sea turtles, lights, and other impacts to schools and meetings of local conservation groups, home owners associations, and other interested groups. Through a Sea Turtle Lighting course, which was developed jointly

with the USFWS, FWC was able to provide information on sea turtles and lights to a variety of entities across Peninsular and Panhandle Florida. Workshops were presented to local governments, code enforcement, private property owners, State agencies, sea turtle permit holders, county employees, lighting consultants, insurance companies, and interested citizens. These workshops were hosted by different organizations around the state, and included demonstration of the Sea Turtle Lighting Trailer.

- **Gopher Tortoises** – Local government assistance continued by providing a series of seven workshops during FY 2010-11. These workshops were attended by more than 200 representatives primarily from public organizations. FWC provided assistance and resources to help conserve gopher tortoises at the local level.

**School-based Programs and Presentations** – Students, teachers, schools, and universities offer wonderful opportunities to learn and talk about Florida's diverse wildlife. The efforts by FWC's Project Wild during FY 2010-11 are examples of the breadth of engagement with students and teachers ranging from pre-kindergarten to college. Educational programs included:

- **Pinellas County Great American Teach-In** – FWC spoke about sea turtles to 125 elementary school students in grades K-5 in November 2010.
- **From Manatee Basics to Marine Biology, Right Whales, Sawfish, Corals, and Shorebirds** – FWC went on the road talking to kindergarten and elementary school students all over the state about corals, Florida manatees and North Atlantic right whales, and explained how to become a marine biologist to 20 students in grades four through seven as part of an activity at Brevard Zoo. A researcher gave five presentations on smalltooth sawfish as part of the Don Ball School of Fishing program that targets middle school students in Charlotte County. Lectures were also presented to students studying environmental journalism at Florida Atlantic University, marine science at the University of Miami and undergraduates interested in shorebirds at the University of Florida.
- **Project WILD** – Project WILD staff and volunteer facilitators provided 70 one-day workshops, including Project WILD, Aquatic WILD, Project/Aquatic WILD, Growing Up WILD, Flying WILD, Science and Civics, Schoolyard Wildlife, and Florida Black Bear. They trained 1,500 educators statewide to instruct students from pre-kindergarten through 12$^{th}$ grade about species such as the Florida panther, Florida black bear, Florida manatee, American alligator, American crocodile, gopher tortoise, loggerhead sea turtle, green sea turtle, leatherback sea turtle, hawksbill sea turtle, Kemp's ridley sea turtle, bald eagle, burrowing owl, and osprey.
- **Meet a Scientist** – An FWC panther biologist participated in a "Meet a Scientist" panel that met with middle and high school students taking summer environmental classes at Florida Gulf Coast University.
- **Sea Turtles** – FWC responded to requests for educational materials concerning sea turtles and provided copies of educational brochures, posters, rack cards, and other information.

**Fairs, Festivals and Special Events** – At fairs, festivals, and special events, FWC staff can connect with kids, families, young people, retirees, and tourists at places and events where they are having fun. FWC attends fairs and festivals, big and small, so folks can become better

acquainted with the state's wildlife. Following are just a few of the many festivals and events visited by FWC during FY 2010-11:

- **South Florida Fair** – A display table and trailer provided information on Endangered and Threatened species at the West Palm Beach event. Hundreds of people stopped by the FWC display and interacted with staff. The fair was held from January 14-30, 2011.
- **Tampa Electric Manatee Viewing Center 25th Anniversary** – FWC provided a display booth at the two-day manatee festival in the Tampa Bay area. Hundreds of manatees were visible in the power plant discharge canal during this event. This event was held from January 15-16, 2011.
- **Florida State Fair** – The FWC exhibit featured information and live displays on the Florida panther and Florida black bear. Other three-dimensional displays featured information about nesting shorebirds, sea turtles, and the American crocodile. This fair was held in February 2011.
- **12th Annual Everglades Day Festival** – FWC set up a display and distributed literature at the festival in the Loxahatchee National Wildlife Refuge in Boynton Beach. This festival was held February 12, 2011.
- **Scrub-Jay Festival** – FWC helped organize the 2nd annual Florida Scrub-jay Festival that took place on February 12, 2011 to celebrate and raise awareness about the Florida scrub-jay (the only bird that occurs exclusively in Florida). The Festival took place on Merritt Island National Wildlife Refuge and included guided walks, presentations, hay rides, environmental exhibitors, children's activities, and live entertainment. An estimated 500-700 people attended. The Festival was a cooperative partnership effort led by Merritt Island National Wildlife Refuge and the Education and Outreach Committee of the Northeast Florida Scrub Working Group, which includes staff from FWC, the Florida Department of Environmental Protection, Volusia County, and the Florida Scrub-Jay Consortium.
- **'Creating the Next Generation That Cares' Youth Event at the Capitol** – The courtyard between the old and new Florida Capitols housed interactive displays on April 7, 2011 to inspire youth to enjoy Florida's natural resources and protect them. One FWC display featured a touch-tank of marine life while another offered kids a chance to pretend to be a bear and search for berries and bugs to eat. Florida manatee, sea turtle, and Florida panther information was also available at this annual event. FWC's Florida manatee mascot posed for pictures with students.
- **MarineQuest** – This annual open house of FWC's Fish and Wildlife Research Institute in St. Petersburg, which took place on April 28-30, 2011, has evolved into a three-day event that welcomes thousands. The first two days brought in students grades four through eight to participate in "School Daze," a special version of MarineQuest available to schools by registration only. Students toured lab stations managed by FWC scientists. Vibrant exhibits with hands-on displays and activities drew students into the world of marine biology and the fascinating things that FWC scientists discover. The third day, a Saturday, was open to the general public. Indoor and outdoor displays discussed species such as Florida black bears, Florida manatees, Florida panthers, the North Atlantic right whale, sea turtles, American alligators, and corals. Displays featured hands-on activities as well as printed materials and information, and staff biologists were on hand to answer

questions. Featured artifacts included Florida manatee bones, turtle shells, and a full-sized mounted panther.

- **Planning 1st Annual Panther Festival** – Planning by FWC and partners began for the first annual Florida Panther festival to be held in Naples on Saturday, October 29, 2011. The free, day-long festival will increase awareness of the Federally-designated Endangered Florida panther while promoting safe coexistence of people, pets, livestock, and panthers.
- **12th Annual Florida Black Bear Festival** – FWC partnered with the Umatilla Florida Chamber of Commerce, the U.S. Forest Service, the Wildlife Foundation of Florida, Defenders of Wildlife, Lake County, and private business sponsors to present the 12th Annual Florida Black Bear Festival. An estimated 5,000 attendees received valuable information on successfully living with Florida black bears, the activities of FWC, and the results of bear research through talks, displays, children's activities, and field trips.
- **Forgotten Coast Black Bear Festival** – FWC partnered with the Defenders of Wildlife, the U.S. Forest Service, the Florida Department of Agriculture and Consumer Services Florida Forest Service, the Franklin County Tourism Development Council, the Carrabelle Chamber of Commerce, the City of Carrabelle, Forgotten Coast TV, Oyster Radio, and Carrabelle CARES to revive the Forgotten Coast Black Bear Festival that will take place in October 2011. The festival had been held in Carrabelle in October in 2008 and 2009, but was not held in 2010. The partnership hired a private event consultant for the festival and plans were well underway at the close of FY 2010-11.

**Publications, Exhibits, Videos, and Signs** – Sharing compelling stories about Florida wildlife in writing and pictures is an ongoing and inviting challenge. Following is a sampling of the work done in FY 2010-11:

- ***Florida Monthly*** – Articles appeared on the gopher tortoise in September 2010, Sherman's fox squirrel in January 2011, and the Southeastern American kestrel in April 2011. Each article provided a photo and detailed natural history information of the species. FWC has published a two-page feature in *Florida Monthly* (formerly *Florida Living*) called "Watching Wildlife" since 1998.
- **Florida Paddling Trails Association Newsletter** – The quarterly newsletter featured FWC articles on the limpkin in fall 2010 and the Florida manatee in winter 2011. The features provided information and conservation tips on each species.
- **Recreation Guides** – New and updated recreation guides were produced for the following wildlife management areas (WMA) and included photos and brief life-history information on Endangered and Threatened species: Andrews WMA in Levy County – Gulf sturgeon; Apalachicola Wildlife and Environmental Area in Gulf and Franklin counties – red-cockaded woodpecker; Aucilla WMA in Jefferson and Taylor counties – Florida black bear; and J.W. Corbett WMA in Palm Beach County – red-cockaded woodpecker.
- **Trail Guide** – The Sunset Ranch Trail Guide for Three Lakes WMA in Osceola County provided a photo and brief information on the whooping crane reintroduction program.
- **Interpretive Signage** – An informational sign and photo of the gopher tortoise was posted at Tosohatchee WMA in Orange County. The sign's content emphasizes how the gopher tortoise creates habitat for hundreds of other species.

- **Manatee Decals** – A total of 15,000 manatee decals were printed and distributed to all of Florida's 67 county tax collectors. More than 5,700 decals were sold to help support the manatee program.
- **Sea Turtle Decals** – FWC created a colorful decal featuring a photograph of a hawksbill sea turtle. This decal, number 20 of a series, was distributed to local tax collectors offices across Florida. Funds from the sale of this decal support FWC's sea turtle program.
- **Panther Awareness Materials** – "A Guide to Living with Florida Panthers" brochure was produced in Spanish to better reach the large Hispanic population in Florida, particularly in southwest Florida where the panther population is concentrated. Work began on a fact sheet to educate motorists in panther country.
- **Black Bear Videos** – FWC has several video and audio segments available to the public via the FWC website (http://myfwc.com/education/educators/black-bear/education/), FWC's YouTube website (http://www.youtube.com/user/MyFWCvideos), and as DVD hard copies. At the end of FY 2010-11, the "Living with Florida Black Bears" 14-minute video segment had been viewed over 6,200 times. The "How to secure attractants from black bears using electric fencing" 12-minute video segment had been viewed over 6,300 times, and four different audio clips were listened to a total of over 5,100 times.
- **Gopher Tortoise Brochures** – In FY 2010-11, FWC created two new "Get the Facts About Gopher Tortoises" fact sheets. The "Recipient Site" fact sheet was distributed at local government workshops throughout the state to a variety of non-profit, educational, and governmental organizations in Florida. The "Wildlife Rehabilitation" fact sheet was individually mailed to all registered gopher tortoise wildlife rehabilitators in Florida. FWC also distributed more than 800 "Guide to Living with Gopher Tortoises" brochures along with a variety of other fact sheets, posters, and brochures to planning councils, county and city building departments, and local permitting offices. The plan to distribute posters to every county, municipality, and planning organization in Florida during FY 2010-11 was accomplished, with the development of a distribution database to track all mail outs. All of these publications are available for download at http://myfwc.com/wildlifehabitats/managed/gopher-tortoise/.
- **TV Show** – The second season of *Operation Wild* premiered in 2010 on the Planet Green network. Episodes have continued to air through 2011 on the Planet Green and Animal Planet networks as well. While the show follows the daily activities of FWC officers, from responding to boating accidents and searching for missing people in the woods, to assisting and relocating wildlife, the show also highlights FWC officers' encounters with Endangered and Threatened wildlife, including the American crocodile, Florida panther, key deer, Kemp's ridley sea turtle, sperm whale, and Florida manatee. The *Operation Wild* website, accessible at http://planetgreen.discovery.com/tv/operation-wild/, has more information about FWC as well as a schedule for the show.
- **Publications** – A list of scientific publications is included in Appendix C.

**Volunteer Opportunities** – Volunteers are making a difference in the success of monitoring and research duties that help conserve Florida's wildlife. Their efforts in FY 2010-11 included:

- Forty-seven regular volunteers donated a total of 4,765 hours and 25 occasional service volunteers donated a total of 174 hours to conserve Endangered and Threatened species. Their subjects included alligator snapping turtles, beach mice, the Key Largo woodrat, crayfish, gopher frogs, Florida panthers, and Florida black bears.
- FWC biologists initiated nest box programs to augment Southeastern American kestrel populations in many areas including the Brooksville Ridge (Hernando, Citrus, Sumter, and Levy counties). During FY 2010-11, FWC and ten volunteers built and monitored ten nest boxes on four properties in Hernando County. All nests were recorded as either active or inactive and the number of eggs/nestlings was recorded for all nests. Volunteers monitored the nest boxes during the breeding season (April–July) and recorded additional pertinent information such as behavior and other species present in the nest boxes. The result after 142 volunteer hours was new nest boxes and the 2011 monitoring survey that found that five of the ten kestrel nest boxes were being used.
- The volunteer program in 12 northeast Florida counties (St. Johns, Flagler, Volusia, Brevard, Indian River, Orange, Osceola, Seminole, Lake, Sumter, Marion, and Putnam) had 45 new volunteers who regularly contributed work for projects involving Everglade snail kite, Florida black bear, Florida scrub-jay, and wood storks.
- FWC biologists manage 75 active red-cockaded woodpeckers nest clusters in the Citrus WMA in Citrus and Hernando counties. During FY 2010-11, 11 volunteers with the Brooksville Ridge Volunteer Program assisted FWC with habitat enhancement at 35 nest clusters. Their 493 volunteer hours focused on habitat enhancement including fire preparation, oak thinning, and repair assistance on nest inserts. Volunteers also gave 382 hours to monitoring active nest clusters.

**Protecting Species through Partnership –** Imagine collecting and communicating data on Florida's large array of seabirds and shorebirds spread along more than 1,200 miles of coastline on the Atlantic Ocean and Gulf of Mexico. To address this huge task, FWC has collaborated with partners to build a shorebird database and shorebird alliance. Stakeholders are investing their time, work, and knowledge in these cooperative efforts.

- **Florida Shorebird Alliance** – Long-term monitoring of shorebirds and seabirds across Florida requires an extensive network of partners. The Database (see below) facilitates this collaborative approach by providing a central location for data entry, compilation, and storage, but it is only as comprehensive as the network contributing to it. In an effort to coordinate and expand coverage of shorebirds and seabirds in Florida, the Florida Shorebird Alliance was created. The Alliance is organized into regional partnerships that work locally to ensure important shorebird and seabird sites are surveyed and monitored. To date, eight active regional partnerships coordinate monitoring and protection across Florida. The Alliance has a newsletter, maintains an email list-serve of 550 partners, and has a website, which may be accessed at www.flshorebirdalliance.org.
- **Florida Shorebird Database** – Managers and permit reviewers need real-time information to respond to situations involving nesting shorebirds and seabirds. The Florida Shorebird Database was created to serve as the central repository for data collected on shorebirds and seabirds in Florida. It is an online tool with a data entry interface allowing users to submit and manage observations. FWC and partners developed the Database and an accompanying protocol for monitoring beach-nesting

shorebirds and seabirds. The database was launched in Spring 2011 and 114 registered users from throughout the state currently are entering locations and nesting data on these birds. The data are now available to anyone online, thereby allowing researchers, managers, conservationists, permit reviewers, and the public to use the information to help conserve shorebirds and seabirds. The Florida Shorebird Database may be accessed at www.flshorebirddatabase.org.

APPENDIX A. LISTED WILDLIFE SPECIES IN FLORIDA AS OF JUNE 30, 2011

## VERTEBRATES

### FISH

| Common Name | Scientific Name | Status |
|---|---|---|
| Atlantic sturgeon | *Acipenser oxyrinchus* | SSC |
| Blackmouth shiner | *Notropis melanostomus* | ST |
| Bluenose shiner | *Pteronotropis welaka* | SSC |
| Crystal darter | *Crystallaria asprella* | ST |
| Gulf sturgeon | *Acipenser oxyrinchus [=oxyrhynchus] desotoi* | FT |
| Harlequin darter | *Etheostoma histrio* | SSC |
| Key silverside | *Menidia conchorum* | ST |
| Lake Eustis pupfish | *Cyprinodon hubbsi* | SSC |
| Okaloosa darter | *Etheostoma okalossae* | FE |
| Rivulus | *Rivulus marmoratus* | SSC |
| Saltmarsh topminnow | *Fundulus jenkinsi* | SSC |
| Shortnose sturgeon | *Acipenser brevirostrum* | FE |
| Smalltooth sawfish | *Pristis pectinate* | FE |
| Southern tessellated darter | *Etheostoma olmstedi maculaticeps* | SSC |

### AMPHIBIANS

| Common Name | Scientific Name | Status |
|---|---|---|
| Florida bog frog | *Lithobates okaloosae* | SSC |
| Frosted flatwoods salamander | *Ambystoma cingulatum* | FT |
| Georgia blind salamander | *Haideotriton wallacei* | SSC |
| Gopher frog | *Lithobates capito* | SSC |
| Pine barrens treefrog | *Hyla andersonii* | SSC |
| Reticulated flatwoods salamander | *Ambystoma bishopi* | FE |

### REPTILES

| Common Name | Scientific Name | Status |
|---|---|---|
| Alligator snapping turtle | *Macrochelys temminckii* | SSC |
| American alligator | *Alligator mississippiensis* | FT(S/A) |
| American crocodile | *Crocodylus acutus* | FT |
| Atlantic salt marsh snake | *Nerodia clarkii taeniata* | FT |
| Barbour's map turtle | *Graptemys barbouri* | SSC |
| Bluetail mole skink | *Eumeces egregius lividus* | FT |
| Eastern indigo snake | *Drymarchon corais couperi* | FT |

| Common Name | Scientific Name | Status |
|---|---|---|
| Florida brownsnake[1] | *Storeria victa* | ST |
| Florida Keys mole skink | *Eumeces egregius egregius* | SSC |
| Florida pine snake | *Pituophis melanoleucus mugitus* | SSC |
| Gopher tortoise | *Gopherus polyphemus* | ST |
| Green sea turtle | *Chelonia mydas* | FE |
| Hawksbill sea turtle | *Eretmochelys imbricata* | FE |
| Kemp's ridley sea turtle | *Lepidochelys kempii* | FE |
| Key ringneck snake | *Diadophis punctatus acricus* | ST |
| Leatherback sea turtle | *Dermochelys coriacea* | FE |
| Loggerhead sea turtle | *Caretta caretta* | FT |
| Peninsula ribbon snake[1] | *Thamnophis sauritus sackenii* | ST |
| Red rat snake[1] | *Elaphe guttata* | SSC |
| Rim rock crowned snake | *Tantilla oolitica* | ST |
| Sand skink | *Neoseps reynoldsi* | FT |
| Short-tailed snake | *Stilosoma extenuatum* | ST |
| Striped mud turtle[1] | *Kinosternon baurii* | ST |
| Suwannee cooter | *Pseudemys suwanniensis* | SSC |

**BIRDS**

| Common Name | Scientific Name | Status |
|---|---|---|
| American oystercatcher | *Haematopus palliatus* | SSC |
| Audubon's crested caracara | *Polyborus plancus audubonii* | FT |
| Bachman's wood warbler | *Vermivora bachmanii* | FE |
| Black skimmer | *Rynchops niger* | SSC |
| Brown pelican | *Pelecanus occidentalis* | SSC |
| Burrowing owl | *Athene cunicularia* | SSC |
| Cape Sable seaside sparrow | *Ammodramus maritimus mirabilis* | FE |
| Eskimo curlew | *Numenius borealis* | FE |
| Everglade snail kite | *Rostrhamus sociabilis plumbeus* | FE |
| Florida grasshopper sparrow | *Ammodramus savannarum floridanus* | FE |
| Florida sandhill crane | *Grus canadensis pratensis* | ST |
| Florida scrub-jay | *Aphelocoma coerulescens* | FT |
| Ivory-billed woodpecker | *Campephilus principalis* | FE |
| Kirtland's wood warbler (Kirtland's warbler) | *Dendroica kirtlandii* (*Setophaga kirtlandii*) | FE |

| Common Name | Scientific Name | Status |
|---|---|---|
| Least tern | *Sterna antillarum* | ST |
| Limpkin | *Aramus guarauna* | SSC |
| Little blue heron | *Egretta caerulea* | SSC |
| Marian's marsh wren | *Cistothorus palustris marianae* | SSC |
| Osprey[2] | *Pandion haliaetus* | SSC |
| Piping plover | *Charadrius melodus* | FT |
| Red-cockaded woodpecker | *Picoides borealis* | FE |
| Reddish egret | *Egretta rufescens* | SSC |
| Roseate spoonbill | *Platalea ajaja* | SSC |
| Roseate tern | *Sterna dougallii dougallii* | FT |
| Scott's seaside sparrow | *Ammodramus maritimus peninsulae* | SSC |
| Snowy egret | *Egretta thula* | SSC |
| Snowy plover | *Charadrius nivosus* (*Charadrius alexandrinus*) | ST |
| Southeastern American kestrel | *Falco sparverius paulus* | ST |
| Tricolored heron | *Egretta tricolor* | SSC |
| Wakulla seaside sparrow | *Ammodramus maritimus juncicola* | SSC |
| White-crowned pigeon | *Patagioenas leucocephala* | ST |
| Whooping crane | *Grus americana* | FXN |
| White ibis | *Eudocimus albus* | SSC |
| Worthington's marsh wren | *Cistothorus palustris griseus* | SSC |
| Wood stork | *Mycteria americana* | FE |

## MAMMALS

| Common Name | Scientific Name | Status |
|---|---|---|
| Anastasia Island beach mouse | *Peromyscus polionotus phasma* | FE |
| Big Cypress fox squirrel | *Sciurus niger avicennia* | ST |
| Caribbean monk seal | *Monachus tropicalis* | FE |
| Choctawhatchee beach mouse | *Peromyscus polionotus allophrys* | FE |
| Eastern chipmunk | *Tamias striatus* | SSC |
| Everglades mink | *Neovison vison evergladensis* | ST |
| Finback whale | *Balaenoptera physalus* | FE |
| Florida black bear[3] | *Ursus americanus floridanus* | ST |
| Florida bonneted (mastiff) bat | *Eumops [=glaucinus] floridanus* | ST |
| Florida mouse | *Podomys floridanus* | SSC |

| Common Name | Scientific Name | Status |
|---|---|---|
| Florida panther | *Puma [=Felis] concolor coryi* | FE |
| Florida salt marsh vole | *Microtus pennsylvanicus dukecampbelli* | FE |
| Gray bat | *Myotis grisescens* | FE |
| Gray wolf | *Canis lupus* | FE |
| Homosassa shrew | *Sorex longirostris eonis* | SSC |
| Humpback whale | *Megaptera novaeangliae* | FE |
| Indiana bat | *Myotis sodalis* | FE |
| Key deer | *Odocoileus virginianus clavium* | FE |
| Key Largo cotton mouse | *Peromyscus gossypinus allapaticola* | FE |
| Key Largo woodrat | *Neotoma floridana smalli* | FE |
| Lower Keys rabbit | *Sylvilagus palustris hefneri* | FE |
| North Atlantic right whale | *Eubalaena glacialis* | FE |
| Perdido Key beach mouse | *Peromyscus polionotus trissyllepsis* | FE |
| Red wolf | *Canis rufus* | FE |
| Rice rat | *Oryzomys palustris natator* | FE[1] |
| Sanibel Island rice rat | *Oryzomys palustris sanibeli* | SSC |
| Sei whale | *Balaenoptera borealis* | FE |
| Sherman's fox squirrel | *Sciurus niger shermani* | SSC |
| Sherman's short-tailed shrew | *Blarina [=carolinensis] shermani* | SSC |
| Southeastern beach mouse | *Peromyscus polionotus niveiventris* | FT |
| Sperm whale | *Physeter catodon [=macrocephalus]* | FE |
| St. Andrew beach mouse | *Peromyscus polionotus peninsularis* | FE |
| West Indian manatee (Florida manatee) | *Trichechus manatus* (*Trichechus manatus latirostris*) | FE |

**INVERTEBRATES**

**CORALS**

| Common Name | Scientific Name | Status |
|---|---|---|
| Elkhorn coral | *Acropora palmate* | FT |
| Pillar coral | *Dendrogyra cylindricus* | ST |
| Staghorn coral | *Acropora cervicornis* | FT |

## CRUSTACEANS

| Common Name | Scientific Name | Status |
|---|---|---|
| Black Creek crayfish (Spotted royal crayfish) | *Procambarus pictus* | SSC |
| Panama City crayfish | *Procambarus econfinae* | SSC |
| Santa Fe Cave crayfish | *Procambarus erythrops* | SSC |
| Squirrel Chimney Cave shrimp | *Palaemonetes cummingi* | FT |

## INSECTS

| Common Name | Scientific Name | Status |
|---|---|---|
| American burying beetle | *Nicrophorus americanus* | FE |
| Miami blue butterfly | *Cyclargus thomasi bethunebakeri* | ST |
| Schaus' swallowtail butterfly | *Heraclides aristodemus ponceanus* | FE |

## MOLLUSKS

| Common Name | Scientific Name | Status |
|---|---|---|
| Chipola slabshell (mussel) | *Elliptio chiplolaensis* | FT |
| Fat threeridge (mussel) | *Amblema neislerii* | FE |
| Florida treesnail | *Liguus fasciatus* | SSC |
| Gulf moccasinshell (mussel) | *Medionidus penicillatus* | FE |
| Ochlockonee moccasinshell (mussel) | *Medionidus simpsonianus* | FE |
| Oval pigtoe (mussel) | *Pleurobema pyriforme* | FE |
| Purple bankclimber (mussel) | *Elliptoideus sloatianus* | FT |
| Shinyrayed pocketbook (mussel) | *Lampsilis subangulata* | FE |
| Stock Island tree snail | *Orthalicus reses [not incl. nesodryas]* | FT |

APPENDIX A. Continued

KEY TO ABBREVIATIONS AND NOTATIONS

## LIST ABBREVIATIONS

| | |
|---|---|
| FWC = | Florida Fish and Wildlife Conservation Commission |
| FE = | Federally-designated Endangered |
| FT = | Federally-designated Threatened |
| FXN = | Federally-designated Threatened Nonessential Experimental Population |
| FT(S/A) = | Federally-designated Threatened species due to similarity of appearance |
| ST = | State-designated Threatened |
| SSC = | Species of Special Concern |

## LIST NOTATIONS

[1] Lower Keys population only.

[2] Monroe County population only.

[3] Other than those found in Baker and Columbia counties or in Apalachicola National Forest.

## APPENDIX B. LIST OF ACRONYMS USED IN THIS REPORT

| Term | Acronym |
|---|---|
| Apalachicola River Wildlife and Environmental Area | ARWEA |
| Big Cypress National Preserve | BCNP |
| Coastal Wildlife Conservation Initiative | CWCI |
| Code of Federal Regulations | CFR |
| Critical Wildlife Area | CWA |
| Deoxyribonucleic acid | DNA |
| Florida Administrative Code | FAC |
| Florida Department of Environmental Protection | FDEP |
| Florida Department of Agriculture and Consumer Services | FDACS |
| Florida Fish and Wildlife Conservation Commission | FWC |
| Fiscal Year | FY |
| Geographic Information System | GIS |
| Global Positioning System | GPS |
| Landowner Assistance Program | LAP |
| Lake Wales Ridge State Forest | LWRSF |
| Lake Wales Ridge Wildlife and Environmental Area | LWRWEA |
| Manatee Protection Plans | MPP |
| National Oceanic and Atmospheric Agency's Marine Fisheries Service | NOAA-Fisheries |
| Passive Integrated Transponder | PIT |
| U.S. Fish and Wildlife Service | USFWS |
| Very High Frequency | VHF |
| Wildlife and Environmental Area | WEA |
| Wildlife Management Area | WMA |

APPENDIX C. FWC PUBLICATIONS DURING FY 2010-11.

Barlas, M. E., Deutsch, C.J., de Wit, M., and Ward-Geiger, L.I. (editors). 2011. Florida manatee cold-related unusual mortality event, January-April 2010. Final report to USFWS (grant 40181AG037). Florida Fish and Wildlife Conservation Commission, St. Petersburg, Florida. 138 pp.

Bartareau, T., Larter, N., Cluff, D., and Leone, E. 2011. Body condition and growth dynamics of black bears in Northern Canada. Ursus, *in press*.

Bjorndal, K. A., Bowen, B.W., Chaloupka, M., Crowder, L.B., Heppell, S.S., Jones, C.M., Lutcavage, M.E., Policansky, D., Solow, A.R. and Witherington, B.E. 2011. Better science needed for restoration in the Gulf of Mexico. Science 331: 537-538.

Bolten, A.B., Crowder, L.B., Dodd, M.G., MacPherson, S.L., Musick, J.A., Schroeder, B.A., Witherington, B., Long, K.J. and Snover, M.L. 2011. Quantifying multiple threats to endangered species: An example from loggerhead sea turtles. Frontiers in Ecology and Environment, v.5, no.1, 295–301.

Delany, M.F., Woodward, A. R. Kiltie, R. A., and Moore, C. T. 2011. Mortality of American alligators attributed to cannibalism. Herpetologica, 67(2): 174-185.

Deutsch, C. J. and Barlas, M.E. 2011. Manatee response to the conversion of the FPL Cape Canaveral power plant: Movements, warm-water habitat use, and thermal regime of satellite-tagged manatees during winter 2010-2011. Annual Report to Florida Power & Light Company. FWC/FWRI file F2864-10-A1. 61 pp

Deutsch, C. J. and Reynolds III, J.E. In press. Florida manatee status and conservation issues: a primer. In: Sirenian Conservation: Issues and Strategies in Developing Countries. Edited by Hines, E., Reynolds III, J.E., Mignucci-Giannoni, A.A., Aragones, L.V., and Marmontel, M. University of Florida Press, Gainesville.

Diemer-Berish, J.E., Wendland, L.D., Kiltie, R.A., Garrison, E.P., and C.A. Gates. 2010. Effects of upper respiratory tract disease on gopher tortoise populations in northern and central Florida. Journal of Wildlife Diseases, 46(3): 695-705.

Folk, M.J., Rodgers, Jr., J.A., Dellinger, T.A., Nesbitt, S.A., Parker, J.M., Spalding, M.G., Baynes, S.B., Chappell, M.K., and Schwikert, S.T. 2010. Status of non-migratory whooping cranes in Florida. Proceedings of the North American Crane Workshop, 11: 118-123.

Hostetler, J.A., Onorato, D.P., Nichols, J.D., Johnson, W.E., Roelke, M.E., O'Brien, S.J. Jansen, D., and Oli, M.K. 2010. Genetic introgression and the survival of Florida panther kittens. Biological Conservation, 143: 2789-2796.

APPENDIX C. Continued

Johnson, W.E., Onorato, D.P., Roelke, M.E., Land, E.D., Cunningham, M., Belden, R.C., McBride, R., Jansen, D., Lotz, M., Shindle, D., Howard, J., Wildt, D.E., Penfold, L.M., Hostetler, J.A., Oli, M.K., and O'Brien, S.J. 2010. Genetic restoration of the Florida panther. Science, 329: 1641-1645.

Johnson, W. E., Onorato, D.P., Roelke, M.E., Land, E.D., and O'Brien, S.J. 2010. Genetic future of Florida panthers- response. *Science* 330:1744.

Martin, J., Royle, J.A., Mackenzie, D.I., Edwards, H.H., Kéry, M., and Gardner, B. Accounting for non-independent detection when estimating abundance of organisms with a Bayesian approach. Methods in Ecology and Evolution, 2.

Martin, J., Fackler, P.L., Nichols, J.D., Lubow, B.C., Eaton, M.J., Runge, M.C., Stith, B.M., and Langtimm, C.A. 2011. Structured decision making as a proactive approach to dealing with sea level rise in Florida. Climatic Change, May, 1-18.

McBride, R., and McBride, C. 2010. Florida panther flehmen response recorded at baited trail camera site. *Southeastern Naturalist* 9:629-631.

McBride, R., and McBride, C. 2010. Predation of a large alligator by a Florida panther. *Southeastern Naturalist* 9:854-856.

McBride, R., and McBride, C. 2011. Photographic evidence of Florida panthers claw-marking logs. *Southeastern Naturalist* 10:384-386.

Meylan, P., Meylan, A. and Gray, J. 2011. The ecology and migrations of sea turtles. 8. Tests of the developmental habitat hypothesis. Bulletin of the American Museum of Natural History, no.357, 1-70.

Onorato, D.P., Criffield, M., Lotz, M., Cunningham, M., McBride, R., Hellgren, E.C., Land, D., Bass, O.S., and Leone, E.H. 2010. Assessing Florida panther habitat selection across the diel period: potential implications to land management and conservation. *Submitted*: Biological Conservation.

Onorato, D.P., Criffield, M., Lotz, M., Cunningham, M., McBride, R., Leone, E.H., Bass Jr., O.L., and Hellgren, E.C. 2011. Habitat selection by critically endangered Florida panthers across the diel period: implications for land management and conservation. Animal Conservation, 14:.196-205.

Reynolds, J. E., Morales-Vela, I., Lawler, I., and Edwards, H.H.. In press. Utility and Design of Aerial Surveys for Sirenians. Hines, E., Reynolds III, J.E., Mignucci-Giannoni, A.A., Aragones, L.V., and Marmontel, M. (eds.). Sirenian Conservation: Issues and Strategies in Developing Countries. University of Florida Press, Gainesville. (*manatees*)

APPENDIX C. Continued

Shamblin, B.A., Dodd, M.G., Bagley, D.A., Ehrhart, L.M., Tucker, A.D., Johnson, C., Carthy, R.R., Scarpino, R.A., McMichael, E., Addison, D.S., Williams, K.L., Frick, M.G., Ouellette, S., Meylan, A.B., Godfrey, M.H., Murphy, S.R. and Nairn, C.J. 2011. Genetic structure of the southeastern United States loggerhead turtle nesting aggregation: evidence of additional structure within the peninsular Florida recovery unit. Marine Biology, no.158, 571-587.

Siegal-Willott, J. L., Harr, K., Hayek, L.C., Scott, K.C., Gerlach, T., Sirois, P., Reuter, M., Crewz, D.W., and Hill, R.C. 2010. Proximate nutrient analyses of four species of submerged aquatic vegetation consumed by Florida manatee (*Trichechus manatus latirostris*) compared to romaine lettuce (*Lactuca sativa* var. *longifolia*). Journal of Zoo and Wildlife Medicine, 41(4): 594-602.

Simpfendorfer, C. A., Yeiser, B.G., Wiley, T.R., Poulakis, G.R., Stevens, P.W. and Heupel, M.R. 2011. Environmental influences on the spatial ecology of juvenile smalltooth sawfish (*Pristis pectinata*): results from acoustic monitoring. PLoS ONE 6:e16918. doi: 10.1371/journal/pone.0016918

Spalding, M., Folk, M.J., Nesbitt, S.A., Kiltie, R. 2010. Reproductive health and performance of the Florida flock of introduced whooping cranes. Proceedings of the North American crane workshop 11: 142-155.

Stewart, K., Sims, M., Meylan, A., Witherington, B., Brost, B., and Crowder, L.B. 2011. Leatherback nests increasing significantly in Florida, USA: trends assessed over 30 years using multilevel modeling. Ecological Applications, 21(1): 263-273.

Tucker, J.W. Jr., Schrott, G.R., Delany, M.F., Glass, S.L., Hannon, C.L., Miller, P., and Bowman, R. Metapopulation structure, population trends, and status of Florida Grasshopper Sparrows. Journal of Field Ornithology, 81(3): 267-277.

Wallace, B.P., DiMatteo, A.D., Hurley, B.J., Finkbeiner, E.M., Bolten, A.B., Chaloupka, M.Y., Hutchinson, B.J., Abreu-Grobois, F.A., Amorocho, D., Bjorndal, K.A., Bourjea, J., Bowen, B.W., Duenas, R.B., Casale, P., Choudhury, B.C., Costa, A., Dutton, P.H., Fallabrino, A., Girard, A., Girondot, M., Godfrey, M.H., Hamann, M., Lopez-Mendilaharsu, M., Marcovaldi, M.A., Mortimer, J.A., Musick, J.A., Nel, R., Pilcher, N.J., Seminoff, J.A., Troeng, S., Witherington, B. and Mast, R.B. 2010. Regional management units for marine turtles: a novel framework for prioritizing conservation and research across multiple scales. PLoS ONE v. 5, no.12, 1–11.

Ward-Geiger, L.I., Knowlton, A.R., Amos, A.F., Pitchford, T.D., Mase-Guthrie, B., and Zoodsma, B.J. 2011. Recent sightings of the North Atlantic right whale in the Gulf of Mexico. Gulf of Mexico Science, 29(1): 74-78.

APPENDIX C. Continued

Witherington, B. 2011. Of falling trees, oil at sea, and floating little turtles. The SWOT Report, The State of the World's Sea Turtles, VI: 18–19.

Witherington, B., Hirama, S. and Mosier, A. 2011. Sea turtle responses to barriers on their nesting beach. Journal of Experimental Marine Biology and Ecology v.401, 1–6.

Witherington, B., Hirama, S. and Mosier, A. 2011. Barriers to sea turtle nesting on Florida (USA) beaches: linear extent and changes following storms. Journal of Coastal Research, v.27, no.3, 450-458.

APPENDIX D. COMMON AND SCIENTIFIC NAMES OF NON-LISTED SPECIES MENTIONED BY COMMON NAME IN THIS REPORT.

| **Common Name** | **Scientific Name** |
|---|---|
| **MOLLUSKS** | |
| Alabama moccasinshell | *Medionidus acutissimus* |
| Choctaw bean | *Obovaria choctawensis* |
| Fuzzy pigtoe | *Pleurobema strodeanum* |
| Narrow pigtoe | *Fusconaia escambia* |
| Round ebonyshell | *Fusconaia rotulata* |
| Southern sandshell | *Hamiota australis* |
| Southern kidneyshell | *Ptychobranchus jonesi* |
| Tapered pigtoe | *Fusconaia burkei* |
| **FISH** | |
| Alligator gar | *Atractosteus spatula* |
| **AMPHIBIANS** | |
| American bullfrog | *Lithobates catesbeianus* |
| Southern leopard frog | *Lithobates sphenocephalus* |
| **REPTILES** | |
| Blue-tail mole skink | *Eumeces egregius lividus* |
| **BIRDS** | |
| Anhinga | *Anhinga anhinga* |
| Bald eagle | *Haliaeetus leucocephalus* |
| Black rail | *Laterallus jamaicensis* |
| Cattle egret | *Bubulcus ibis* |
| Clapper rail | *Rallus longirostris* |
| Common moorhens | *Gallinula chloropus* |
| Eastern bluebird | *Sialia sialis* |
| Eastern screech-owl | *Otus asio* |
| Glossy ibis | *Plegadis falcinellus* |
| Great blue heron | *Ardea herodias* |
| Great-crested flycatchers | *Myiarchus crinitus* |
| Great egret | *Ardea alba* |
| King rail | *Rallus elegans* |
| Marsh wrens | *Cistothorus palustris* |
| Peregrine falcon | *Falco peregrinus* |

APPENDIX D. Continued

| | |
|---|---|
| Red-bellied woodpecker | *Melenerpes carolinus* |
| Red knot | *Calidris canutus* |
| Royal tern | *Sterna maxima* |
| | |
| Seaside sparrow | *Ammodramus maritimus* |
| Tufted titmouse | *Baeolophus bicolor* |
| Yellow-crowned night-herons | *Nyctanassa violacea* |

**MAMMALS**

| | |
|---|---|
| Eastern gray squirrels | *Sciurus carolinensis* |
| House mouse | *Mus musculus* |
| Old-field mouse | *Peromyscus polionotus* |
| Puma | *Puma concolor stanleyana* |
| Southern flying squirrel | *Glaucomys volans* |
| Southeastern myotis bat | *Myotis austroriparius* |

**INVERTEBRATES**

| | |
|---|---|
| Elkhorn coral | *Acropora palmate* |
| Horseshoe crab | *Limulus polyphemus* |
| Purple bankclimber mussel | *Elliptiodeus sloatianus* |
| Staghorn coral | *Acropora cervicornis* |

**PLANTS**

| | |
|---|---|
| Cabbage palm | *Sabal palmetto* |
| Egyptian paspalidium | *Paspalidium geminatum* |
| Longleaf pine | *Pinues palustris* |
| Oak trees | *Quercus* spp. |
| Sand pine | *Pinus clausa* |
| Saw palmetto | *Serenoa repens* |
| Slash pine | *Pinus ellioti* |
| Torpedograss | *Panicum repens* |
| Wiregrass | *Aristida stricta* |

# APPENDIX E. GLOSSARY OF TERMS

## DEFINITIONS

**Abiotic** – The non-living chemical and physical factors in the environment.

**Anthropogenic** – Resulting from human influence on nature.

**Benthic** – The lowest level of the ocean that includes the sediment surface and some sub-surface layers.

**Cavity** – A hollow or hole occupied by an organism.

**Cavity insert** – A premade box with a cavity built into it that is used to mimic natural cavities.

**Cluster** – The aggregation of cavity trees previously and currently used and defended by a group of woodpeckers.

**Colonial breeding** – Breeding between individuals of the same species that occupy the same colony.

**Colony** – A distinguishable localized population within a species.

**Depredation event** - When domestic livestock or pets are preyed upon by a panther or other wildlife.

**Endemic** – Restricted or peculiar to a certain area or region.

**Ephemeral** – Lasting a very short time.

**Euryhaline** – Describes organisms that tolerate varying levels of salinity.

**Explosive breeder** – All or most of the population congregates to breed during a short period of time.

**Extirpation** – Cease to exist in a given area.

**Federally-designated Endangered species** – Species of fish or wild animal life, subspecies or isolated populations of species or subspecies, whether vertebrate or invertebrate, that are native to Florida and are classified as Endangered under Commission rule by virtue of designation by the U.S. Departments of Interior or Commerce as Endangered under the Federal Endangered Species Act.

APPENDIX E. Continued

**Federally-designated Threatened species -** Species of fish or wild animal life, subspecies or isolated populations of species or subspecies, whether vertebrate or invertebrate, that are native to Florida and are classified as Threatened under Commission rule by virtue of designation by the U.S. Departments of Interior or Commerce as Threatened under the Federal Endangered Species Act.

**Fledge** – To raise a young bird until it is capable of flight.

**Fledged** – To leave the nest.

**Fledgling** – A young bird that has recently developed flight feathers and is capable of flight.

**FWC Commissioners** – The seven-member board of FWC that meet five times each year to hear staff reports, consider rule proposals, and conduct other Commission business.

**Gene flow** – In population genetics, gene flow is the movement of genes from one population to another.

**Genetic Introgression –** Adding new genes to a population.

**Geographic Information System (GIS)** – Captures, stores, analyzes, manages, and presents data that is linked to a location.

**Habitat** – A natural environment where a species lives and grows.

**Hydroperiod** – The cyclical changes in the amount or stage of water in a wet habitat.

**Hydrophone** – Used for determining short-term, fine-scale movements and to listen for acoustic tags at moored stations.

**Intraspecific** – Occurring within a species or involving members of one species.

**Life History –** All of the changes experienced by a species, from its birth to its death.

**Listed species** – Species included on the Florida Endangered and Threatened Species list or the Species of Special Concern list. Prior to November 10, 2010, listed species were those species designated as Endangered, Threatened, or Species of Special Concern.

**Morbidity** – A disease or the incidence of disease within a population.

**Necropsy** – The examination of a body after death.

**Nestling** – A young bird that has not abandoned the nest.

APPENDIX E. Continued

**Nonessential Experimental Population** – A population of a species that is designated under the Endangered Species Act to restore a species outside the species' current range but within its historical range, but is not essential to the survival of the species. A population designated as experimental is treated as Federally-designated Threatened regardless of the species' designation elsewhere in its range.

**Pelagic** – Deep ocean water.

**Phenological** – Periodic biological phenomena that correspond with climatic conditions.

**Productivity** – The ability to produce; fertility.

**Recruitment** – The addition of individuals into a breeding population through reproduction and/or immigration and attainment of breeding position.

**Recruitment cluster** – A cluster of artificial cavities in suitable nesting habitat, located close to existing clusters.

**Resin well** – A wound in a pine tree's cambium, created and maintained by red-cockaded woodpeckers for the purpose of resin production. These wells are maintained to keep sap flowing out of the tree, and prevents snakes from climbing the trees and ultimately from eating birds that are in the cavity. By maintaining resin wells, the birds keep the tree from forming a scab over the well.

**Rookery** – A colony of breeding animals.

**Roosts** – A place where species such as bats, and often multiple individuals sleep or reside.

**Safe haven** – an area of water [established by §379.2431(2)(o) Florida Statute] that manatees may rest, feed, reproduce, give birth, or nurse in while remaining undisturbed by human activity.

**Species of Special Concern** – As designated by the FWC Commissioners, a species, subspecies, or isolated population of a species or subspecies which is facing a moderate risk of extinction, or extirpation from Florida, in the future.

**State-designated Threatened species –** As designated by the Commission, species of fish or wild animal life, subspecies, or isolated population of a species or subspecies, whether vertebrate or invertebrate, that are native to Florida and are classified as Threatened due to a reduction in population size, a severely fragmented and/or declind geographic range, a population size that numbers fewer than 10,000 mature individuals, a small and/or restricted population, and/or a quantitative analysis showing the probability of extinction in the wild is at least 10% within 100 years

APPENDIX E. Continued

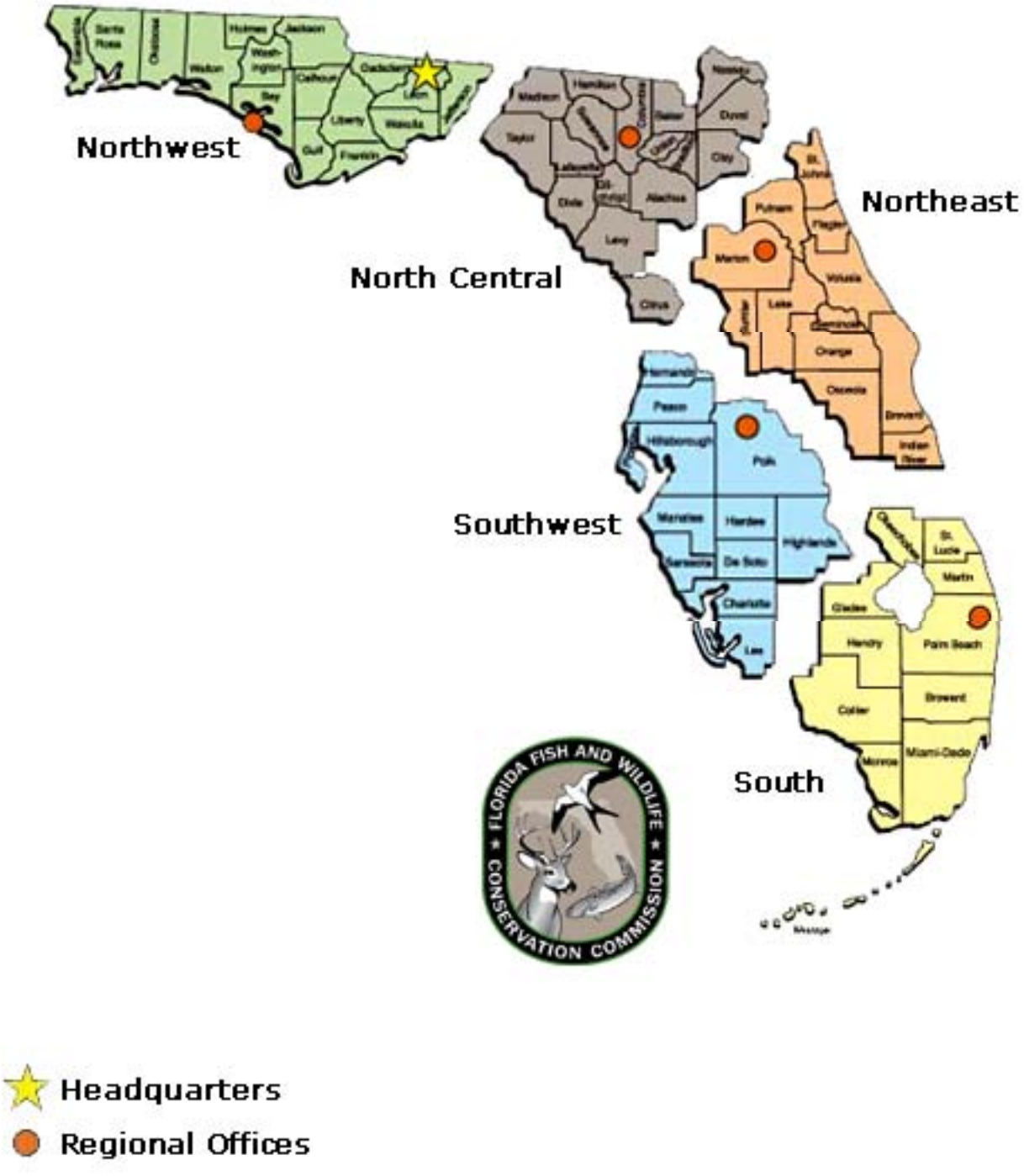
**Stock** – A group of marine mammals of the same species or smaller taxa in a common spatial arrangement that interbreed when mature.

**Telemetry** – Transmission of data through technology (such as radio collars attached to panthers) from a species to an observer.

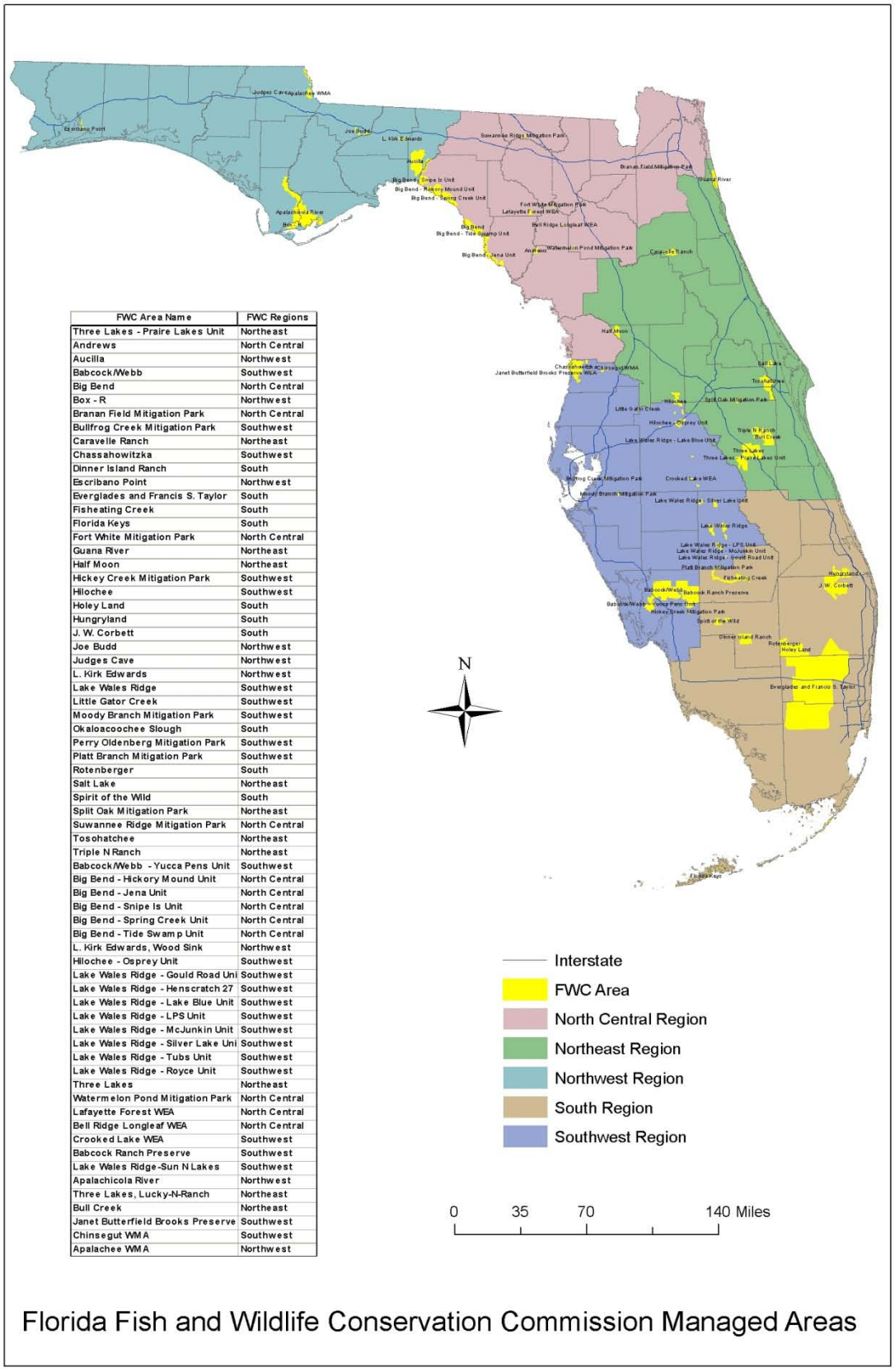
**Transect** – A path along which one records and counts occurrences of species, vegetation, and other relevant factors of a study.

**Translocation** – Capture, transport, and release or introduction or reintroduction of wildlife.

APPENDIX F. MAP OF FWC'S REGIONS



# APPENDIX G. MAP OF FWC'S MANAGED AREAS




| FWC Area Name | FWC Regions |
|---|---|
| Three Lakes - Praire Lakes Unit | Northeast |
| Andrews | North Central |
| Aucilla | Northwest |
| Babcock/Webb | Southwest |
| Big Bend | North Central |
| Box - R | Northwest |
| Branan Field Mitigation Park | North Central |
| Bullfrog Creek Mitigation Park | Southwest |
| Caravelle Ranch | Northeast |
| Chassahowitzka | Southwest |
| Dinner Island Ranch | South |
| Escribano Point | Northwest |
| Everglades and Francis S. Taylor | South |
| Fisheating Creek | South |
| Florida Keys | South |
| Fort White Mitigation Park | North Central |
| Guana River | Northeast |
| Half Moon | Northeast |
| Hickey Creek Mitigation Park | Southwest |
| Hilochee | Southwest |
| Holey Land | South |
| Hungryland | South |
| J. W. Corbett | South |
| Joe Budd | Northwest |
| Judges Cave | Northwest |
| L. Kirk Edwards | Northwest |
| Lake Wales Ridge | Southwest |
| Little Gator Creek | Southwest |
| Moody Branch Mitigation Park | Southwest |
| Okaloacoochee Slough | South |
| Perry Oldenberg Mitigation Park | Southwest |
| Platt Branch Mitigation Park | Southwest |
| Rotenberger | South |
| Salt Lake | Northeast |
| Spirit of the Wild | South |
| Split Oak Mitigation Park | Northeast |
| Suwannee Ridge Mitigation Park | North Central |
| Tosohatchee | Northeast |
| Triple N Ranch | Northeast |
| Babcock/Webb - Yucca Pens Unit | Southwest |
| Big Bend - Hickory Mound Unit | North Central |
| Big Bend - Jena Unit | North Central |
| Big Bend - Snipe Is Unit | North Central |
| Big Bend - Spring Creek Unit | North Central |
| Big Bend - Tide Swamp Unit | North Central |
| L. Kirk Edwards, Wood Sink | Northwest |
| Hilochee - Osprey Unit | Southwest |
| Lake Wales Ridge - Gould Road Uni | Southwest |
| Lake Wales Ridge - Henscratch 27 | Southwest |
| Lake Wales Ridge - Lake Blue Unit | Southwest |
| Lake Wales Ridge - LPS Unit | Southwest |
| Lake Wales Ridge - McJunkin Unit | Southwest |
| Lake Wales Ridge - Silver Lake Uni | Southwest |
| Lake Wales Ridge - Tubs Unit | Southwest |
| Lake Wales Ridge - Royce Unit | Southwest |
| Three Lakes | Northeast |
| Watermelon Pond Mitigation Park | North Central |
| Lafayette Forest WEA | North Central |
| Bell Ridge Longleaf WEA | North Central |
| Crooked Lake WEA | Southwest |
| Babcock Ranch Preserve | Southwest |
| Lake Wales Ridge-Sun N Lakes | Southwest |
| Apalachicola River | Northwest |
| Three Lakes, Lucky-N-Ranch | Northeast |
| Bull Creek | Northeast |
| Janet Butterfield Brooks Preserve | Southwest |
| Chinsegut WMA | Southwest |
| Apalachee WMA | Northwest |